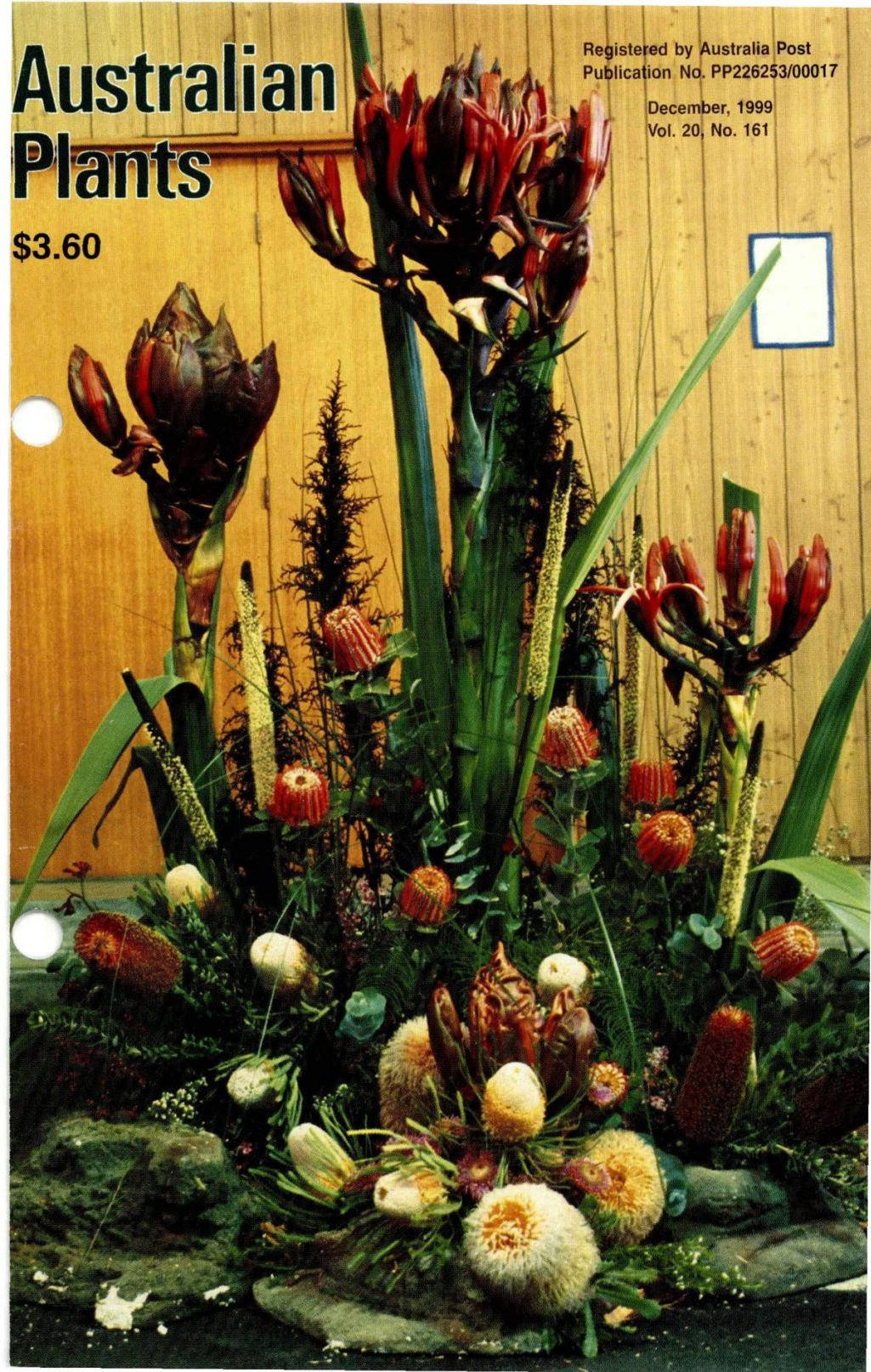


Australian Plants

Registered by Australia Post
Publication No. PP226253/00017

December, 1999
Vol. 20, No. 161

\$3.60



Our unique flora is rapidly becoming extinct, a crisis that is going unnoticed by our "responsible" leaders. All our native creatures are dependent on the flora they have become adapted to and their extinction is reaching crisis proportions. We will continue to express our concerns as an informed group.

There is no way we can conserve our flora and the vast range of creatures that depend upon it, by cultivation of the wild plants in gardens and reserves. We will continue to promote the cultivation of Australian wildflowers for horticulture with practical proven advice on cultivation practices and describe new plants recommended for cultivation. As the world-wide reference we are performing an important function. This applies also to the commercial production from the flora providing significant export earnings with emphasis on the cutflower trade.

Hardy but showy wildflowers for horticulture. This issue presents many:

Rainforest Proteaceae. Many are readily grown as far south as Melbourne.

Tea-tree, *Leptospermum* and *Melaleuca*, very hardy reliable plants.

***Bursaria*,** Kangaroo Thorn, scorned by some but reliable in that hardy position.

Anthotium are unique and excellent for that small rockery for 'gem plants'.

***Grevillea*,** the details given here will assure successful cultivation of most wildflowers.

***Phillotheca* (*Eriostemon*)** featured in a recent issue, are indeed hardy and showy.

CONTENTS

Proteaceae of the rainforest, their commercial potential	Garry Sankowsky	187
<i>Athertonia</i> , <i>Austromuellera</i> , <i>Bleasdalea</i> , <i>Cardwellia</i> , <i>Carnarvonia</i> , <i>Catalepidia</i> , <i>Darlingia</i>		
<i>Alloxylon</i> , Tree Waratah	W. H. Payne	190
Smoke induced germination	Angus Stewart	197
<i>Phillotheca myoporoides</i>	Jeff Howes	199
The Darling Lily	Robert Gibson	200
Tuberous, Cormous and Bulbous Plants	John Pate and Kingsley Dixon	202
<i>Anthotium</i> , Goodeniaceae	L. W. Sage	206
Families of flowering plants of Australia	K. R. Thiele and L. C. Adams	207
The tea-trees, <i>Leptospermum</i>	Angus Stewart	210
<i>Callistemon</i> , <i>Melaleuca</i> , <i>Kunzea</i> , <i>Leptospermum</i> report	Colin Cornford	211
A new range of insecticides	Trevor Birley	215
Friends and Foes, Living with all creatures, <i>Psyllids</i>	David Hockings	217
Research on Australian flora and horticultural promotion	W. H. Payne	219
<i>Leptomeria</i> , a genus in Santalaceae	B. J. Lepschi	220
<i>Bursaria</i> , a genus in Santalaceae	L. W. Cayzer, et al.	220
<i>Grevillea</i> , their care and maintenance	Heather Clarke	222
The Rosten Garden, Our garden number 32	Pamela Mawbey	224
Vegetation of Macquarie Island	Robert Gibson	227

COVER PLATE, The Gynea Lily, *Doryanthes excelsa*, is featured in this large display, together with a number of *Banksia* flower heads. All of these magnificent flowers are in great demand as cut flowers and we are earning millions of dollars on the export market. Of concern is the ravages to our bush by "bush pickers" and the only answer is to cultivate better flowers in wildflower farms, bringing prosperity to some country areas. There is a desperate need for research and the Gynea Lily is one instance where there is a research project with assured success, but it was rejected due to lack of funds, see page 219.

Australian Plants. No. 161 issue of Volume 20 which comprises issues 157-164. International Series Index ISSN 0005-0008. A national publication in 8,000 copies. Published by the Australian Plants Society, registered as Society For Growing Australian Plants, NSW Ltd., A.C.N.002 680 408.

Publication date of previous issue No. 160 was 1 September, 1999.

Proteaceae of the rainforest

Foliage for floral work

by Garry Sankowsky*

Many rainforest Proteaceae have large leaves that are now in demand for flower arrangements. Like many rainforest trees they can be grown as large specimen shrubs or in plantations with some protection, as far south as Sydney. A bonus is the timber which is in great demand. They are also ideal for container plants for extensive use indoors. Those for commercial production are mentioned.

We have learnt a lot about growing Proteaceae over the last ten or so years. I have found that many are not easy to grow. Those marked "A" can be grown without too much difficulty and the "B" ones are almost impossible to grow for most people in Northern Queensland. They need a very special habitat which matches closely that of which they are found in, but!!!!

Cardwellia sublimis is a classic example. It is very widespread in the Wet Tropics but very few people up here have actually grown it well in cultivation. There has been more success with it in northern New South Wales and south-east Qld than in the north. This applies to many of the difficult to grow species. The mild sub-tropical climate subjects them to much less stress than that of the north. It seems incredible but many trees that grow to great heights in the rainforest seeking sunlight, grow as attractive hardy trees in more temperate areas.

They make stunning specimen trees, some hardy enough to be used as street trees. Many have been tamed as attractive container plants, even as indoor decorative plants for periods.

The species with most potential for the cut flower industry as single leaves:

Placospermum, *Athertonia*, *Darlingia*, *Alloxylon flammeum* and *Alloxylon wickhamii*. It is only the juvenile leaves which can be used, so they would need to be cut very low to maintain the production of coppice shoots.

Species which have potential as cut stems (with several leaves) are *Neorites*, *Lomatia fraxinifolia*, *Stenocarpus* sp. Tully River, and *Grevillea baileyana*. The problem with most Proteaceae is that they are slow to recover from severe pruning. The exception is *Grevillea baileyana*. I do not think *Stenocarpus davallioides* is of much use. It is a difficult species to grow and why grow something that looks like a fern, when a fern will do the job?

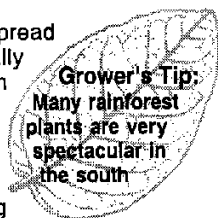
The thing to remember is that when individual leaves are being sold for flower arranging they must be in perfect condition. This means the plants must be grown in ideal conditions. They cannot be wind blasted or stressed from heat, cold, or lack of moisture. I think the ideal way to grow them would be in a bush-house. A completely enclosed area, covered with 50% shade cloth would produce large, lush leaves and help keep out insects which could chew the foliage. Or, at least make it easy to control pests with spray.

Continued on page 191

*Australian Tropical Plants

This a compact disc available from the Yuruga Nursery, P.O. Box 220, Walkamin, 4872 Queensland for \$40 plus postage of \$3. It contains vast amounts of data on 524 species of Australian tropical plants with over 1,200 true-colour pictures, up to three for each species. Photographs on pages 189 and 192 are taken directly from this compact disc. By selection you can make lists of plants based on flower colour, perfume, those suitable for a specific area such as yours, bush tucker, survival rating, attracts birds, attracts butterflies, use as shade trees, ground covers, etc. Many of the above plants are described and illustrated in colour.

Want some of these plants for your plantation? Contact Yuruga Nursery above.

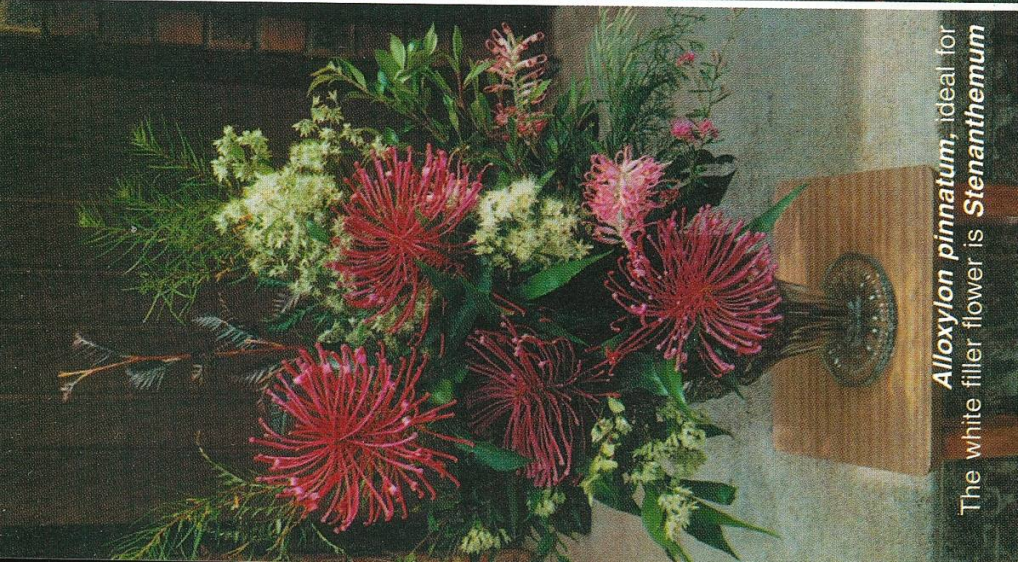




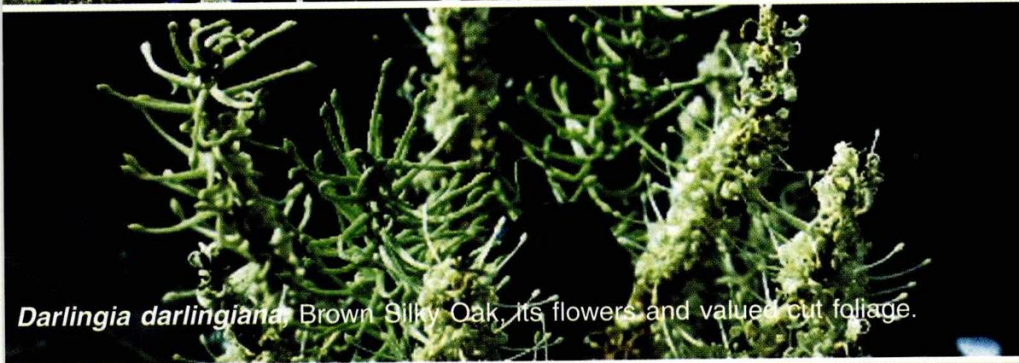
cut flower production,
scortechinii, Corroboree Flower.



Alloxylon flammeum
Tree Waratah in Editor's garden



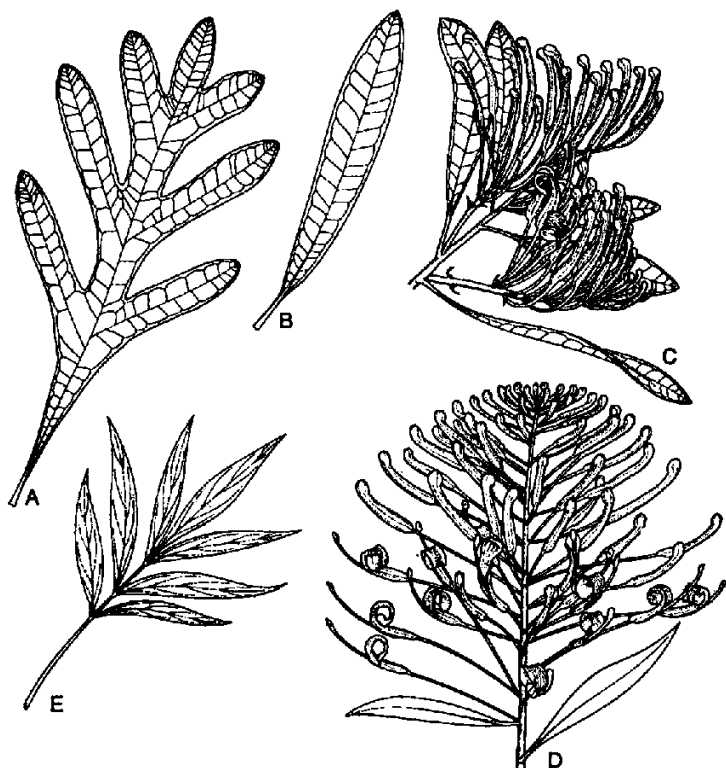
Alloxylon pinnatum, ideal for
The white filler flower is *Stenanthemum*



Alloxylon, Tree Waratah

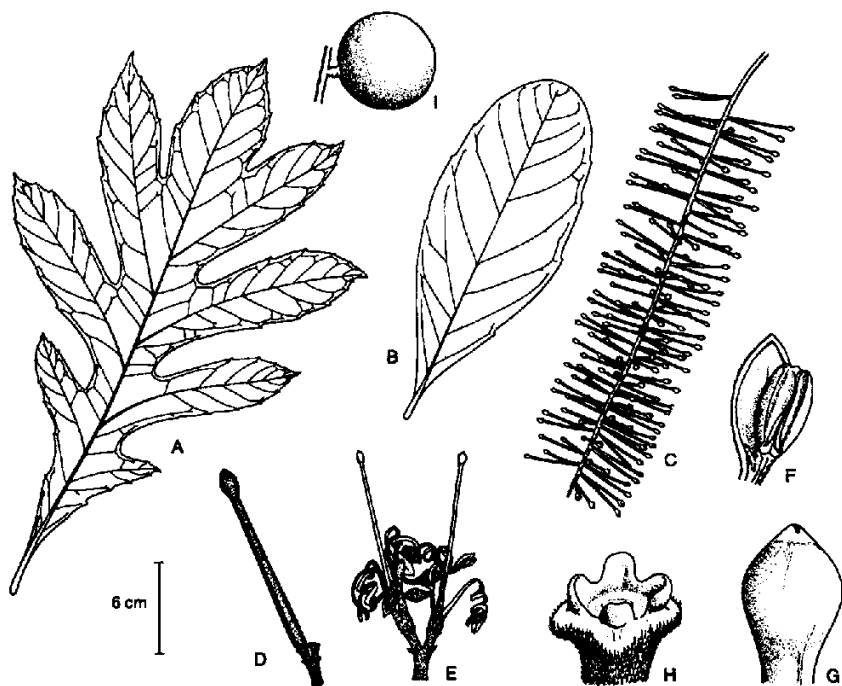
Notes from W. H. Payne

The three species of tree found in Australia have been referred to as the Tree Waratah, or Queensland Waratah, because of their large flamboyant heads of red flower. As a flowering tree the most spectacular is *Alloxylon flammeum*, C, (al-o-ZY-lon) found only in a restricted area near Atherton, Queensland. This is a spectacular well formed tree and is very widely grown. It has been featured in *Australian Plants*, Volume 6, pages 18 and 202, 9:315D, 380 (with colour photograph), 12:194C, 202C, 207C, 210CD, 215C and 14:256D. Adaptable to growing conditions, my tree in Sydney, 20 years old, 10 m high, (photo, page 188) provides welcome dense shade from a sinking summer westerly sun on a glassed area of the house, and covers itself with large heads of red flowers from August to November. The juvenile leaves, A, give way to mature leaves, B, before flowering. *Alloxylon wickhamii* is a similar tree but with all parts glabrate (without hairs).



Alloxylon pinnatum, sometimes referred to as the Dorrigo Waratah, as it occurs from Dorrigo NSW, north to just across the border in the McPherson Range. While not as spectacular in flower, the heads of pink to crimson flowers are terminal, detail D, and can be cut with long stems, ideal for the commercial cut flower trade. Leaves as in E. They are shown in colour in an arrangement on page 188. There is potential for selection and development of suitable forms for the cut flower trade.

Athertonia diversifolia, **Atherton Oak** (ath-er-TO-nee-a) may be easily grown and is rated A for ease of cultivation. A spectacular tree, it grows 8–10 m tall in association with other plants but can be kept 3–4 metres if pruned and treated as a *Macadamia* tree; in fact if you can grow and fruit a *Macadamia* you can also grow and harvest Atherton Oak or Tarzali. They are also grown much further south for the large leaves to 30 cm long, being deeply lobed, the new growth clothed in silky pink to red hairs ageing to rusty brown. There is a proven market for this foliage in the flower markets. As a bonus the 30 cm long pendulous racemes of cream and brown flowers in summer, mature to large dark blue oval fruit the following spring. If you can beat the white tailed rats to the fruit (in northern Queensland), crack the hard nuts carefully to expose the white seed. They are very crisp and crunchy to eat, sweeter than a *Macadamia*. They are high in demand for bush tucker food. Sown in a seed tray of potting mix, barely covered, the seeds will germinate in 4–8 weeks. This tree does best if it is well advanced when planted out; grow it up to a metre tall but do not let it become pot bound before planting out. It grows best in wet, humid areas. Plant it out into soft, well dug soil and keep it mulched, fertilized, moist and weeded.



Athertonia diversifolia, **A**, an intermediate leaf; **B** an adult leaf; **C** head of flowers in pairs as in **E**, each from a bud **D**; flower comprises anthers **F**, pollen presenter **G**; **I** fruit to 4 mm dia. Sketch by D. Mackay from *Flora of Australia*, see page 196.

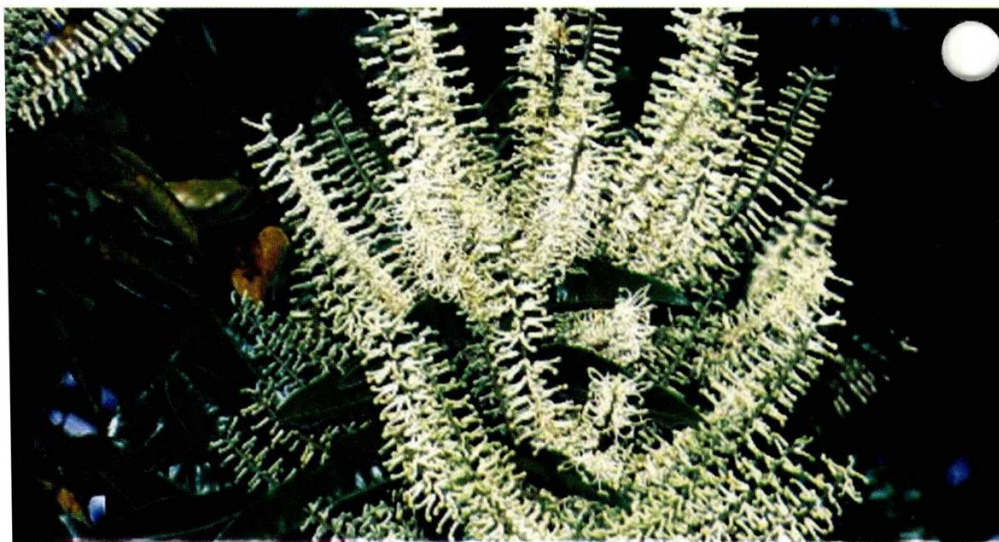


△ *Austromuellera vallida*

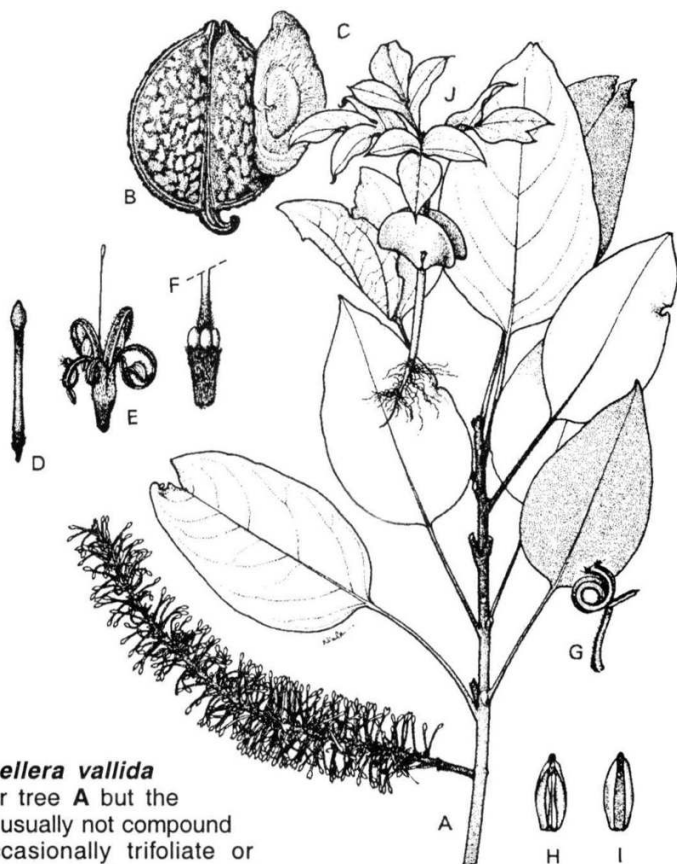


△ *Austromuellera trinervia*

▽ *Cardwellia sublimis*, Northern Silky Oak



Austromuelleria trinervia, **Muellers Silky Oak** (os-tro-MEW-ler-a) has large, compound leaves covered in brown hairs when new, to 50 cm long with more than 6 leaflet pairs each to 14 cm long and maturing to a shiny bright green. This attractive tree with new growth completely covered in brown hairs should be cultivated and pruned for this foliage feature. The flowers are a mass of 60 cm long cream racemes, hanging from the older branches and are followed by large woody seed pods. While it is more difficult to grow here, rated B, it is really worth growing. In the rainforest it grows to 10 m tall but as a specimen tree and treated as a *Macadamia*, the Atherton Oak can be kept to 3–4 metres. It is found in a small area on the eastern edge of the Atherton Tableland and on Mount Lewis.



Austromuelleria vallida

is a similar tree **A** but the leaves are usually not compound though occasionally trifoliate or pinnate with 2–3 leaflet pairs, each to 12 cm long; flowers are in racemes to 30 cm long, as shown, each in bud as in **D**, opening out **E**, cream to rusty brown, a feature being the ovary with hypogynous glands at the base, the perianth (petal) segment **G** and anthers **H** (front) and **I** (back); The large fruit **B**, is 10–15 cm long, producing two seeds **C**, 3.5–5.5 cm long, 2–3 cm wide. Sketch by T. Nolan from *Flora of Australia*, Volume 17B, available from CSIRO Publishing, P.O. Box 1139, Collingwood, Victoria 3066, see page 196.

Gevuina (formerly *Bleasdalea*) *bleasdalei*, **Blush Silky Oak** (ghev-yoo-EEN-a) a tree to 5–24 m high in the forest. It can be kept to 3 m as a specimen tree and is worth growing just for foliage and an attractive landscape specimen. It is not easy to grow up here, being given a cultivation rating of B, because it suffers from lack of water and low humidity. Very few trees would have more striking new foliage. The leaves are compound and from 40–60 cm long. The new growth is completely covered in silky pink hairs and creates a spectacular flush several times a year. Management of this plant as a shrub and pruning for foliage harvest could be rewarding. The flowers are small and cream, displayed in racemes.

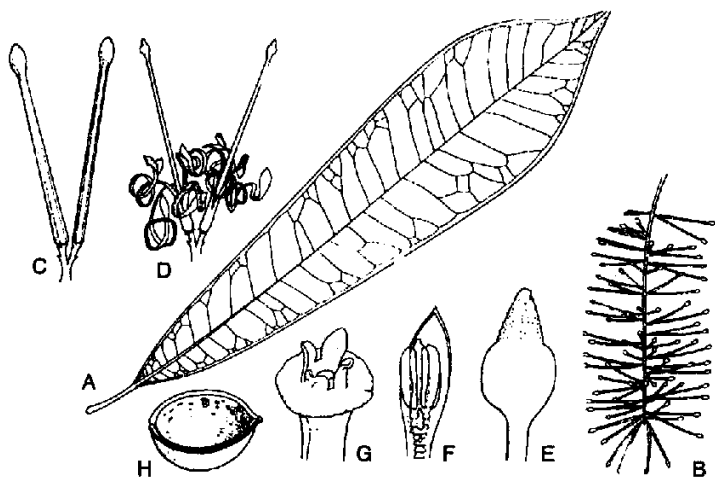
Buckinghamia celsissima, **Ivory Curl Flower** (buck-ing-HAYM-ee-a) has been described and illustrated in colour in past issues and is not described further. It is an example of how rainforest trees are adaptable for cultivation, this one being widely used as a street tree. It grows well as far south as Melbourne and a beautiful plant in full flower is shown in Volume 19, page 260.



Cardwellia sublimis, **Northern Silky Oak** (card-WELL-ee-a) **A** the largest of the 'oaks', the large mature leaves are compound 65 cm long with 5 to 12 or more leaflets, very dark green on top with a faint purplish sheen on the underside. The new growth has pink to purple silky hairs on the underside. Well worth a try in plantations, coppiced for leaves. It is widespread from Townsville to about Mossman and is a very important timber tree, the largest of the oaks. The tiny cream/white flowers **B** are borne profusely in branching spikes and are held upright on the ends of branches making these trees very easy to spot in the rainforest. The flowers literally cover the outside of the tree and are very spectacular (sketch above by D. Boyer, see page 196, photograph on page 192).

The fruit take a year to develop. They are very large, **C** (about the size of a clenched fist), thick and woody, and oval in shape. They split open, **D**, when ripe without falling from the tree, releasing large papery seeds, **E**. The seeds germinate readily with no special treatment, producing seedlings with very large distinctive butterfly-shaped cotyledons as first leaves.

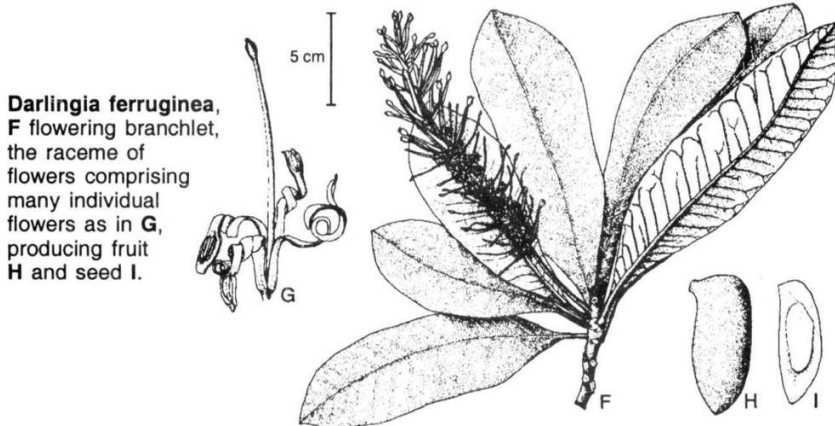
Carnarvonia araliifolia, **Caledonia Oak** or **Red Silky Oak** (car-nar-VO-nee-a) is a beautiful tree with dark green unusual compound leaves to 35 cm long, the new growth covered in reddish-brown hairs. The tiny flowers each as in **B**, produce fruit as in **C** and seed **D**. Planted in the open it forms a dense cylindrical shape, a beautiful specimen tree. It is readily grown in a wide range of conditions, and is rated **A** for cultivation. Sketch by D. Boyer, see page 196.



Catalepidia heyana, is a glabrous tree 3–18 m tall, **A** a leaf 8–33 cm long; the pendulous head of flowers **B** (to 21 cm long) comprises many individual flowers in pairs first in bud **C** opening to **D**, each to 3 cm long, dusky pink to red outside, cream inside each comprising a pollen presenter with its pollen sacs on the end **E**, anthers **F**, hypogynous glands **G**, the pinkish red fruit to 3 cm dia., half shown in **H**. Drawn by D. Mackay (*Flora of Australia*, see page 196).

Darlingia darlingiana, **Brown Silky Oak**, and *Darlingia ferruginea*, **Rose Silky Oak** (dar-LIN-jee-a) is found only in North Queensland rainforests from the Paluma Range to Cooktown. It is a bushy tree and will grow 8–10 m tall at a moderate to fast rate. It makes a good windbreak, or an attractive specimen tree by pruning the lower branches. It is easy to grow with a cultivation rating of **A**. The foliage is handsome and attractive, especially on juvenile plants where the leaves are large and deeply lobed, to 40 cm long, and clothed in brown hairs. During the flowering period, winter to spring, the large racemes, to 24 cm long, of showy white/cream flowers are attractive and last well in a vase.

To propagate from seed, pick the woody fruit in summer when they are ripe (that is, still green but just starting to open), place them in a dry sunny spot and the woody follicles will open to release four white seeds surrounded by papery wings; sow the seed in a seed tray of potting mix barely covering with compost.



Darlingia ferruginea,
F flowering branchlet,
the raceme of
flowers comprising
many individual
flowers as in **G**,
producing fruit
H and seed **I**.

Proteaceae of the rainforest will be continued by Garry Sankowsky ■

Flora of Australia, Volume 16 and 17B, Proteaceae

The basis of many of the plant descriptions and all the sketches shown here were taken from **The Flora of Australia**. Apologies are due to the sketch artists as the drawings used here are just a part of full page drawings showing other botanical features of the plant. **Volume 16** presents *Acidonia*, *Adenanthos*, *Agastachys*, *Alloxylon*, *Athertonia*, *Bellendena*, *Buckinghamia*, *Cardwellia*, *Carnarvonia*, *Catalepidia*, *Cenarrhenes*, *Conospermum*, *Darlingia*, *Eidothea*, *Floydia*, *Franklandia*, *Gevuina*, *Helicia*, *Hicksbeachia*, *Hollandaea*, *Isopogon*, *Lambertia*, *Lomatia*, *Macadamia*, *Megahertzia*, *Neorites*, *Opisthiolepis*, *Orites*, *Persoonia*, *Petrophile*, *Placospermum*, *Sphalmium*, *Stenocarpus*, *Stirlingia*, *Strangea*, *Symphionema*, *Synaphea*, *Telopea*, *Triunia*, *Xylomelum*, **Volume 17B** presents *Austromuellera*, *Banksia*, *Dryandra*, *Hakea*, and *Musgravea*.

The Flora of Australia is a series of scientific publications describing in volumes, the flowering plants of Australia. A scientific publication? Yes, but not really. Information in this form presented here may be readily taken from the descriptions of the species described so it is not a book solely for scientists. The sketches here are also reproduced from the volume and it is immediately apparent that you do not have to plough through the scientific descriptions but can identify the plants easily from these excellent sketches. A very valuable reference available from CSIRO Publishing P.O. Box 1139, Collingwood, 3066.

Smoke induced germination

What sort of smoke, how would the small user apply it?

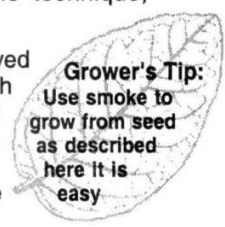
Some notes by Angus Stewart*

Perhaps a natural response to this question would be that the smoke should be generated by the combustion of dried vegetation of the species itself or at least from the plant community that it belongs to. This approach has certainly been successful for most species. However, it also appears that for many species suitable smoke can be generated from just about any sort of cellulose source, even something as mundane as newspaper

How should the smoke be applied?

An interesting aspect of the smoke phenomenon is that it explains the success of a practice that has long been recommended for the germination of flannel flower (*Actinotus helianthi*). The technique involves sowing seed as normal in a seed tray and then piling leaf litter on top and burning it. I have found this method to be extremely successful and it would appear that smoke-generated chemicals were the active ingredient in breaking seed dormancy. This method can therefore be recommended as a viable technique, especially in small-scale situations such as home gardens.

A number of methods have been successfully employed to bring the active ingredients from smoke into contact with the seeds. The most obvious method is to plant the seed in a suitable medium in a seed tray and then expose the tray and its contents to artificially-generated smoke, usually produced from some convenient smoke-generating device such as an apiarist's smoker.



Grower's Tip:
Use smoke to
grow from seed
as described
here it is
easy

Another exciting application for this knowledge is for rehabilitation of disturbed landscapes such as mining sites. Two approaches can be followed in applying smoke technology to the situation in restoration ecology. The first approach is to pretreat seed of the species to be used in the revegetation process before sowing. The second approach is to treat the actual site to stimulate germination of seeds in the natural seed bank in the topsoil or alternatively stimulate germination of seeds that have been sown in the soil. In the first approach seeds may be smoke-treated immediately before sowing or they may be treated some time before and stored under appropriate conditions (for a limited period) until sown. Smoke treatment may be actual smoking, soaking in aqueous solution of smoke or soaking in an aqueous solution of charred wood before sowing. In the second option seed in the topsoil (natural seed bank or sown seed) can be treated in a number of ways: (i) by direct smoking, using a polythene-film smoke tent, or (ii) by spraying aqueous smoke solution, or (iii) by irrigation of plots with aqueous smoke solution (alternatively, an aqueous solution of charred wood).

***Lets Propagate! A propagation manual for Australia** by Angus Stewart, pub ABC Books

This 240 page book is the best I have seen on the subject and is devoted entirely to the Australian flora. Angus is a professional propagator and authority on horticulture, and this shows through in the sensitive way the subject is exhaustively presented; all the queries you will find in every aspect of practical propagation; are answered here in simple, practical terms. The section on smoke-induced germination concludes with the question answer format reproduced above. At least all the concerns I had are answered.

Can smoke treatments be applied in the field without burning the area?

The ever-increasing interest in retaining genetic diversity in plant communities worldwide has led to propagators collecting indigenous seed from localized plant communities and using this for regeneration works. Often the scale of work required and limited availability of funds dictates that the seed be sown directly into the site to be regenerated, rather than being propagated in pots first. This direct sowing approach meets with varying success, with large seeded legumes, such as acacias, often being the easiest to establish. For fire prone areas smoke treatments will have obvious applications for direct sowing. A study on a South African grass, *Themeda triandra*, showed not only that smoke treating seed promoted germination, but also that the smoke-treated seed could be stored for up to 21 days and still retain this improvement. This suggests that it may be possible to develop smoke pretreatments for sensitive seed that will be applicable to the direct sowing of extensive areas. Hence, treating seed in bulk and then drying it for sowing over a period of time adds some flexibility to regeneration.

What are the active ingredients in smoke?

It is still unclear what the active ingredients are. It would seem likely that a combination of chemicals is involved, as smoke extracts which have been analysed show a cocktail of dozens of different compounds and to date no single chemical has been able to elicit the same response as the 'cocktail' does.

Are there any other factors which interact with smoke chemicals such as hormones, temperature, moisture, nicking of seeds etc?

Research with various South African species has shown that other important cues include alternating germination temperatures, dry (smokeless) heat, ethylene, ammonia and seed storage temperature. The growth regulators GA₄ and GA₇ (gibberellic acids) can be substituted for smoke in breaking dormancy in some species. In *Syncarpha vestita*, light inhibited germination, darkness promoted germination and smoke overcame the effects of light. In the hard-seeded South African legume *Cyclopia intermedia* there was a 40 per cent increase in germination following a 24-hour soak in 1:320 dilution of smoke extract in water, after the seed had first been acid scarified to break down the hard seed coat.

It would seem that for many species a series of environmental cues are required, sometimes in a particular order, while in other species smoke is the major trigger on its own. Researches working with particular species need to examine the natural environment cues which may interact with smoke treatments.

What is the importance of this discovery to horticulture?

There are many spectacular wildflowers in fire prone areas around the world. Many of these species are highly sought-after as cut flowers, and a flourishing worldwide trade has developed in flowers picked from the wild. Examples include the proteas (*Protea* species) of South Africa, kangaroo paws (*Anigozanthos* species) and feather flowers (*Verticordia* species) of Western Australia, and the flannel flower (*Actinotus helianthi*) of eastern Australia. Picking of such species from the wild is obviously an undesirable way to supply the commercial trade as the removal of the choicest specimens not only reduces the overall seed supply in the wild but also skews the gene pools of the plant's population towards the inferior types left behind. In addition, wild picked material is often damaged and does not usually give high quality flowers.

Cultivation of the wildflowers mentioned above (all of which come from fire-prone areas) has often been hindered by **unreliable propagation**. Flannel flower provides a great example of how smoke-induced germination may play a crucial role in successful cultivation, resulting in a reduction in exploitation of wild populations. The flannel flower is a short-lived perennial that is probably best grown as an annual or biennial in cultivation. It has proven difficult to establish in cultivation because of unreliable germination, and poor success in transplanting seedlings into the field situation. As this species has already demonstrated a response to smoke treatment, a very worthwhile avenue of research could be to pretreat seed and then sow it directly into the field.

Smoke treatments offer **considerable promise to would-be breeders** of plant species. A higher rate of recovery of hybrid seedlings should be achievable, giving breeders a much greater diversity from which to select new cultivars.

I have tried smoke treatments but have had limited success. Are there any factors which may cause problems for propagators?

The chemicals released by smoke are water soluble and thus it is possible for them to be leached from around the seeds if overwatering occurs. To avoid problems it would appear that watering should be sparing for 24–48 hours after smoke treatments have been applied.

Smoke assisted seed germination

Some observations by W. H. Payne

This item in the last issue resulted in much comment. The comments by Angus Stewart may answer a lot of queries. There appears to some mystery and much uninformed comment. There are some expensive products such as Smoke Primers from South Africa \$3 each or \$13.75 for five. Regen 2000 Germinator is another with claims for effective results on revegetation products.

One reader simply bubbles some smoke (any smoke) through water and uses the water to lightly water the seed trays, is it, effectively, the same product.

We are small users and I suggest you try the simple method from Angus Stewart is a highly experienced commercial propagator. Some English people advise they use the water after soaking a smoked kipper. Ron Crowden, from Tasmania, Leader of the *Epacris* Study Group has had success with difficult *Epacris* species by — “I place the seed, already sown (thinly with minimal fine sand covering and lightly watered), in seed punnets, in a plastic bag and blow smoke in using a bee smoker, seal the bag and leave for half an hour or so, remove and give another light watering, then place the punnets in a shade house and wait for germination to occur. This is usually no more than 3 to 4 weeks, provided the punnets are kept moist, not wet.”

Philothea myoporoides

From Jeff Howes, Sydney

This *Eriostemon*? was one of the first plants planted 27 years ago at my new home in Westleigh, a northern suburb of Sydney. Both plants are still growing and as healthy as ever. Now known as long-leaf form, they were planted in a north facing, full sun position in a fairly thin layer of soil on top of heavy clay, with a good layer of mulch. Over the years they have become shaded except for the hot afternoon sun. I always give these plants a prune after flowering as the flowers are wonderful as cut flowers. I have repeated this plant in other positions. All have survived despite months of wet and prolonged dry, in heavy clay forming cracks up to 1 cm wide. Definitely a hard but rewarding plant.

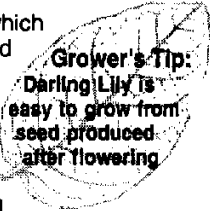
The Darling Lily

Its variation and cultivation

by Robert Gibson, Dubbo, NSW

Crinum flaccidum (CRY-num) or the Darling Lily, is the most widespread of the native species in this bulbous genus in the Amaryllidaceae family. This species is found primarily on flood plains of inland rivers in eastern Australia, hence its common name, with scattered occurrences across northern Australia. Not surprisingly there are a number of different forms. Many of these are amenable to cultivation.

The plant has an egg-shaped true bulb to 10 cm across which is pulled into the soil by contractile roots and can be situated at a depth of over 50 cm. Both leaves and flowers are produced in response to soil moisture and rapidly emerge after heavy rain. The lax, linear leaves are dark green, strongly folded and have a coarsely fringed margin. They may reach to 80 cm long and 5 cm width and die back to the soil surface, the buried leaf base forms a column which protects the new growth. One to three erect scapes are produced which have a loose umbel of between 5 and 20 flowers which are initially enclosed by two overlapping papery sheaths. The flowers are borne on individual pedicels, between 1 and 3 cm long and have an inferior ovary. Each flower has 3 petals and 3 sepals, of approximately the same shape and size, which occur at the end of a curved column. A ring of 6 stamens surrounds the down curved style. Each flower is sweetly scented and lasts for approximately a day, opening in the late afternoon and closing before the next night. The majority of flowers are pollinated, by bees, ants or hawk moths, and each one produces 3 to 25 irregularly ovoid seeds.



Grower's Tip:
Darling Lily is
easy to grow from
seed produced
after flowering

Within eastern Australia the typical form has leaves and scapes to 80 cm tall, with large, white, sweetly scented flowers, to 12 cm across as shown opposite. Plants on the headwaters of the Macquarie, Castlereagh and Namoi Rivers are smaller, with leaves and scapes to 50 cm long and include plants with pale pink, and rarely dark pink, flowers to 10 cm across as shown opposite. Near Quorn, in the southern Flinders Range grow plants with pale yellow flowers — the only form in the large genus with this colour. In the south-western corner of Queensland grows a form which is notable for its strongly scented the flowers, reputedly pungent enough to induce vomiting if walking through a flowering colony of them, and has been called *C. pestilensis*.

In the review of the genus in Australia by H. Hewson (*Flora of Australia*: Volume 45: 1987) the other native *Crinums* are described. *Crinum angustifolium* and *C. venosum* are very similar to the Darling Lily, the former species is characterized by sessile to shortly stalked flowers with noticeably curved anthers, whilst the latter is defined by sessile flowers with stamens less than half the length of the petals. *Crinum uniflorum* is an easily identified species on account of its very thin (<2 mm wide) leaves and one, rarely two small, sessile flowers. *Crinum pedunculatum* is of very different appearance and robust size. The narrow bulb emerges from the ground as a pseudostem with sword-shaped erect leaves which reach to 1 metre long. These species are found across coastal northern Australia with *C. angustifolium* and *C. pedunculatum* extending part way down the east coast. The boundaries between species are not always clear and the genus appears in need of further investigation.



The Darling Lily is easy to cultivate In a sunny location in free draining soil, especially in areas with humid summers. Fresh seed germinates readily but is vulnerable to disturbance whilst the bulb is initially forming. The bulbs are greedy feeders and respond well to a range of mulches and fertilizers, such as blood and bone. Seed grown plants may take up to 5 years to reach flowering size, whilst bare-rooted bulbs may take 1 to 2 seasons to become re-established. The bulbs are drought-deciduous and will appreciate supplemental water in dry times to build up of reserves in each bulb and assist in flower formation.

Propagation is best by seed for offsets are rarely produced. Growth from a seed to a bulb is shown opposite. There is a chance that cutting the bulb into segments, each with a piece of basal plate, will enable a select form to be reproduced true to form. The range of forms available in this species, and different form of other native *Crinum* opens up the possibility for select crosses to be made and choice cultivars to be produced.

The Darling Lily is an attractive native bulb which is amenable to general cultivation. The flowers are large and fragrant, and there is scope for the development of a range of cultivars. ■

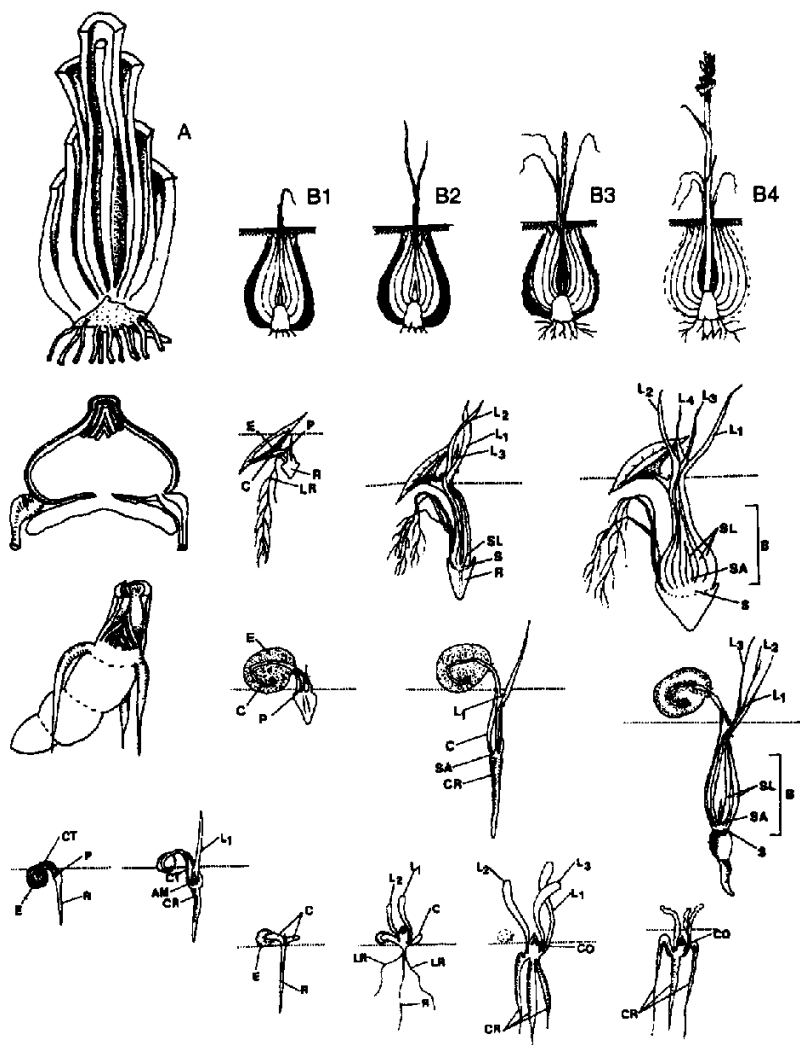
Tuberous, Cormous and Bulbous Plants

by John Pate and Kingsley Dixon, these comments by W. H. Payne

All these plants have storage organs near or below ground and the difference is not obvious to many people. These differences are shown in the sketches opposite and the colour plate on the next page. The title above is that of a very valuable book and the source of the sketches and colour plate. The book is shortly to become a very valuable rare volume as only a few copies are left at \$40 each; contact University of WA Press, Nedlands, WA 6009, for a copy urgently. The book is an outstanding reference to hundreds of plants, all from Western Australia, but can be readily applied to related plants elsewhere. A student of botany or horticulture, a grower of terrestrial orchids or trigger plants, you need a copy. Interested in the commercial prospects of underground storage organs as vegetables, contact the editor, we could have a potato or peanut challenger.

Just what are the differences between the various types of storage organ, how do they germinate and grow into plants, all is described in detail for each of the 200 species described.

- E. **Corm of *Typhonium brownii***, a single surviving structure thickened vertically into a cylindrical corm, 1.0–1.5 cm dia., 3–5 cm long representing the accumulated storage tissue of several seasons growth. Numerous contractile-like roots form each growing season.
- F. **Corm of *Philydrella pygmaea*** being produced from seed; the cotyledon CT extends greatly in length both above (producing only one leaf L1 in the first season) and below the ground surface, the plumule P being pulled down by the radicle R forming contractile root CR then lateral roots CR; approaching dormancy, stem tissue has swollen below the apical bud to form a diminutive corm CO that remains for next season all other parts eventually withering and dying.
- G. **Corm of *Stylidium petiolare*** showing development of a corm on a dicotyledon. Two or three foliage leaves L1–L3 develop in addition to a pair of photosynthetic cotyledons. Each season a replacement corm forms by swelling of an axillary bud of the parent corm which in turn forms adventitious contractile roots before it in turn is emptied during the next season of growth.



- A. **Bulb *Haemodorum spicatum***, the bulb showing the overlapping "scales" comprising a bulb; a2 and a3 as it develops flowers; growth from a seed is shown a4-a6 the seed is on the ground surface or just below it. From the endosperm E, the cotyledons C comprising the radicle R (producing the lateral root LR) thrusts downwards, and the plumule P (the embryo leaf bud) thrusts upward to become the first single seed leaf. The first foliage leaves L1 and L2 finally appear after the radicle thrusts down and expands into a cone to anchor the plant eventually forming a new bulb B comprising the scale leaves SL with the shoot apex SA.
- B. **Bulb**. The formation of a bulb from seed of *Crinum asiaticum* b1 the seed on the ground comprising the endosperm E germinating, the cotyledons C thrusting into the ground, leafbud P (plumule) develops the single leaf L1 then L2 etc., the bulb B forming.
- D. **Corm**, a swollen, much compacted underground stem. *Hypoxis occidentalis*, a perennial with an ovoid corm, 1.0-1.5 cm dia., positioned above or embedded in the fibrous remains of the previous seasons sheathing leaf-base giving a multi-jointed appearance of seasonal additions to the root system.

➤ Captions for E, F and G are shown opposite.



Fleshy underground storage organs of a range of Western Australian plants:

1. *Curculigo ensifolia* (corm); 2. *Stylidium petiolare* (corm); 3. *Drosera erythrorhiza* (stem bulb); 4. *Microseris lanceolata* (root tubers); 5. *Tribonanthes australis* (stem tubers); 6. *Haemodorum spicatum* (bulb); 7. *Platysace deflexa* (root tubers); 8. *Calothamnus tuberosus* (root tubers); 9. *Conospermum stoechadis* (root tuber); 10. *Rhizanthella gardneri* (stem tuber); 11. *Thysanotus patersonii* (root tubers); 12. *Platysace cirrosa* (root tuber); 13. *Calandrinia* sp. (root tubers); all shown almost three quarters full size.



△ *Anthotium rubriflorum*, photograph by Brian Crafter.



△ *Anthotium odontophyllum*, photograph by L. W. Sage.

▽ *Anthotium junciforme*, photograph by Greg Keighery.



Anthotium

Notes on the genus, family Goodeniaceae

by L. W. Sage*

Anthotium R.Br. (an-THO-she-um) a small genus of four species, endemic to the south-west of WA. First named by Robert Brown in 1810, the name comes from the Greek *anthos* for flower and *otos* for ear. This refers to the auriculate inner wings of the superior corolla lobes. They are perennial herbs which are glabrous except for the indusium and the interior margins of the corolla lobes of two species. *Anthotium* is closest to *Lechenaultia* R.Br. in the family Goodeniaceae, sharing an elongated inferior ovary that remains unilocular with numerous ovules. Distinguished from *Lechenaultia* by four vertical rows of ovules instead of two, radical leaves only, cup shaped indusium, mostly glabrous corolla interior and free pollen grains.

Anthotium odontophyllum, Durell's *Anthotium*, is a tufted clonal herb to 8 cm high, with the separate tufts, usually 4, connected underground to a central rootstock. The leaves are basal and spatulate to c. 60 mm long and 6 mm wide usually with minute dentations or "teeth". The flowering stalks are ribbed, typically curved, up to 3 cm long, usually just shorter than the leaves and having compact heads. The flowers are always cream, sometimes with reddish auricles. Occurs mostly in the interzone between *Eucalyptus wandoo* Blakey woodland and low heath in sandy lateritic soil or the down slope of lateritic breakaways.

Recent surveys have shown that though *Anthotium odontophyllum* tends to occur only in small populations in the patchy remnant vegetation of the central Western Australian Wheatbelt, it is well represented in conservation reserves. The minute flowers of the species (and genus) infer insect pollination and this was confirmed by the author when observing 'Monarch' butterflies (*Danaus* sp.) feeding on a small population near Narrogin. The late flowering period (November/ December) may be to take advantage of a greater pollinator activity in the warmer months. Threats to *Anthotium* species include urban and agricultural clearing, rising salinity and weed invasion.

Anthotium humile, Dwarf *Anthotium*, is a tufted herb to 10 cm high, with up to 5 tufts from the rootstock. The leaves are typically entire and linear to terete to 11 cm long and 1 mm wide. Some plants from the eastern part of its distribution have linear to narrowly spatulate leaves which can be up to 3 mm wide. The flowering stalks are up to 7 cm long, usually shorter than the leaves, with compact heads. The flowers are varied in colour from light blue to mauve (or purple) or pink to cream. The species occurs in heath and woodland in sand and sandy clay. A number of forms exist which may require taxonomic recognition.

Anthotium junciforme, Rush-like *Anthotium*, is a grass-like herb to 40 cm in height with a solitary tuft. The leaves are linear to terete to 14.5 cm long and 1 mm wide. Flowering stalks are up to 40 cm long, usually twice as long as the leaves and with loose heads. The flowers are purple to light blue in colour.

*Department of Conservation of Land and Management, Bentley Delivery Centre, WA 6983. Reference may be made to "The genus *Anthotium* in Nuytsia Volume 7. By Morrison, D. A. *Anthotium odontophyllum* was recently discovered by the author in unidentified material at the Western Australian Herbarium (PERTH) and later described. The specific epithet is latin, *odonto* for toothed and *phyllum* for leaf in reference to the mostly minutely toothed or dentate leaf margins. The suggested common name is 'Durell's *Anthotium*', in honour of the type collector Greg Durell of the Department of Conservation and Land Management in Narrogin.

Anthotium junciforme occurs in eucalypt woodlands on the Swan Coastal Plain and is currently listed as Priority 4 under the Western Australian Department of Conservation and Land Management Priority Flora List (July 1998).

Anthotium rubriflorum, Red Anthotium, is a tufted herb to 15 cm high with up to 5 tufts from the rootstock. The leaves are lanceolate to spatulate, entire to serrulate and up to 8 cm long and to 6 mm wide. The flowering stalks are up to 16 cm long, usually twice as long as the leaves and with compact heads. The flowers are usually bright scarlet and easily distinguish the species. Occurs inland from north-east of Perth to Ravensthorpe in the south. Grows in sand or sandy gravel in heath, scrub and Eucalypt woodlands.

Key to species

- 1 Flowering heads loose; coastal plain from Perth to Augusta *A. junciforme*
- 1: Flowering heads compact; inland from north-east of Perth to the south coast between Walpole and the Esperance region
 - 2 Petals usually bright scarlet; flower stalks usually twice as long as leaves ... *A. rubriflorum*
 - 2: Petals light blue to mauve (to purple) or pink to cream; flowering stalks usually shorter than the leaves or just above
 - 3 Height to 8 cm; central Wheatbelt from Tutanning Nature Reserve south to Arthur River; flowers cream (with red auricles); wings on superior lobes of corolla 1.6–3.2 mm *A. odontophyllum*
 - 3: Height to 10 (40) cm; south coast between Walpole and the Esperance region; flowers light blue to mauve (or purple) or pink to cream; wings on superior lobes of corolla 1.2–1.5 mm long *A. humile*

Families of flowering plants of Australia

by K. R. Thiele and L. C. Adams

This interactive identification guide is a compact disc produced by Australian Biological Resources Study, Environment Australia, G.P.O. Box 707, Canberra, ACT 2601, and available from CSIRO Publishing, P.O. Box 1139, Collingwood 3066 for \$69.95. Known as the **Lucid programme** it complements the *Flora of Australia* series where species are described in groups, as families.

With this CD coupled to your computer, it is possible to identify the botanical family to which any specimen of the Australian flora belongs. Pick a small leafy branch, complete with flower and fruit if possible (though neither is essential for easy identification). The **Lucid programme** presents the reader with a series of questions such as, area of collection, general habit, leaf arrangement, flower colours, etc. You answer only those questions you are confident about and by a procession of elimination the 240 plant families are reduced to one. The questions are of the tick the block applicable kind. For leaf arrangement the selection is form, alternate and spiral, alternate and 2 ranked, opposite and whorled. The screen shows a sketch for each of these alternatives and you double click on the sketch that fits your specimen.

You can then view a brief description of the Australian species in the family. There is a full colour photograph of the flower of a species in many of the genera so you can confirm your result. Alternatively you can get a full description of the characteristics of the family, in botanical terms and get really confused as these descriptions cover so many variations possible.

The hundreds of colour photographs interested me, an amazing collection. By guessing the probable family you can select from the colour photograph of a species for each genus in the family in turn, an incredible picture reference.



△ Display of **Everlasting Daisies at Mount Annan**, see our rear cover. Visit Mount Annan Australian Botanic Garden throughout the year, it is spectacular.

▽ *Bursaria spinosa*

See page 220, photograph by Ivan Holliday.





Leptospermum macrocarpum



The tea-trees

Leptospermums

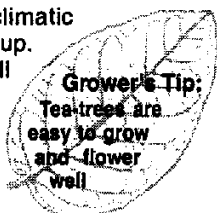
by Angus Stewart

The tea-tree has been an object of interest ever since the first settlers tried to brew them up as a refreshing beverage — apparently without outstanding success. Indeed, *Leptospermum* (lep-to-SPERM-um) were one of the first groups of Australian plants to be cultivated in England, as far back as 1774. They are a very adaptable group of plants and a couple of species have recently grown in popularity as garden subjects. A cultivar known as 'Lavender Queen', arising from *L. rotundifolium*, has very large, mauve-coloured flowers on a shrub 2–3 metres tall. The flowers are excellent for cutting and are somewhat reminiscent of the very popular Geraldton wax. *Leptospermum macrocarpum* derives its name from the extremely large flower it carries. Colours range from white to various shades of pink and red and new cultivars are being selected and released.

Propagation — Leptospermums must be propagated from cuttings of firm new growth, preferably in the autumn. They strike readily and are rewarding.

Cultivation — They adapt to most soil types and climatic conditions as indicated in the article from the Study Group.

They prefer full sun and plenty of moisture though they will survive long dry periods. They will tolerate some shade and still give a good display. A good pruning immediately after flowering will produce spectacular results in the next flowering season, given adequate water. The following are recent cultivars developed for horticultural display.



***Leptospermum rotundifolium* 'Lavender Queen'** is a low-growing shrub to about 1.5 metres tall by 1–2 metres wide. Leaves are small and round and somewhat aromatic. The large flowers are up to 3 cm wide and are pale pink tinged with lavender. The plant flowers from mid to late spring. The very large, glossy seed capsules persist on the branches and are quite ornamental in their own right. This is a stunning plant when in flower. Since it lasts very well as a cut flower, it is a good idea to cut it for indoor decoration, thereby pruning it at the same time. It is a selection from a batch of *L. rotundifolium* seedlings.

***Leptospermum rotundifolium* 'Julie Ann'** is a prostrate, ground-covering shrub less than 30 cm tall and up to 2 metres across. Foliage is similar to *Leptospermum rotundifolium* 'Lavender Queen' which has received very wide acclaim. Flowers are pale mauve and about 2 cm across, and are borne from mid to late spring. It originated from a naturally occurring prostrate variant of the species from the Beecroft Peninsula near Jervis Bay, New South Wales. A very useful plant because of its ground-covering habit, which makes it suitable for rockeries or embankments. A particularly good specimen can be seen in the rockery section at the National Botanic Gardens in Canberra.

Gardening on the Wideside, The Australian Bush Garden by Angus Stewart

Republished by ABC Books, this book was reviewed in a previous issue of Australian Plants. After a sensitive overview of Australian wildflowers and those of specific wildflower natural areas, and a brief reference to propagation and cultivation, it then describes 100 of the more recent cultivars developed for horticulture. The section on The Tea-Trees, *Leptospermum* is represented above.

***Leptospermum polygallifolium* 'Cardwell'** is a compact shrub 2–3 metres tall by 2 metres wide, with weeping branches that give the plant a very graceful appearance. It can be kept to a smaller compact plant by pruning after flowering. Its new growth sometimes has a reddish tinge. The deep green leaves are small and lance-shaped. The white flowers are 1–1.5 cm wide and smother the branches from late spring into summer. Presumably a selected seedling of a wide spread species *Leptospermum polygallifolium* that grows in heathlands or eucalypt forest from north Queensland down to the central coast of New South Wales. A fantastic background shrub or screening plant. It can be relied upon for a spectacular display even under drought conditions. It should be given a moderate pruning immediately after flowering.

***Leptospermum spectabile* 'Aphrodite'** is a small to medium shrub with a very dense branching habit, giving it a tight, bun-shaped appearance. It has short, narrow elliptic leaves that are resistant to frost. The flowers, which are produced in early spring, are about 2 cm across and are an interesting red-purple colour. *Leptospermum spectabile* is a very attractive, recently described species from the Colo River area near Sydney. The name *spectabile* actually means "remarkably spectacular". 'Aphrodite' is a seedling selection obtained by Mr P. Ollerenshaw of Bungendore, New South Wales from a batch of open pollinated seed of *L. spectabile*. This looks like being an outstanding new tea-tree. It has been trialed for five years in the frosty climate of Canberra and has come through with flying colours. The dense branching habit and spectacular flowers are other very desirable features. Well worth a try, particularly if you are in a frosty climate.

Melaleuca and Allied Genera Study Group Report April 1999 Notes by Editor

Callistemon, *Melaleuca*, *Kunzea* and *Leptospermum*. Report by Colin Cornford

Leptospermum spectabile 'Rhiannon' is a similar flowered plant to *Leptospermum spectabile* 'Aphrodite'.

Leptospermum spectabile 'Merinda' is a more open bush producing masses of bright red flowers up to 15 mm in diameter. All of these grow and flower well in Brisbane.

Ten years of study and recording are contained in this massive report as follows:

Introduction — cultivation and management of plants in gardens under a wide range of conditions considering soil types, frosts, fertilizers, plant health, flower colour and pests and diseases. As the recorded data is based upon reports from all over Australia, a table has been included giving the geographical location and climate conditions of the study group members reporting. There is a section recording the species that have been successfully grafted and their rootstock.

***Callistemon* species**, Section 1. For each of the 25 species of *Callistemon*, there is a record of successful cultivation giving the location, its soil type and colour, plant health, flower colour and flowering time, drainage, pests and diseases, fertilizer used and frost recorded. *Callistemon* cultivars, Section 2, records numerous reports on each of 101 cultivars.

***Leptospermum* species and cultivars**, Section 3, see table of results on page 214.

***Melaleuca* species and cultivars**, Section 4, records similar reports on 110 species of *Melaleuca*. See page 230 for a reference to the *Melaleuca*.

***Kunzea* species and cultivars**, Section 5, records similar reports on 21 species of *Kunzea*.

Information plus. Limited copies of this report are available from the Study Group Leader, Colin Cornford, 16 Eldorado St., Bracken Ridge, Queensland 4017, Phone 07 326 98256. E-mail, colincornford@bigpond.com., for \$10 including postage. See report page 214.



△ *Leptospermum rotundifolium* 'Jervis Bay'.
Photograph by Neil Marriott.



◁ *Leptospermum sericeum*.
Photography by John Simmons.

▽ *Leptospermum polygalifolium* 'Pacific Beauty'. Photograph by Murray Fagg, ANBG.





△ *Leptospermum polygalifolium* 'Cardwell'.

INSET: *Leptospermum macrocarpum* 'Copper Sheen'.

Reproduced from *Gardening on the Wild Side* as a guide to its quality.

Leptospermum cultivation record. What will we do with this information. I (editor) am amazed at the wealth of data and the work involved. The same detail is presented for other genera. We will work toward this but a lot needs to be done in presentation and obtaining photographs of flowering plants in full splendour. Meanwhile obtain this report, plant numerous species in the garden and record results. The books by Ivan Holliday, see page 230, are certainly the way to go. We will be presenting *Leptospermum* and *Kunzea* in separate issues.

Species	Area in cultivation	Soils at areas nominated	Fertilizer where used	Frost
<i>amboinense</i>	1 Coffs Harbour	brown clayey loam	multigrow twice a year	no
'Aphrodite'	2 Greenbank, Qld	sandyloam over clay		yes
<i>arachnoides</i>	"	"		yes
<i>attenuatum</i>	"	"		yes
<i>brachyandrum</i>	1, 2 & 3 Brisbane	various soils	fertilizer used	no
	4 Atherton, Qld	red loam	" "	yes
<i>continentale</i>	1 Coffs Harbour	as above	" "	no
'Horizontalis'				
<i>epacridoides</i>	2 Greenbank, Qld	as above	no	no
<i>grandiflorum</i>	1 & 4 England	" "	multigrow twice yearly	yes
	5 Berry, NSW	basaltloam over clay	dynamic lift & manure	yes
<i>juniperinum</i>	1, 2 or 3	as above	multigrow & others	no
<i>laevigatum</i>	1, 2, 3 & 6 Corowa	red clay	no	yes
	& 7 Jimboomba	clay to sandy loam	no	no
<i>lanigerum</i>	1-2-3 & 6 Ormeau	grey gravelly loam	no	no
<i>liversidgei</i>	1, 2 or 3	as above	multigrow & others	yes
<i>leuhmannii</i>	1, 2 or 3	as above	" "	yes
<i>macrocarpum</i>	1, 2, 3 & 6	clayey loam	" "	yes
<i>madidum</i>	1, 3, 7 & 9 Africa	loams	" "	yes
'Merinda'	2	as above		yes
<i>microcarpum</i>	1	" "	" "	no
<i>myrsinoides</i>	9 Malawi, Africa	red lateritic soil		no
<i>neglectum</i>	4 Atherton, Qld.	red loam		yes
<i>nitidum</i>	1 Coffs Hb, NSW	as above	" "	yes
<i>novae-angliae</i>	1 " "	" "	" "	no
Pacific Beauty	1, 2, 3, 4, 5, 7 & 8	" "	" "	yes
<i>parviflorum</i>	4 Atherton, Qld	red loam		yes
<i>peteronii</i>	1-9 inclusive	various	" "	yes
'Pink Cascade'	1-8 inclusive	"	" "	yes
<i>polygalifolium</i>	1-8 "	"	" "	yes
all 6 forms				
<i>purpurascens</i>	2 Greenbank, Qld	sandy loam		yes
<i>rotundifolium</i>	2, 3, 5 & 6	various	nitram &	yes
	10 Shepperton, Vic	clay	dynamic lifter	yes
<i>rupestra</i>	1 & 5	loam over clay	multigrow & dyn. lifter	yes
<i>scoparium</i>	1, 7 & France	loam	multigrow	no
Mt. Spee sp.	2. Greenbank, Qld	sandy loam		yes
<i>semibaccatum</i>	2. Greenbank, Qld	" "		yes
<i>sericeum</i>	1, 8 & 10	clay & loam		yes
<i>speciosum</i>	3, 7 & 8	gravelly clay	sulfate of ammonia	no
<i>spectabile</i>	8 Corowa, NSW	grow in pots		yes
<i>squarrosus</i>	1 & 5	loam over clay	various	yes
<i>variabile</i>	2 Greenbank, Qld	sandy loam		yes
<i>venustum</i>	2 "	" "		yes
<i>wooroonooran</i>	1, 2 & 4	loams	multigrow	yes

A new range of insecticides

by Trevor Birley*

With few exceptions, the garden insecticides available in Australia today are broad-spectrum and non-discriminatory, they kill all of the insects and spiders on and around plants that have been sprayed.

A new generation insecticide is Confidor®, that controls sucking and some chewing pests, but is soft on other species that prey upon or parasitise these same pests. It will leave spiders, predatory mites and wasps, and when used judiciously will leave other predators such as hoverflies and their larvae, and ladybirds and their larvae. Further it can be applied so that a few pest insects such as aphids survive and linger on the sprayed plants, and provide an ongoing food source for those insects and spiders that eat them, the "meat eaters".

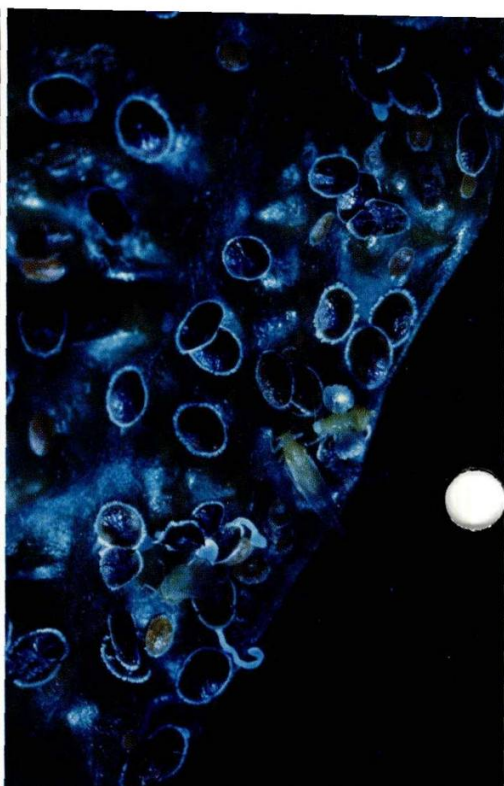
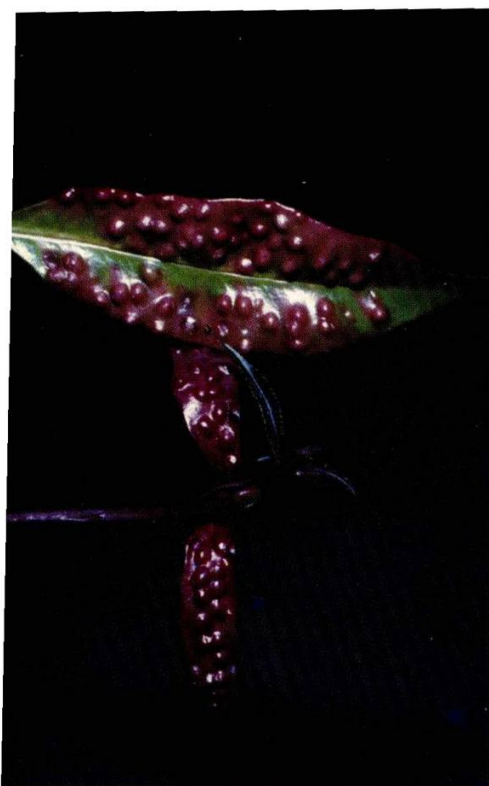
The garden contains huge populations of insect life, and many (perhaps most) of them do no harm to plants at all. In fact they need the plants as their haven and their protection. These "goodie" predator species are killed as a consequence of the use of broad-spectrum sprays applied to control damaging pests. These predators take longer to build up their numbers than do plant-eating insects, and often their final numbers are far lower than those of the damaging pests. Use a spray with a broad-spectrum insecticide and the result is an ecological vacuum in the plant canopy. The cycle re-commences and the pests once again outeat and outbreed the predators and a healthy balance is never achieved.

The best solution is to leave the predators and a few of the pest species as a food source for them, achieving an equilibrium with pleasing benefits, at least to the gardener with 95 to 99% fewer pests and some ladybird larvae, some spiders and some wasps that lay eggs in the live pest insects. This could be the breakthrough we have been dreaming of, a garden with a balanced population of all creatures and healthy plants as well, see *"Living with all creatures"* next page. Possibly the first of the genuine "green" garden chemicals, the advantages appear too perfect. It will kill bees so do not spray when they are active.

The active ingredient is imidacloprid which belongs to an unusual group of systemic insecticides known as the chloronicotinyls. It works by disrupting nerve and muscle impulses in a different manner to the commonly used insecticides available. It is more active on the nervous system of an insect than that of a warm blooded animal, and this coupled with its very low rates of use in garden and horticulture, ensures that it does not pose a hazard to users or the environment. It is taken in through leaves of plants and moves upward in the sap stream to the growing points, where it can do most good in controlling tiny sucking insects such as aphids, psyllids and thrips. It breaks down to inert by-products and eventually to ammonia, carbon dioxide and water.

Confidor® Plant Insecticide is available as an alcohol based aerosol and can be used upside down to treat the undersides of leaves. Confidor® Garden Insecticide is marketed in measured packs of five-gram airtight sachets to a box. Each sachet will dissolve in 5 litres of water. The high urea content of the granules offers a further benefit when used as a foliar spray, the treated plants often exhibiting enhanced growth and greener leaf colour.

*Trevor Birley B.Sc.Agr. is a consultant to Bayer Australia Ltd. Manufacturer of Confidor®, a product distributed by Yates.



Friends and foes OR Living with all creatures

by David Hockings¹ and W. H. Payne²

All creatures living together in harmony! How desirable this would be, but what an impossible dream, or is it? Humans are a plague on this continent and have irreversibly upset the balance of nature. We cannot (that is the readers of this article) correct this so it remains for us to find a way for all creatures to live together in some controlled way. This series of articles seeks to find a way. We need to encourage our "friends" that are helping to limit the excessive build-up of "foes" which we shall now regard not as enemies but creatures that are welcome as long as their populations are limited.

To do this we need to understand the like cycle of the "foes" to determine how their populations can be controlled, not eliminated. The control agent needs to be sympathetic both to the environment and to the "friends" we so desperately need. Hopefully the preceding article *A new range of insecticides*, will be a start. We will start with Psyllids, a foe we can tolerate in most cases but a real problem to commercial cut flower growers. The foliage with cut flowers needs to be perfect.

Psyllids are small to minute sap-sucking insects, some are shown opposite.

A. Pimple Psyllid, *Trioza eugeniae*. The pimple-like bumps on young *Eugenia* leaves are caused by the nymphs of a tiny psyllid. Sometimes young stems are also distorted. The insect commonly attacks *Callistemon* and *Eucalyptus* also.

B. The first stage nymphs move freely on leaves and young shoots but then settle down in one place and become scale-like and embedded in the leaf or stem, thus causing the distortion, bumps shown in A. Eventually they hatch into winged adults, note one adult has just hatched (on the lower edge) and is drying its wings. The white wax is secreted by the nymphs.

C. Hibiscus Woolly Psyllid, *Mesohomotoma hibisci*. Each nymph of this psyllid is densely covered with long white waxy filaments and, as the nymphs live closely together in large numbers, infested leaves and shoots have a white woolly appearance. The adults are typical green coloured psyllids, one is just emerging from the bottom of the upper most woolly patch on the leaf. This species is found on species of *Hibiscus*.

D. Grevillea Bud Drop Psyllid. The flower spikes of some *Grevillea*, in particular *Grevillea hodgei* shown and *Grevillea juncifolia*, may be severely blighted by this tiny psyllid. The minute nymphs as well as the adults live amongst the buds and feed by sucking sap, leading to bud drop and can cause the loss of the whole flower head. The psyllids also find shelter among the foliage adjacent to the flower buds. The white waxy secretions of the nymphs are the obvious sign of their presence. The young shoots may also be attacked and distorted. One of the pale speckled adults is shown between the first and second developed buds near the tip of the spike.

1. Friends and foes by David Hockings is a valuable book, limited copies being available from The Australian Plant Society, P.O. Box 744, Blacktown 2148, for \$30 including postage. This article and associated photographs are taken from this book as a guide to its value.

2. The editor is involved here to cover comments not included in the above book and to deflect any comments off its author. The concept of Living with all creatures is a policy item of Australian Plants. Our last issue, page 155 introduced this concept with butterflies.

Grevillea rosmarinifolia and similar species have sparse flower spikes. Examination with a hand lens will reveal the presence of the minute yellow nymphs that cause buds to turn yellow and fall off. Infestations may also cause leaf curl of young shoots. Removal of effected buds has controlled the outbreak, so do not resort to sprays.

Bunch Psyllid has a noticeably severe effect on some *Grevillea* such as *G. sericea*. Similar damage has been reported on other genera such as *Acacia fimbriata*. Feeding by the minute insect produces a toxic saliva causing the leaves to be drawn together, deforming the leaves and shoots into a bunched mass that provides shelter for the hard-to-see orange coloured nymphs.

Psyllids are small to minute sap-sucking insects that abound in nature. The family also includes the lerp-constructing species and many gall-forming or leaf and shoot-distorting species. Some species secrete fluffy white material on young shoots or on the underside of leaves. Others secrete long, white waxy filaments, and two species are known to live in colonies and may be ant-attended. Honey dew excreted by the psyllids attracts ants and also causes the growth of sooty mould. Some species of psyllid have toxic saliva, which causes death of leaves.

The adult females lay eggs on the host plant, and the nymphal stages as well as the adults feed by piercing and sucking. The nymphs may look like small, wingless versions of the adult or, in some species, they may be scale-like or otherwise modified as in the case of gall-forming species. Some cause serious disfigurement of ornamental plants.

Lerp insects is the name given to some species of psyllid, the nymphs of which construct a distinctive covering or testa (lerp) on leaves or twigs. Nearly all species are associated with eucalypts. Lerps take many forms and some are very elaborate and beautiful. Eggs are laid by the adult female on the leaves of the host plants. The nymph constructs a lerp in which to shelter and feed and which it enlarges as it develops. The adult emerges from the lerp and lives a free existence. The toxic saliva of some species can disfigure plants

The natural enemies of psyllids include birds, marsupials, spiders and predatory insects, particularly ladybird beetles, hover flies and lacewings. In addition they are parasitised by minute wasps and attacked by fungal diseases. They may be controlled chemically by spraying with dimethoate or endosulfan.

Rarely do they cause a major problem but an infestation of a cut-flower crop of Christmas Bush has caused a major loss of product because of unsightly deformation of young growth. In this case it was a Leaf roller Psyllid. The eggs were laid and hatched on fresh new growing leaf tips. A short time later the eggs hatched into tiny nymphs that excrete a wax leading to rolling up of the soft leaf edges. These mature to a winged psyllid that flies to another plant. What happens between seasons to these creatures is unknown. To control the Leaf roller Psyllid it has been recommended to spray with methidathion (marketed as Supracide) when the first new tip growth appears and again after three weeks. The spray recommended on page 216 would be well worth a trial.

Study Groups. There will be frequent references to these groups. They comprise people who are especially interested in a particular group of plants. They exchange notes on experiences, plants and seed. They usually operating by mail as they come from all over Australia and it is a service our country people enjoy. Most produce a very informative newsletter. They must all be members and enquiries for this exciting activity must be directed through the state societies on inside rear cover.

To foster research on the biology, conservation and cultivation of the Australian flora, the society founded the Australian Flora Foundation, a completely autonomous body. It is run by a dedicated group of scientists. This has been extremely successful and is now operating with funds bequeathed to it from members who have passed on and member donations.

The Joyce Ward legacy is currently funding research into growing conditions of *Boronia* species. Three other research applications on *Boronia* have been rejected due to lack of funds, who can help?

The Inez Armitage legacy is supporting research on an urgent conservation issue, the cause of large scale mortality of coastal seagrass meadows with catastrophic consequences for dugongs and turtles, and the remedy.

The Carver legacy is supporting research into other urgent conservation issues being investigated. Together with the Bowden legacy, research in 1999 was; development of propagation techniques for Bush Tomato, *Solanum centrale*; the role of mycorrhizal associations in the growth and survival of the native daisy, *Ixodia achillaeoides*; shoot production of *Banksia* lignotubers for ornamental horticulture; breeding system and genetic diversity and their implications for conservation management of *Grevillea williamsonii*; effect of European honey bees, *Apis mellifera*, on population genetics and pollination ecology of species in Myrtaceae, Proteaceae and Epacridaceae; the role of mating systems and insect pollination on hybridization of *Persoonia*.

Requests for submissions from scientists from all over Australia resulted in 42 submissions for urgent research. Most of these had to be rejected due to insufficient funds. If you are concerned about the conservation of the Australian flora and its dependent creatures, or some aspect of its cultivation, make some provision in your will for the future.

Australian wildflowers have exceptional potential for horticulture

Nature produces exceptional forms of plants in the wild. There is an urgent need to report these and arrange for their propagation for wider cultivation. The *Grevillea thyrsoidea*, labelled 'giant form', on page 228 is an example. It needs to be given a distinctive name so that the trade can market it and you can confidently purchase a plant knowing that you have the best form. It could be named *Grevillea thyrsoidea* 'Giant' or possibly the locality where it was found.

This application of cultivar names does not assign exclusive rights to anyone, it can be propagated and sold everywhere. A cultivar is a specific clone of value available to us all. Plant Breeders Rights is different, it assigns conditions of sale and reward for its "owner". There is a case for financial return to a breeder who has invested in the propagation and development of superior forms of plants and the authority concerned is taking a more stringent view of plants just taken straight from the wild.

The Study Groups should lead the way in the distribution of superior forms of plants, a direction the *Grevillea* Study Group, with all its resources, is not doing. Fortunately, the Correa Study group is more practical and will shortly announce its selections for horticulture.

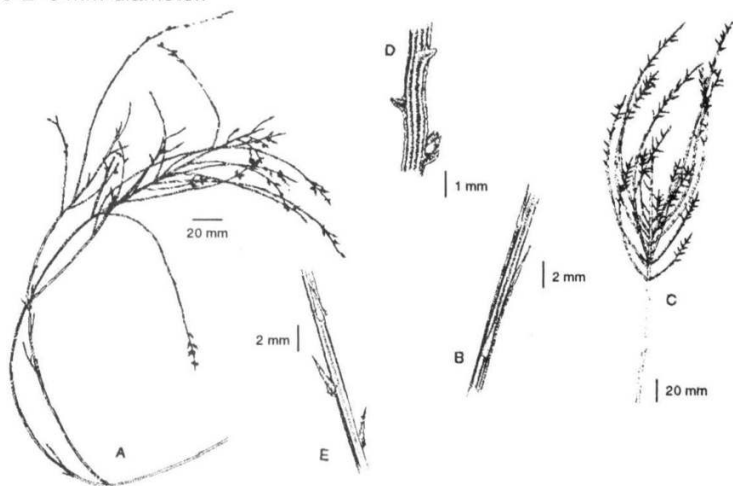
Leptomeria

an update to *Flora of Australia* Volume 22 by B. J. Lepschi*

The genus *Santalaceae* has become well known for its edible fruits, some of which are undergoing commercial development, especially *Santalum* species, the Quondong. The genus *Leptomeria* (ribbed) (lep-to-MEER-ee-a) has recently been revised. Fruits are edible of *Leptomeria acida*, *L. aphylla*, *L. drupacea*, *L. ellytes*, *L. lehmannii* and possibly *L. glomerata*, *L. dielsiana* and *L. pachyclada*. 17 species are described in *Flora of Australia*, Volume 22 and this revision includes two new species *L. ellytes* and *L. furtiva* making 19 spp. in all.

Leptomeria ellytes is an erect broom-like, rounded shrub to 2 m tall, very similar to *L. lehmannii*, its fruits being also edible are a depressed globe as distinct from those of *L. lehmannii* that are an oblong cylinder. Like *L. lehmannii* it occurs in the south-east area of Western Australia in the western area of occurrence.

Leptomeria furtiva **A** and **B** is a lax, sprawly shrub to 0.5 m known only from an area south and east of Busselton, Western Australia. It is closely related to *L. scrubiculata* **C** and **D** occurring in the same area. The small fruits are a round drupe 2–3 mm diameter.



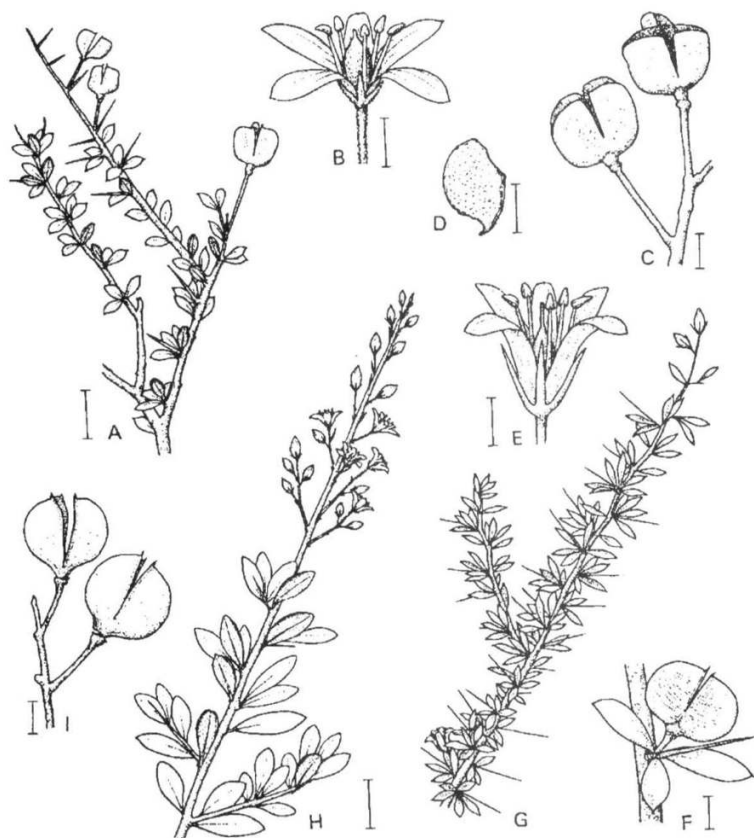
Bursaria

a revision of the genus by L. W. Cayzer, M. D. Crisp and L. R. H. Telford*

Bursaria (bur-SAIR-ee-a), plant family Pittosporaceae are widely recognized as the thorny rather scruffy shrubs and small trees. They are found in many arid regions, often widespread and regarded as a weed, reproducing from a vigorous rhizome creating "stands". They occur in all states except Western Australia and Northern Territory.

Bursaria spinosa is harvested for the medicinal drug aesculin. A recently published revision* recognizes seven species, *Bursaria calcicola* and *B. reevesii* being newly described. This revision includes the following sketches opposite and serves to illustrate the features of most species. Photograph on page 208.

*Summaries by the Editor of papers in the Australian Systematic Botany, 12/1/99 published by the CSIRO. Permission to reproduce for the general public, from scientific papers is appreciated.



Bursaria reevesii is similar to *Bursaria spinosa* but is a multi-stemmed shrub if less than 3 m high whereas *B. spinosa* may grow to a small tree to 10 m in height. The branchlet shown in Fig. 1H is applicable to both species as are the spines and fruit in F, the adult leaves of both being variable in shape usually, but those of *B. reevesii* are longer. The flowers of both are small, rarely longer than 6 mm, the numerous orange round fruits to 9 mm diameter.

Bursaria calcicola A is a spinescent sprawling shrub to 3 m high which is similar to some forms of *B. spinosa* but differs with flowers having distinctive persistent densely hairy sepals almost half the length of the petals as on B, the five petals E are cream, tinged pink 6–7 mm long. The fruits C may split in two or three ways as shown, to 10 mm round, a slightly flattened globe: the seed D has a thickened margin.

Bursaria longisepala G is similar; the glossy dark green leaves are to 10 mm long as in F; the fruit as in I.

All the other species *Bursaria incana*, *B. occidentalis*, *B. tenuifolia* are described with a key to identification in Volume 15, pages 26–28 with a colour photograph of *B. incana*, an attractive shrub with few spines. *Bursaria lasiophylla* described there is reduced to subspecies *lasiophylla* of *B. spinosa*.

Grevillea

Their care and maintenance

by Heather Clarke, Hunter Region Botanic Garden*

Care should be taken to avoid IMPULSE buying as some plants may not be at all suitable for your site or soil. Your final choice can make the difference between success and failure in any given aspect and in the years of pleasure you may gain or lose. Just which ones suit you is the first problem **The Grevillea Book**, Volume 1, see page 231, has a listing of species regarded as most reliable for the capital cities. It also has a checklist for all species with recommendations for all types of soil and conditions such as coastal and frost tolerance, wet and dry, shade, etc. We cannot confidently advise you for all areas so try as many as possible and see what does grow in your area.

Most grevilleas like full sun, though in half to dappled shade. Shady sites tend to reduce flower production and can make the plant tall and "leggy." Windy sites will destroy some species which have shallow roots, so you can see how important YOUR choice is. *Grevillea* can be very rewarding in the garden and a major attraction for birds. There is a *Grevillea* for most situations. I recommend very strongly that you purchase a copy of the three volumes of **The Grevillea Book**, see page 231.

Preparation and Soil Types:

The Hunter Region Botanic Garden has sandy, acid soil, ideal for grevilleas. To begin with, your soil should be loose and friable, perfect drainage being a pre-requisite for the majority of species, although this can be manipulated to suit. The ideal site faces North/South and has a degree of slope — for water to run off naturally. **If it has sandy soil**, clay can be built up as described below; it should have, these are acid loving plants; it should have no animal manure in it nor been pre-fertilized and should be sunny and open although this depends upon the species. Sandy soils can be built up by the addition of leaf mulch or very old wood chip. **DO NOT** use pine bark, as the resin retained in it is detrimental to the plants survival.

Clay Soils!: As drainage is so important, only the more hardy species will grow in clay soils so some treatment is necessary as follows.

If you desire a well-grown plant, then an area (2 m x 2 m) can be built up using, one handful of gypsum per m² and several large shovel-fuls per m², of coarse river sand, dug into the topsoil. Leaf mulch may be added. Cover area with 10–20 sheets of old newspaper. On top of the newspaper add at least 10 cms of old mulch. Water this well and allow a few weeks to settle. This will raise the bed to elevate the plant and improve drainage. The newspaper/mulch keeps the shrub roots at a constant temperature and prevents them from drying out, especially in summer. If possible, choose a site where water can run off at all times.

***Disclaimer:** This information is based on the editor's many years of experience and is not necessarily the opinion of the Hunter Region Botanic Garden. I have been unable to continue my work on this marvellous collection of *Grevillea* at this very fine Australian flora botanic gardens. Call in and see it when passing through, on the right side of the main highway north just north of the Hunter River bridge at Hexham. I will be continuing with the Grevillea Study Group and those interested in learning more about *Grevillea* are invited to join.

Planting out *Grevillea*: After the mulch has settled well and the newspaper is soft enough to dig into with a spade, plant your *Grevillea* out in either autumn or early spring for best results. Smaller plants are better than tall, overgrown ones and once established, will quickly make new growth. Older plants can be pot-bound and may never flourish despite their appearance at point of sale. Disturbance of the root ball should be avoided. Remove the mulch from the soil surface, make a hole double the size of the roots, fill with water, then gently place plant in. Water into hole after placement then replace soil and firm it down around base of stem, being careful not to damage or water leaves. Replace mulch no closer than 3 cm from plant stem. The base of the plant may be watered for a week or so until it has settled in after which no more water is required. Should extremes of heat dictate, apply water to the base only. I have lost plants OVERNIGHT in the past from overhead watering. Our plants are never watered, but are mulched and weeded on a regular basis.

Fertilizer: is rarely applied. A teaspoon of phosphate free, slow release fertilizer is given to each one every 6 months. Remember that in the wild these plants are neither fed nor watered and mulch is their only natural food supplement in the form of leaves and sticks.

Pruning: is important and it is a personal choice as to whether you want a large, loose effect or a neat, trim plant. Many are used for hedge or wind-break and are left a natural shape. All *Grevillea* benefit from a light but frequent clipping from planting time, when reduced foliage will shape the plant and enhance flower production. They may be reduced by as much as $\frac{1}{3}$ without detriment. Be brutal when clipping and cut off flowers when required to improve the shape of your plant. DO NOT prune in autumn/winter or you may lose the spring flowers, their best display. You will be rewarded for consistency with a well-shaped floriferous plant.

Maintenance: No sprays are necessary on *Grevillea*, except in isolated cases, as with White Oil for scale. These appear as tiny white protuberances on the stems or leaves of some plants. Other pests include Looper Caterpillars that are hard to detect as they lay along the stems and imitate their colour. Pick off and squash them or they will quickly defoliate your shrub. They are usually on the leafy stems. Borers? these will be seen as frass (sawdust), where they bore into your plant, usually at the base of old wood. They are a grub which can be poked out with wire, the area then cleaned to enable the shrub to regenerate. Their presence can signify two things, either the plant is aged (in which case you may as well cut it out), or it is suffering, i.e., too much shade or insufficient mulch. Correct the problem and the plant may recover. Mulch too near the stem can promote borer infestation.

Root Rot: The plant will die very suddenly if drainage becomes inadequate. A root fungus will remain unnoticed until TOO LATE. You may as well remove the plant and BUILD UP the soil before attempting to plant *Grevilleas* again.

Weeding: Once established, *Grevillea* do not tolerate root disturbance. Nor will they thrive with weed infestation. Mulch prevents much of this but hand-weeding of area and the cutting off of large weeds just below the soil surface with a sharp knife can eliminate many.

Last minute items: Remember: Plant out in Autumn/Winter/Spring — not summer. Inspect regularly for problems. Prune regularly. Rocks and logs are excellent landscaping features. Remove dead or dying plants — they ruin your garden!!!!!! Good management beats good luck any time!!!!!!

The Rosten garden

Our garden number 32

by Pamela Mawbey

Noel and Rae Rosten's array of plants in their Sydney native garden is a delight. You name it, they've got it; flannel flowers, blackboys, tree ferns, banksias, bottlebrushes, waratahs, daisies, and masses of native orchids. The orchids thrive in the mostly shaded block, and thumb their noses at its shallow soil. They grow on rocks, old logs, and in the forked trunks of trees. There are even some growing on the sawn off trunk of an old tree fern. The best orchid display, however, is around a small rock pond at the bottom of the driveway, in front of the house. It features spectacular yellow *Dendrobium speciosum* and pink *Dendrobium kingianum*.

An interesting feature is Noel's man-made rocks. He builds them up with cement, stains them to look natural, and then plants orchids on them.

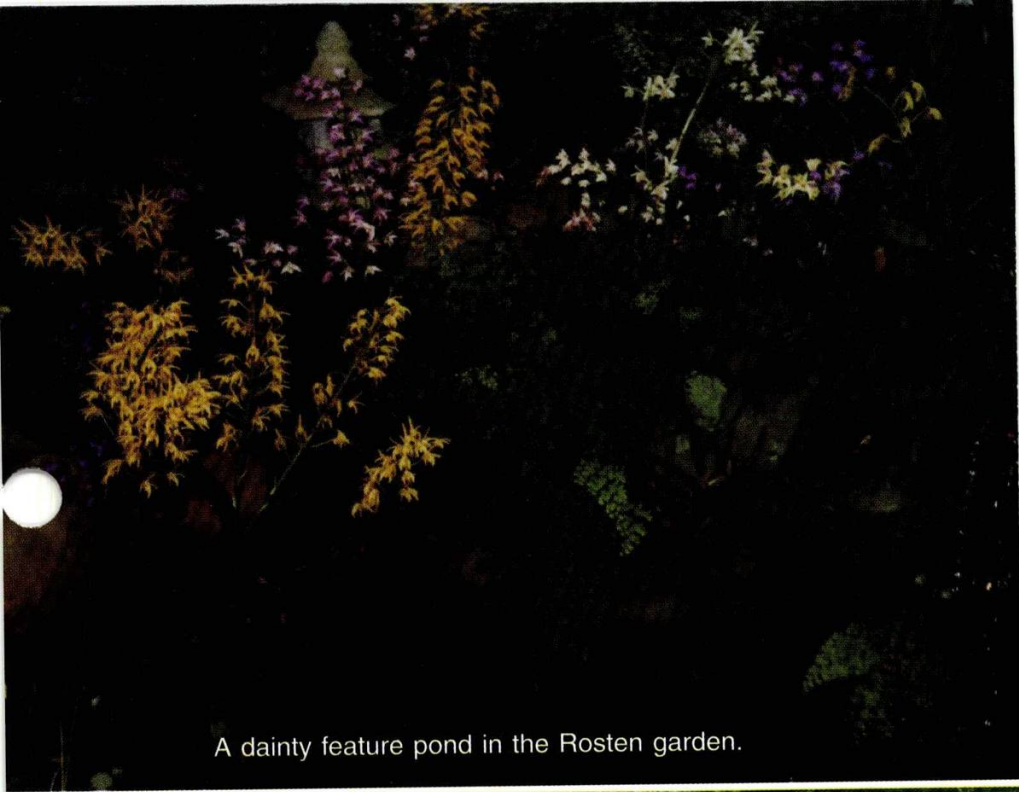
The garden slopes down fairly sharply from the front gate to what once was bus at the back of the house. Noel has done some creative bush regeneration there and added natives like rich, red bottlebrushes plus a mini rainforest. The area attracts regular "visitors" like whip birds and lyrebirds. Lyrebirds are the biggest problem as they will scratch plants out while looking for food. His plant beds at the rear are covered with fencing wire to protect the plants.

The main attraction in the front bed is the waratahs, a red one and a white one, both in bloom in mid-September. Noel says his secret of success is that he has had a lot of practice in trying to grow them. There are also pink and white native daisies, and pink and red kangaroo paws.

The block faces north-east and has a thin layer of soil on sandstone. The soil is so shallow that when he is planting seedlings from pots, he has to lay them on their side, rather than pop them into a hole. It's also a very windy spot and, as a result, everything dries out very quickly, but if he waters too much his garden is invaded by unwanted plants from next door, so he does it once a fortnight.

Noel is growing Sturt Desert Pea raised from a packet of Yates seed. He says these plants have to have good drainage and protection from rain. They were planted in a besser block standing against the wall on the western side of the house, under the eaves.

A wildflower garden, it can be a large area or a dainty small one such as opposite. We have now featured 32 private gardens but would like to present more. It may be just a part of your garden that looks good at a certain time of the year but take a photograph of it. Colour prints will do, the ones opposite are reproduced from ordinary colour prints. If you want to try, take a number of photographs at different times of the day and on different days. Please share your pleasures with us. A small garden such as that opposite can be a challenge. We have presented many plants suitable for that dainty small garden, including Anthotium in this issue. If you cannot get plants ask for others in the same plant family such as Leschenaultia Goodenia, Scaevola or Dampiera. Get some seed of everlastings and just sprinkle it on potting mix or straight on the ground and keep moist. Editor.



A dainty feature pond in the Rosten garden.



Vegetation of Macquarie Island

by Robert Gibson*

Macquarie Island is an amazing sub-Antarctic Island lying at 54°35'S, 158°50'E, or approximately 1,000 kilometres south-east of Tasmania, and which is politically part of that state. It is roughly rectangular in shape, approximately 34 km long by up to 5.5 km wide, with its long axis aligned perpendicular to the almost incessant "Furious Fifties" westerly winds. The island is rugged, with narrow coastal zones rising rapidly to three plateaux. The highest peak is 433 m altitude. Geographically this island is fascinating, for it is an emergent peak on the otherwise submarine extension of New Zealand's Southern Alps. This island is composed of still-rising oceanic crust, and has been above sea-level for less than half a million years. During this short time it has been a Mecca for marine birds and mammals, which breed there in their thousands. It has also acquired a flora of approximately 45 species of vascular plants, in addition to a rich assemblage of ferns, mosses and lichens.

The climate is strongly oceanic given its distance from other land masses and the vigour of local atmospheric circulation, and is remarkably uniform. The most variable feature is day-length, from 17 hours in January to 7 hours in July. Generally the wind strength and direction, high level cloud cover, precipitation and humidity vary little throughout the year. Rain, snow, sleet, hail and mist may occur at any time of the year. Temperatures average just under +5°C at the Australian Antarctic base, which has experienced extremes from -9°C to +12.4°C. Conditions on the plateaux will be significantly cooler and wet.

The plant species have filled a range of niches on the island to form distinctive communities, see photographs on page 229:

Tall tussock grassland. The tallest plant on the island is *Poa foliosa*, which forms tussocks to over 2 m tall, especially where erosion has occurred around their base. This is the dominant species of this community which occurs at the back of many beaches, but is locally common on the plateaux. *Cardamine corymbosa* and *Epilobium* species commonly grow beneath the grass canopy.

Short grassland. The meadow-like Short Grassland community occurs mainly on steep coastal slopes up to approximately 330 metres elevation. It also occurs in wind-protected inland slopes, well-drained coastal terraces and in some river valleys. It is dominated by species of *Agrostis*, *Uncinla*, *Luzula* and *Deschampsia* or *Festuca*. This community often subtly merges with Mire and Herbfield in response to changing drainage patterns.

Herbfield. In flats and slopes exposed to moderate winds the Herbfield community is developed, including raised coastal terraces and sheltered slopes to 380 metres elevation. There are three different types of alpine Herbfield: those dominated by *Acaena* species; those dominated by *Pleurophyllum hookeri* and *Stilbocarpa polaris*; and those dominated by *Azorella macquariensis* and *Pleurophyllum hookeri*.

*This account is based on field work on the island over the summer of 1992-93, and includes a summary from Selkirk *et al.* (1990). I wish to thank Drs Patricia Selkirk and Don Adamson, of the Macquarie University School of Biological Sciences, and Australian Antarctic Division for their support in undertaking research on Macquarie Island, and Jenny Selkirk for her help and friendship with study on the island, and for Dave Mallinson of the Australian National Botanic Gardens for recent discussions.

Fernbrake community. In a few sheltered coastal valleys, especially on the east coast the Fernbrake community is developed. This is dominated mainly by *Polystrichum vestitum*. *Blechnum penna-marina* is locally dominant in one locality on the island. Commonly these ferns occur as a mixed community where *Poa foliosa*, *Stilbocarpa polaris* and *Pleurophyllum hookeri* are locally common species, forming a mixed community.

Mire. Where the water table is at, or near the surface, Mire vegetation occurs. This includes *Pleurophyllum hookeri*, *Ranunculus bitermatus*, *Cardamine corymbosa*, *Colobanthus quitensis* and the endemic orchid *Corybas dienemus*. In parts of the raised coastal terrace this community grows on a floating layer of peat which trembles underfoot.

Feldmark. Feldmark is the most widespread vegetation community on the island, growing in all areas subject to high wind velocities, and growing mainly above 180 metres altitude. The vegetation cover within this community is variable, and bare gravel is common. The cushion plant *Azorella macquariensis* is the dominant vascular plant. This community often grades into Short Grassland communities. Natural gravel terraces are commonly developed on the plateau, and depending upon aspect to the prevailing winds. The Feldmark vegetation may be either on the rises or the treads of this stepped land surface which appear to be formed in conjunction with frost formation and particle movement by wind and water.

Lake communities. There are numerous lakes on the island due to regular rainfall, low humidity, and abundance of depressions. The latter are commonly formed by earth movements along faults. In the generally nutrient-poor lakes of the plateau, *Myriophyllum triphyllum* commonly forms dense stands around the margins. Planktonic green algae and diatoms are almost ubiquitously found in lakes ponds and creeks on the island, the latter forms distinctive deposits of diatomite which are diagnostic records of former lakebeds.

Coastal communities. The dynamic coastal environment contains niches for many different plant communities, the distribution of which is strongly influenced by waves and saltspray. A lichen zone occurs on rocks subject to salt water immersion during storms. Dense cushions of *Colobanthus muscoides*, with tufted and short tussock grasses, mosses, lichens and rare flowering herbs grow on the top of coastal rocks. Where steep beaches abut the plateau edge the Tall Tussock community may abut the lichen zone. A diverse assemblage of marine algae grow around the island, dominated by the large and distinctive *Durvillea antarctica*, which reduces wave erosion of the coast.

Some distinctive plants

Acaena magellanica and *A. minor* are commonly called 'Buzzies' on the island, they are members of the Rose family and have spherical flower heads which produce burrs which have an affinity to sticking to clothing. The compound leaves are composed deeply divided leaflets.

Azorella macquariensis is the main cushion plant of the island. It forms dense mats of stems with closely-spaced triangular leaves. In cross-section only the uppermost leaves are still alive, with an accumulating volume of dead leaves underneath through which new roots grow.

Coprosma perpusilla ssp *subantarctica* is the only woody plant on the island. It grows amongst grasses and herbs on the plateau slopes. Succulent red berries are produced on the female plants in late summer.

Corybas dienemus, a Macquarie Island endemic, is the southern-most orchid in the world. It grows in Mire communities below 180 metres altitude. Each tuber produces a single round leaf, which may support the small red flower in December. Whilst this species sets seed on the island it commonly reproduces by stolons with daughter tubers.

Pleurophyllum hookeri is a distinctive and widespread daisy on the island, It has rosettes of silvery grey hairy leaves from which stiff scapes with maroon flower heads are produced during the height of most summers. When in mass-flower in Herbfield they are spectacular.

Stilbocarpa polaris, the Macquarie Island Cabbage is a rhizomatous herb which grows in Tall Tussock Grassland, Short Grassland and Coastal Communities. In the latter it can form dense stands. It has tough, dark green spreading leaves and produces clusters of small green, rarely reddish flowers In December and January. It has a similar intolerance of warm temperatures to *Pleurophyllum hookeri* and appears unsuitable for cultivation on the mainland.

Cultivation. Many species have been grown by Universities and Botanical Gardens but it has been found that many of the plants are intolerant of average temperatures above c. +15°C, needing to be grown indoors in refrigerated units.

▷ ***Grevillea
thyrsoides*,**
giant form,
see page 219.
Photography by
Neil Marriott.





△ View south along the central plateau on a rare sunny day. Note the grey leaves of *Pleurophyllum hookeri* and cushion plant (*Azorella macquariensis*) in the foreground in the Herbfeld community. Some of the island's many lakes are visible in the background.

▽ Two of the most distinctive plants on the island. In the centre is a flowering clump of *Pleurophyllum hookeri* (Asteraceae) with the broad leaved Macquarie Island Cabbage (*Stilbocarpa polaris*: Araliaceae) in the background. The leaves of the latter were used by sealers to prevent scurvy. Photographs by Robert Gibson.



Melaleuca, plants for beginners, hardy and very floriferous

Melaleuca (mel-a-LOO-ca) are, without a doubt, the easiest Australian wildflower to grow over the widest range of conditions of soil or climate. Neglect them or leave them to rely on natural rainfall and they will survive; comes a good bout of rainfall, they freshen up and, if in late winter to autumn, they will flower beautifully. Be sure to prune hard after flowering. The only thing that appears to hold them back is that there is so many of them, about 200.

Ivan Holliday has solved our problems in the best way, he produced two cheap but very well presented books. In his first book there is a page each of 150 species with simple descriptions opposite a full page colour plate of each. It is possible to identify every plant simply by flicking through the colour pages. In Volume 2 he has presented a further 50 recently researched species. **A Field Guide To Melaleuca, Volume 2** was produced at his own expense and we should support this initiative. Purchase a copy direct from him for \$10, 29 Tennyson Avenue, Tranmere, South Australia 5075.

Wildflower Nurseries in Queensland

Fairhill Plants and Botanic Gardens — Huge range; rainforest plants, grafted grevilleas, rare plants, wildflowers, ferns, orchids, revegetation trees. Extensive display gardens. Open every day 8.30 a.m.—5.00 p.m. Fairhill Native Plants, Fairhill Rd, Yandina, Qld 4581. Tel. (07) 5446 7088.

Nielsen's Native Nursery — Over 500 species including grafted grevilleas, eremophilas, eucalypts and brachychitons, also Foxtail Palms, cycads, rainforest, Bush Tucker plants. Display garden. Open 8.00 a.m. to 5.00 p.m. every day. 49–51 Beenleigh Redland Bay Rd, Loganholme, Qld 4219. Tel. (07) 3808 1414.

Wildflower Nurseries in New South Wales

Annangrove Grevilleas — 98 Annangrove Rd, Kenhurst 2156. Tel. (02) 9654 1380. Wide range of natives including hundreds of different species in tubes — many hard to get. Ten percent discount to SGAP members.

Bryants Native Plant Nursery — Cosy Camp Rd, Bex Hill, N.S.W. 2480. Tel. (02) 6628 4323. 15 kms north of Lismore. Open 7 days (from 11 a.m. on Sundays). Extensive range. Excellent quality and service.

Dealbata (cold climate) Aust. Plant Nursery — off Bloomfield St, Dalgaty 2630. Tel. (02) 6456 5043. Specializing in alpine and dry Monaro plants — Sorry no overseas orders. Phone to arrange visit.

Illawamba Native Growers — P.O. Box 89, Cobargo, N.S.W. 2550. Tel. (02) 6493 7398, mail order specialist. Send 2 x 45¢ stamps for catalogue of our large range including rare species.

Newcastle Wildflower Nursery — 260 Lake Rd, Glendale 2285. Tel. (02) 4954 5584. Extensive range of native plants including rare and endangered species.

Stocks Native Nursery — Lot 3, Simmonds Rd, Harden, 2587. Tel. (02) 6386 2682. Plants for frost and dry weather suited to Canberra, Wagga Wagga, Orange type conditions.

Sydney Wildflower Nurseries — South at Heathcote (02) 9548 2818; West at Marsden Park (02) 9628 4448; North at Terray Hills (02) 9450 1555. Excellent range of native plants. Open 7 days.

Wirrimbirra Native Nursery — Hume Hwy, between Bargo and Tahmoor E. side 2574 (3 km from Freeway entry). Wide range including unusual plants. Tel. (02) 4684 1112.

Wirreanda Nursery — End of Wirreanda Rd, Ingleside 2101. Tel. (02) 9450 1400. Growers of advanced and semi-advanced native trees and shrubs. Open 7 days.

Wildflower Nurseries in South Australia

Brenton Tucker Native Plants and Carawatha Garden — Placid Estates Rd, Wellington East via Taillem Bend. Tel. (08) 8572 7104. Wide range of tubestock and advanced plants, Extensive display gardens and picnic areas. Open weekends and public holidays March to November and by appointment, 10 a.m.—4 p.m.

Wildflower Nurseries in Tasmania

Plants of Tasmania Nursery — 65 Hall St, Ridgeway 7054. SAE catalogue. Tel. (03) 6239 1583. Open 7 days.

Wildflower Nurseries in Victoria

Kuranga Native Nursery — Australia's largest range of Australian plants. Delivery Australia-wide. Free stocklist on request. The Kuranga Handbook of Australian Plants now available RRP \$19.95. A comprehensive guide on plants stocked at Kuranga, 393 Maroondah Highway, Ringwood 3134. Tel. (03) 9879 4076. Open 7 days.

Australian Wildflower Seed Suppliers

R. Horner — 1 Grundy St, Alice Springs, N.T. 0870. Seed of trees and shrubs of Central Australia. Please sent 45¢ stamp for a list.

Wildflower Society of Western Australia (Inc.) — R.O. Box 64, Nedlands 6009. A range of seeds available, labelled and packed, at \$1.00 (plus postage) per packet. Send for a 1997/98 Descriptive Seed List (\$1.95 posted) to: The Seed Sales Officer, Eastern Hills Branch, 65 Swan View Road, Swan View, WA 6058. Also available a book "Hints on Growing Native Plants" \$4.00 posted.

Books on wildflowers going out of print

Editor

If a publisher has a book available for 2-3 years, unsold copies are remaindered. The keen types pay a very high price, a few get a bargain and the book goes out of print. As it concerns books of great value to us and those joining us, the society has acted, we buy the unsold copies at a remaindered price but store and sell them at 50% discount for as long as possible.

The Grevillea Book, Volumes 1, 2 and 3 by Peter Olde and Neil Marriott, is the complete reference to all species of *Grevillea*. The society ensured that they were published to a very high standard with at least one large colour photograph of each of the 340+ species with easily read description of each species and details of its occurrence and cultivation. They are available from Australian Plant Society, P.O. Box, Blacktown, NSW, 2148 at \$39.95, and as an introductory offer they will be post free for orders received within Australia in 1999; overseas add \$A10.

The Fern Book and the **Cycad Book** will be published shortly and will be treated the same. Purchase a copy from the society from the address above with the confidence that you are getting excellent value, books with exceptional information and very many colour photographs. You can wait three years for a reduced price copy but you may miss out altogether.

Australian Plants received by membership or subscription

Membership: Contact the secretary, listed below, of your state of residence.

Annual subscription: \$18.00 (A\$32.00 overseas) including postage to your address.

Binders: Ring binders to fit the holes drilled, available for \$6 plus 90¢ postage.

Past issues: Recently published issues are \$4 plus 90¢ postage.

Australian Plant Reference, an index for all volumes 1-18, \$15 + \$5 postage.

Bound volumes: Past issues available only in bound volumes, \$45 + \$6 postage.

Want back issues of this periodical? Giving a present? The best way is to own the past issues fully bound with a quality spine that sits proudly on a bookshelf. Volume 18 has a bonus, it includes the Australian Plant Reference alone valued at \$15. Volume 19 is now available.

Discount book service: Each state society listed below has a mail order book supply service, usually at discount prices. Contact the secretary listed below for your requirements.

AUSTRALIAN PLANTS SOCIETY:

President: Mrs Val Williams, 51 Yaralla Crescent, Thornleigh, NSW 2120.

Secretary: Mr Rolf Cambridge, P.O. Box 744, Blacktown, NSW 2148.

Office — Tel. (02) 9621 3437. Fax. (02) 9676 7603. E-mail: austplantssocadmin@nectar.com.au

THE SOCIETY FOR GROWING AUSTRALIAN PLANTS — CANBERRA REGION INC.:

President: Ms Cindy Royston, P.O. Box 217, Civic Square, ACT 2608.

Secretary: Ms Rosemary Blemings, P.O. Box 217, Civic Square, ACT 2608.

THE SOCIETY FOR GROWING AUSTRALIAN PLANTS — QUEENSLAND REGION INC.:

President: Mr Geoff Goadby, P.O. Box 586, Fortitude Valley, Qld 4006.

Secretary: Mr Ian Waldron, P.O. Box 586, Fortitude Valley, Qld 4006.

AUSTRALIAN PLANTS SOCIETY, S.A. REGION INC.:

President: Mr Jim Ferguson, 36 Telethon Avenue, Athelstone, SA 5076.

Secretary: Mr Michael Freeborn, 5 Marram Terrace, Large North, SA 5016.

AUSTRALIAN PLANTS SOCIETY TASMANIA INC.:

President: Mr Graham Roberts, Blendon, RMB 3165 Broadmarsh, Tas. 7030. Tel. (03) 6268 1713.

Secretary: Ms Sue Gray, 472 Smarts Road, Oldina, Tas. 7325. Tel. (03) 6438 1266.

AUSTRALIAN PLANTS SOCIETY (SGAP VICTORIA) INC.:

President: Mrs Nicky Rose, 13 Karabil Crescent, Scoresby, Vic. 3179.

Secretary: Mr John Walter, 11 Davies Street, Bacchus Marsh, Vic. 3340.

WILDFLOWER SOCIETY OF WESTERN AUSTRALIA INC.:

President: Mr Brian Moyle, P.O. Box 64, Nedlands, WA 6009.

Secretary: Mrs Barbara Dewar, P.O. Box 64, Nedlands, WA 6009.

Office open Tuesday/Thursday — Tel. (08) 9383 7979 (24 hr answering service).

ASSOCIATION OF SOCIETIES FOR GROWING AUSTRALIAN PLANTS INC.:

President: Mrs Wendy Fopp.

Secretary: Mrs Eileen Crooks, 39 King George Avenue, North Brighton, SA 5048.

PUBLISHED BY THE SOCIETY FOR GROWING AUSTRALIAN PLANTS — NSW LIMITED

Under the direction of the PUBLISHING COMMITTEE — Editor: W. H. Payne.

Assisted by: P. D. Leak, B. Maloney, N. Scarborough, R. Smythe Kirk and P. Bailey.

Editorial Material: Editor, Australian Plants, 860 Henry Lawson Dr., Picnic Point 2213. Enquiries by mail only. Email address: austplantsed@nectar.com.au. Fax only by appointment on (02) 9773 9866.

PUBLISHING COMMITTEE: D. G. Brooks (Chairman), Ms J. Caldwell, R. Daniels, W. H. Payne, D. Murray, R. Smyth-Kirk, B. Walters, Mrs V. Williams, P. Davies and M. Robinson corresponding members.

ALL PUBLISHED MATERIAL IS COPYRIGHT AS DIRECTED BY AUTHORS.



Everlasting daisies at Mount Annan Australian Botanic Garden, see page 208.

