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Editorial

Joanne Caldwell

This issue we bring you a rainforest theme complete with some beautiful photos taken by Hugh Nicholson, and from Nan and Hugh's latest book, *Rainforest Plants* Volume 6. We have articles from Victoria and a special on *Triunia*. For those of you who were fired up by the Bush foods in our last journal (December 2004), Tony Irvine brings a warning about the inherent dangers of tasting even small amounts of plant material in his toxic tale about an encounter with *Triunia erythrocarpa*.

A colleague of mine who is not really a plant person is leaving this very weekend on a trip across the Simpson and Tanami Deserts. After reading Lloyd Hedges review of *Plants of Inland Australia* she promptly went out and purchased a copy. It sounds like the perfect companion for such a trip.

Last but not least Marco Duretto of the Tasmanian Herbarium provides a brief account of the diversity found in *Boronia* and an overview of the currently accepted classification, adapted, in part, from an account given in the proceedings of the Fourth Biennial F.J.C. Rogers Seminar. This extensive article has been divided into two parts so that you will have something to look forward to in the next issue.

Articles wanted! We try to cater for a variety of tastes - from beginner to serious Australian Plant nuts (*pardon the pun*). If you know something worth sharing, please consider writing an article. Contact details are at the bottom of the inside back cover.

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Front cover: ***Triunia robusta* flowers - photo: Hugh Nicholson** (p. 11)

Back cover: ***Triunia robusta* fruit - photo: Hugh Nicholson** (p. 11)

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Opposite top:

Alectryon subcinereus (p. 6)

Opposite Left and Bottom:

Bedfordia arborescens (pp. 6 & 22)

Opposite Centre Right:

Pomaderris aspera (pp. 6 & 19)

Left: Cool Temperate Rainforest

Above:

Prostanthera lasianthos (p. 6)

Below: *Olearia argyrophylla* (p. 6)



Tristaniopsis laurina (Water Gum), *Bedfordia arborescens* (Blanketleaf) (photo p. 4), *Pittosporum undulatum* (Sweet Pittosporum), *Pomaderris aspera* (Hazel Pomaderris) (photo p. 4), *Rapanea howittiana* (Muttonwood) (photo p. 8) and *Elaeocarpus reticulatus* (Blue Olive-Berry). Less common trees include *Acronychia oblongifolia*, commonly known as White Lilly Pilly, Yellow-wood or Hard Aspen, *Polyscias murrayi* (Pencil cedar), *Alectryon subcinereus* (Wild Quince) (photo p. 4) and *Ficus coronata* (Sandpaper Fig). *Eupomatia laurina* (Bolwarra or Copper Laurel) and *Livistona australis* (Cabbage form) are also found in warm temperate rainforests.

2. Cool Temperate Rainforest

This alliance requires a cool climate with very high and reliable rainfall (1,750–3,000 mm annually). Such conditions are generally only found in mountain ranges, particularly on the southern and eastern faces, usually at an altitude of 900 to 1,500 m, however cool temperate rainforests can occur down to 200 m in sheltered valleys.

Once extensive in the Otway Ranges, the Central Highlands, the Strzelecki Ranges, Wilson's Promontory, and the Errinundra Plateau in East Gippsland, this type of rainforest has been all but decimated by logging, clearing for agriculture and in the case of Wilson's Promontory by severe wildfire.

Species diversity in the single or two tree layers is very low, often being one species only. In Victoria this is usually *Nothofagus cunninghamii* (Myrtle Beech). In East Gippsland the dominant species are *Atherosperma moschatum* (Southern Sassafras) and *Elaeocarpus holopetalus* (Black Olive-Berry) (photos p. 8). From the Howe Ranges in far East Gippsland *Eucryphia moorei* (Pinkwood) takes over and is dominant as far north as Sydney.

In cool temperate rainforests, leaves are generally simple, small and toothed, trunks are often festooned with ferns, mosses and lichens and the ground layer is covered with tree ferns and ground ferns.

Under-storey species include a number of large shrubs or small trees such as *Phebalium squameum* (Satinwood), *Lomatia fraseri* (Forest Lomatia), *Coprosma quadrida* (Prickly Currant Bush), *Correa lawrenceana* (Mountain Correa), *Pomaderris aspera* (Hazel Pomaderris) (photo p. 4), *Pittosporum bicolor* (Banyalla), *Bedfordia arborescens* (Blanket-leaf) (photo p. 4), *Olearia argyrophylla* (Musk Daisy-Bush) (photo p. 5) and *Zieria arborescens* (Stinkwood). Many of these species also occur in wet sclerophyll forest, an association which often intergrades with cool temperate rainforests or occurs in less than optimal sites.

A unique sub association of cool temperate rainforest occurs at Goomirk Rocks on the Errinundra Plateau where *Podocarpus lawrencei* (Mountain Plum fine), normally a low shrub in exposed alpine areas attains the proportion of a tree at 18 m. Here it grows in association with *Atherosperma moschatum* (Southern Sassafras), *Lomatia fraseri* (Tree Lomatia), *Telopea oreades* (Gippsland Waratah), *Persoonia silvatica* (Forest Geebung), *Prostanthera lasianthos* (Victorian Christmas Bush) (photo p. 5), *Notelaea ligustrina* (Privet Mock-olive) and *Tasmannia lanceolata* (Mountain Pepper).

In several superb areas surrounding the Errinundra Plateau, such as along the Arte River, the components of this cool temperate rainforest have mingled

with the warm temperate rainforest to create a mixture of both. Sadly, much of this area has been and still is being degraded by logging.

3. Dry Rainforest

Growing in areas with less than 750 mm annual rainfall in rocky gorges protected from fire, this rainforest is rare in Victoria. It usually features a closed canopy draped in vines and lianas, with very few under-storey ferns and shrubs.

Possibly the best known example of this in the state is the Den of Nargun on Woolshed Creek in Mitchell River National Park. Dominant trees are *Tristaniopsis laurina* and *Acmena smithii*, with occasional *Acronychia oblongifolia*, *Elaeocarpus reticulatus* and *Rapanea howittiana* (photo p. 8). The most common of the climbers festooning the tree are *Eustrephus latifolius* (Wombat Berry), *Marsdenia rostrata* (Milk Vine) (photo p. 8) and *Smilax australis* (Austral Sarsaparilla); all at their most western distribution. However some may argue that the Den of Nargun is not true dry rainforest despite its sheltered rocky aspect and its less than 700 mm annual rainfall.

True 'dry rainforest' is climax vegetation that occurs in locations that virtually guarantee that it will not be burnt, even under the most extreme circumstances. Rocky gorges of the Mitchell and Snowy Rivers etc. have patches of dry rainforest, which are quite depauperate in terms of plant species. Some sites are almost pure thickets of *Pittosporum undulatum*. Although soil and rainfall have a bearing in determining the natural distribution of rainforest, in Victoria, it is the pronounced dry summers with the resultant incidence of bushfires more than any other cause that limits rainforest development in Victoria and southern NSW. 'Dry rainforest' is a clear example of the fact that fire is a far greater determinant of rainforest distribution than rainfall.

Most rainforest species have no adaptive traits to assist in recovery after fire. When a fire burns through rainforest this encourages its replacement by sclerophyll forest. These remnant rainforest areas are further threatened due to the regular logging and clear felling of surrounding forests, combined with regular fuel reduction burns to 'keep the bush safe'. There is clear evidence that rainforest would readily re-colonise large areas of southern Victoria provided that there were no fires. Although Victorian policy is to 'protect all rainforest on public land' the strict interpretation of just what is rainforest allows logging of pristine areas simply because there are emergent eucalypts above the rainforest canopy. Given all these factors and our Governments and Department of Conservation attitude and record, the long-term survival of Victoria's rainforest is doubtful.

Growing Rainforest Plants in Victoria

With several thousand species of Australian rainforest plants to choose from, it is not difficult to select a considerable number to suit the temperate conditions found in Victoria. One has only to look at the hundreds of superb rainforest trees, palms, and shrubs thriving in the Melbourne Botanic Gardens to see how easily they can grow. Rainforest plants can be grown as ordinary garden plants, planted together to create your own rainforest patch, combined with fernery plants or used as indoor plants.

In the garden they require, good garden conditions - well prepared soil,



Above Left:
Rapanea howittiana
(pp. 6, 7 & 23)

Above Right:
Marsdenia rostrata (p.

Left:
***Atherosperma
moschatum*** (p. 6)

Below:
***Elaeocarpus
holopetalus*** (p. 6)

Photos: H Nicholas



good drainage, adequate moisture, annual fertilising and plenty of compost - similar to the conditions required for cultivating azaleas, rhododendrons and many other exotic plants. Many rainforest trees when cultivated as individual specimens assume an attractive rounded and bushy habit, unlike their forest characteristics of taller proportions with most foliage and flower confined to the crown of the tree.

A fernery generally requires a cool sheltered site with little direct sun. Provided the site is well drained, this is also an ideal site for many small rainforest plants. If there is sufficient room then one or two rainforest trees can be incorporated into the design, soon becoming overhead shelter for the ferns and shrubs below.

I have found *Brachychiton acerifolius* (Illawarra Flame-tree) and *B. discolor* (Lacebark) to be excellent in this role. Rainforest shrubs that grow well with ferns include most Cordylines, *Alocasia macrorrhiza* (Cunjevoi), *Alpinia caerulea* (Native Ginger), *Eupomatia laurina*, *Linosyris monostachys* (Walking Stick Palm), *Helmholtzia glaberrima* (Stream lily) and the beautiful rainforest epiphytic Staghorn, Elkhorn and Bird's Nest Ferns.

Many rainforest plants thrive as indoor plants, however selection needs to be based on light requirements. If you rotate your plants in and out doors (say every 2-3 weeks) then there is virtually no limit to your selection. Even tropical species will survive indoors during a Melbourne winter providing the position is well lit, is not too hot, or dry and soil is kept moist but not wet. Regular misting also helps retain a plant's health. When plants are placed back outside make sure they acclimatise in a sheltered shaded spot.

Requirements for Growing a Rainforest

Creating and planting a rainforest garden is not likely to be instantly achievable. Establishing appropriate windbreaks and building up the compost in the soil are likely to be longer-term projects, although short cuts are possible. Growing or collecting plants for your rainforest may also be a long-term project. Rainforest plants survive very well in pots with minimal attention.

For greatest success a sheltered site is required as with their often large, soft leaves, many rainforest plants will not tolerate exposure to cold or drying winds. If a naturally sheltered site cannot be found, it can be created by establishing a dense windbreak around the proposed site. Shelter from hot, drying summer winds and cool south-westerlies could also be temporarily provided by wind-mesh.

In areas that experience heavy winter frosts and/or harsh summer sun, the early establishment of long-lived over-storey trees is beneficial. Quick growing wattles used to be favoured, but as they die out and fall over after 10-20 years they can do untold damage to the trees establishing below. I have found that rainforest, margin and emergent eucalypt species, such as *Eucalyptus saligna* (Sydney Blue Gum), *E. botryoides* (Mahogany Gum) and *E. grandis* (Flooded Gum) establish rapidly and shelter the young establishing rainforest plants.

To develop a rainforest garden the soil should be thoroughly prepared, ideally by deep ripping with a tractor or bobcat. If drainage is less than perfect, 'creeks' can be dug out to drain the site. Even if drainage is good, a

creek and several pools add to the atmosphere of a rainforest garden and increase humidity. Great quantities of garden litter and compost can be used to develop a deep layer of organic material. All the branches, leaves, lawn clippings, kitchen scraps, dead plants from your own and neighbours' gardens should be spread out after chopping or shredding. Decomposition is assisted by applications of animal manures, thin top dressings of soil and moisture.

A good start can be made about what species you wish to plant by visiting Melbourne Botanic Gardens or a nursery specialising in rainforest plants. There are also numerous excellent references to assist in your choice (see *Reference List*).

Many tropical and even some subtropical lowland specimens will not tolerate Victoria's harsher conditions. A good idea is to start with cool temperate and warm temperate species and progress from there. Many highland tropical species such as *Rhododendron viriosum* (= *lochiae*) actually thrive in Victoria.

Growing your own rainforest plants is extremely easy, especially if fresh seed is sown. Joining the ASGAP Rainforest Study Group will not only give you access to heaps of information and contact with like minded people, but also has a free seed service.

Planting involves loosening the base soil and blending it with the compost layer and basically planting into the rich leaf litter. Plants then develop an extensive network of surface roots, which feed on decomposing matter. When planted deeply, these feeder roots are buried and poor growth or death is probable. Constant topping up of this mulch layer ensures the soil remains cool and moist for long periods.

Watering is ideally achieved by overhead fixed sprinklers or drippers so they can be applied during hot, dry weather to keep the rainforest, actively growing. When properly mulched and sheltered, the necessity for frequent, watering is greatly reduced. To counter the hot dry summers in Victoria, overhead sprinklers or misters applied for short spells benefit the rainforest plants. As the over-storey develops and the tree-crowns begin to meet up, they effectively trap in much of the moisture in the air, creating their own microclimate.

Fertilising of your rainforest can be achieved partly by the topping up of the mulch and also by a good feed of animal manure during spring and possibly again in late summer. Rainforest plants are not phosphorus sensitive. Phosphorus is an essential element to their successful growth. Fertilising too late in autumn could result in lush growth being damaged by winter frosts.

Your rainforest will establish quickly given the correct conditions. When established it will provide year round interest and in particular a superb summer retreat - no need for an air-conditioner and no leeches either!

References

I have found the following to be the best:

1. *Australian Rainforest Plants*, Vols. 1, 2 & 3 Nan & Hugh Nicholson
2. *Creating an Australian Rainforest*, Ralph Bailey & Julie Lake
3. *Ornamental Rainforest Plants in Australia*, David Jones
4. *Growing Australian Tropical Plants*, Peter & Ann Radke, Gary & Nada Sankowsky

Triunia robusta

A rediscovered species from the Sunshine Coast _____ Alison Shapcott
University of the Sunshine Coast

Distribution & Habitat

Triunia robusta is a rare, restricted-endemic understorey rainforest species of the Proteaceae family, which until recently was thought to be extinct until it was rediscovered in the mid-eighties and is now classified nationally as endangered¹.

Hence, its conservation has been given high priority nationally. A new National Park, Triunia National Park, was proclaimed to secure its survival, while less than 20 ha of it contains 13 plant species classified as rare and threatened². *Triunia robusta* occurs in small, compact stands in complex notophyll vine forest (subtropical rainforest³) or wet sclerophyll forest with rainforest understorey on river terraces where the alluvial and/or colluvial soil is enriched with nutrients or on richer basaltic derived soils on coastal foothills. The species is largely restricted to a single river catchment - the Maroochy River. Early journal records describe *T. robusta* as common in this area⁴. GIS studies have indicated that approximately most of its potential habitat has been cleared⁴. We found quite high levels of genetic diversity in *T. robusta*, which is consistent with the relatively recent reduction in abundance of the species.

There are only four species in this genus and *Triunia youngiana* is the geographically nearest relative. Its distribution is limited to the rainforest block that extends from the Dorrigo Plateaux in northern New South Wales to the Gold Coast hinterland rainforests in the north, more than 100 km south of the *Triunia robusta* distribution. The other species occur in North-Queensland rainforests. *Triunia robusta* is not genetically depauperate compared with *T. youngiana*⁴.

Description

Triunia robusta is a small shrub up to 5 m, often multistemmed and is related to the commercial macadamia nuts (*Macadamia integrifolia* and *M. tetraphylla*). *Triunia robusta* has much larger and more-succulent leaves than *T. youngiana* which has much smaller fruit, flower spikes and leaves and much thinner stems and is generally much less-robust looking plant than *T. robusta*. Flowers of both *Triunia* species appear in spring (Sept.-Oct.) and are expected to have similar pollinators as *Macadamia integrifolia*, with which *T. robusta* can co-occur and which is pollinated by native bees *Trigona* sp. and honey bees *Apis mellifera* (Wallace *et al.* 1996). Both species were however, found to have significantly inbred populations in the wild.

Like the Macadamia, *Triunia robusta* produces a large drupe encased in a thin shell (unlike the thick macadamia shell) similar in size to the commercial Macadamia species; *T. youngiana* fruit are much smaller, only approximately 1 cm in diameter. Fruit develops over the summer months maturing by late summer-early autumn, corresponding to higher summer rainfall and, hence, localised flooding which would facilitate its dispersal downstream.

The Macadamia fruits are known to be eaten and dispersed by ground dwelling rodents and the same could be true for *Triunia robusta*. However, the other *Triunia* species are known to be highly toxic, at least to humans! Genetic studies found that *T. robusta* populations were much more differentiated between themselves than were *T. youngiana* populations. This may indicate the *T. youngiana* seeds may have been dispersed more readily and populations more interconnected in the past than were *T. robusta* populations.

References

1. Briggs JD, Leigh JH, 1996, *Rare or threatened Australian plants*, Revised Edn. (CSIRO: Canberra)
2. Thomas MB, Mc Donald WJF, 1989, *Rare and threatened plants of Queensland* (Department of Primary Industries: Qld)
3. Adam P, 1992, 'Australian rainforests', *Oxford biogeography series*, no. 6. (Oxford University Press: Oxford)
4. Bean A, pers. comm.

Rainforest Plants Volume 6

Book review by Cas Liber

Nan and Hugh Nicholson ran Terania Rainforest Nursery for 20 years and are well known as pioneers in growing rainforest plants for regeneration and the garden. Although they sold the nursery in 1995, they continue to research the growing and propagation of rainforest species and their quest to photograph every rainforest species in Australia.

Nan and Hugh Nicholson have written a sixth instalment in their popular Rainforest Plants series, with this one adding another 120 species to a running total of 656 plants over the six volumes. Each plant has notes on occurrence and cultivation, with an accompanying photo. The photos are of high quality, and Hugh has kindly let us use some in this issue of *Australian Plants*. Species from drier rainforests and temperate regions are included alongside flora from warmer climates.

The book concludes with some notes on the 'Right Rainforest', urging people to try local native rainforest species rather than those from afar, and remember species which have a role in providing food for fauna. Nan and Hugh freely acknowledge the irony in promoting rainforest plants while urging planters to show restraint, but emphasise that ecological thinking is vital.

Ten percent of the income from these books goes to conservation and human rights causes.

Rainforest Plants Volume 6 by Nan and Hugh Nicholson.

Published by Terania Rainforest publishing, The Channon NSW, 72 pp. RRP: \$29.95

Triunia

Triunia L. Johnson & B. Briggs

John Wrigley

TYPE SPECIES

Triunia youngiana (C. Moore & F. Muell.) L. Johnson & B. Briggs

MEANING OF GENUS NAME

From Latin *tri-*, three and *unus*, one; referring to the fact that 3 perianth segments remain partially coherent and one is separated.

NUMBER OF SPECIES

4 species are recognised.

DISTRIBUTION

One species, *T. youngiana* occurs in northern NSW and SE Queensland, 2 others occur in north Qld and the fourth species, until recently thought to be extinct, occurs in SE Qld.

ECOLOGY

Triunia species occur as under-shrubs in a variety of rainforest types but particularly at higher altitudes.

HISTORY

The type species was first described in 1864 by Baron Ferdinand von Mueller and Charles Moore as *Helicia youngiana*. In Bentham's *Flora Australiensis*, 1870, Mueller transferred the species to *Macadamia* on the basis of its whorled leaves. F. M. Bailey, unhappy with this classification, returned it to *Helicia* in the *Queensland Flora* of 1901 and there it remained until 1975. In that year Johnson and Briggs created a new genus for this plant and named it *Triunia* on the basis of its unique, asymmetrical flower structure, whorled leaves and fruit anatomy.

DESCRIPTION

Triunia species are medium-sized to tall shrubs or small trees with rusty-brown hairs on the young stems. The leaves are narrowly obovate to elliptical with margins either entire or with a number of small teeth towards the end. Leaves are mostly held in whorls of three or four. The fragrant flowers are borne in erect, terminal racemes. Each pair of flowers is subtended by a small, greenish bract, which falls when the flowers open. The perianth is cylindrical in bud but slightly curved. On opening the lower segment separates from the upper 3 and all 4 bend back markedly. Male and female parts are present. A tiny anther is borne at the tip of each linear perianth segment. Four separate nectar glands are present. The style is hairy near the base and with a knob-like tip bearing the stigma. The bright red, globular fruit is a drupe with a prominent groove and a more or less succulent outer covering. **The fruit is poisonous.**

Johnson and Briggs (1975) placed their new genus in a subtribe of its own, Triuniinae, in the tribe Helicieae.

CULTIVATION

All species form beautiful shrubs that appear to adapt to full sun as well as heavy shade. This comment is based on the common *T. youngiana*, but it is likely that the other species will react similarly. Their fragrant flowers are well-displayed and the young growth is decorative. **The fruits**, while attractive, **are extremely poisonous** and care must be taken to ensure that children do not eat them. Fortunately they do not appear to set seed frequently in cultivation. A well-drained loam is recommended. Propagation is from seed or from cuttings, which root easily.

Triunia erythrocarpa D. Foreman

From the Greek *erythros*, red and *carpos*, fruit, referring to the large, red fruit.

Distribution & Ecology: Grows in rainforest, at altitudes of 38–1,000 m above sea level.

Description: A tall shrub or small tree, usually 5–10 m tall but occasionally taller. The young shoots are clothed in rusty hairs. The obovate to narrow elliptical leaves are either opposite or in whorls of 3 or 4. They are thick and up to 19 cm long, with a few hairs persisting on the underside even when mature. Margins are entire except as seedlings, when some teeth are present. The cream, fragrant flowers are borne in terminal spikes up to 70 mm long in spring. The perianth is up to 20 mm long and clothed sparsely with rusty hairs. The bright red, globular fruit is up to 35 mm in diameter, smooth and semi-succulent.

Cultivation: This species, which was only described in 1987, is in limited cultivation and would appear to have similar potential to the others, although it is considerably taller. Some pruning may be necessary. **The fruit is very poisonous** and a very small amount (half a seed) is said to cause symptoms such as decreased pulse rate, lowered blood pressure, diarrhoea and headache.

Triunia montana (C. T. White) D. Foreman

From Latin *montanus*, from the mountains, referring to its habitat. Syn. *Helicia youngiana* C. Moore and F. Muell. var. *montana* C. T. White, *Triunia* sp. aff. *youngiana* (Mount Lewis).

Distribution & Ecology: Found on windswept slopes at high altitudes on several high peaks of north Qld.

Description: A small to medium-sized shrub up to 3 m high. The young growth is coppery-red, hairy at first and then becoming smooth. The leaves are in whorls of 4 and elliptical in shape. The flowers are borne in erect, terminal racemes up to 10 cm long in spring. They vary in colour from light to deep pink. The flower structure is similar to *T. youngiana*, with the perianth clothed in rusty hairs near the tip. The style is red. Fruits are purplish at maturity. This species differs from *T. youngiana* by having more leathery and glossier leaves.

Cultivation: This beautiful shrub is in limited cultivation and has great potential as an ornamental. It apparently flowers equally well in sun and shade and propagation can be achieved from cuttings.

Conservation Status: 2RC

***Triunia robusta* (C. T. White) D. Foreman**

From Latin *robustus*, robust, referring to the large leaves. Syn. *Helicia youngiana* C. Moore & F. Muell. var. *robusta* C. T. White

Distribution & Ecology: After being thought to be extinct, this species was rediscovered in December 1989 in rainforest pockets near Yandina and Mapleton. It had not been seen for over 100 years.

Description: This species is very similar to *T. youngiana* but differs in having larger, oblong elliptical leaves that are smooth and glossy on the upper surface. The leaves are mostly entire but some deeply cut teeth are sometimes seen near the tip. The flowers are similar to *T. youngiana*.

Cultivation: This species in limited cultivation.

Conservation Status: 2K

***Triunia youngiana* (C. Moore & F. Muell.) L. Johnson & B. Briggs**

Named in honour of Sir John Young, later Baron Lisgar (1807-1876), Governor of New South Wales and later Governor General of Canada. Syn. *Helicia youngiana* C. Moore & F. Muell. *Macadamia youngiana* F. Muell.

Common Names: Spice bush, honeysuckle bush, native honey suckle.

Distribution & Ecology: Found in a variety of rainforest types but particularly at higher altitudes in northern NSW and south-eastern Queensland.

Description: A medium-sized to tall shrub up to 4 m high with rusty brown stems. The leaves are narrowly obovate to elliptical and vary in length from 6 to 12 cm. They are slightly hairy on the top side and more densely hairy underneath, becoming smooth with age. The margins are either entire or with a number of small teeth towards the end. The young growth is bright pink and densely hairy. The leaves are mostly held in whorls of 3 or 4, but occasionally just 2 opposite leaves are seen. The white, fragrant flowers are borne in erect terminal racemes to 10 cm in spring. The perianth is clothed in rusty hairs. The green style is slightly hairy near the base. The fruit is bright red, globular and about 15 mm in diameter, slightly hairy and with a prominent groove.

Cultivation: A very handsome shrub with well-displayed flowers and decorative new growth, which seems to be present at most times of the year in mild and warmer climates. It accepts full sun or heavy shade and flowers in the second or third year from seed. It is growing well in a rich loam on a well-drained slope in the author's garden. Several stems come from the base and after 5 years no pruning has been necessary. Propagation is from seed or cuttings, which root easily. **Care must be taken that children do not eat the poisonous fruit.**

Toxic Tales - An Encounter with *Triunia erythrocarpa*

Tony Irvine, SGAP - Cairns Group

Reprinted from Tropical Topics, April 2003

Fellow botanist, Bernie Hyland, and I had just returned to the laboratory at CSIRO in Atherton with a collection of *Triunia erythrocarpa* fruit. The species is related to Macadamia; it is in the same family, Proteaceae. The fruit is spherical, 18–40 mm in diameter and orange red with a longitudinal groove on one side. The flesh is white and contains an ovoid brown seed, about 15 mm wide.

Bernie nibbled a small part of the seed, said it tasted okay and then spat it out. I also nibbled a small part of the seed. It had a similar taste to Macadamia. I rolled it around in my mouth for a few minutes and decided, as it had a pleasant taste, to swallow it.

I then went to do some sowing of seed in the potting shed. While I was working, I began belching a bit and then felt that I needed to go to the toilet but I didn't perform. I felt briefly that I wanted to vomit but again didn't perform. So I continued my seed sowing. It was an overcast day and a comfortable temperature but I noticed that my arms were beginning to sweat. I thought that was strange, as it wasn't very hot. Within minutes, sweating began to increase over all parts of my body and shortly my clothes became saturated. I looked as though I had dived fully clothed into water for a swim. It was at this time, that I thought I should seek some medical attention. While waiting at the doctor's surgery, I was sweating so much I began to shiver from loss of heat. As soon as the doctor saw me, he examined my heart beat and immediately gave me an injection of atropine to stimulate my heart muscle as the effect of the toxin in the seed was to slow my heart beat down. I was sent straight to hospital where they monitored my condition. I received one more injection overnight when they felt that my heart rate had dropped too low for safety. The next morning when I woke up, I walked the three kilometres home.

The total amount of the seed that I had eaten was equivalent to about nine cubic millimetres or 0.3 grams in weight. I was very fortunate the sampling had occurred at the office. If I had consumed it in the bush, I could have been in severe trouble. Imagine what would have happened if I had ingested a whole seed on the basis of its pleasant taste.

The plant is commonly known as Spice Bush, a name that is also applied to *Triunia youngiana*, a species from southern Queensland and northern New South Wales with which it was confused. This is a dangerously misleading name for both species as it suggests edibility and human use. A far better common name for *T. erythrocarpa*, based on the above experience, would be 'toxic seed tree'. On looking through an array of references on common names, I cannot find any other plant in Australia with this common name, which makes the case for its use more compelling. It goes to show that pleasant tastes can be deceptive!



Above: *Triunia erythrocarpa* flowers (p. 14 & 16)

Right: *Triunia erythrocarpa* fruit

Below: *Triunia montana*

Photos: H Nicholson



Plants Of Inland Australia

- A guide

Book Review by Lloyd Hedges

Anyone that has toured the outback and is interested in plants knows the inadequacy of the identification guides presently on the market. It's not that there aren't good local guides, it is that they all either suffer from being restricted in the area or the range of plants they cover. On a couple of tours of the interior I have resorted to taking a crate of books and still found the information inadequate.

Philip Moore* had spotted this gap in the literature and when he retired from his post as a scientist with ANSTO bought himself a 4wd, learnt to drive it, then set about criss-crossing the country bringing a scientific discipline to his botanical research. One hundred thousand kilometres and many frustrating years later the results are now palpable.

The first part of the book is an introduction to the evolution of inland flora and a discussion on plant communities and their interaction with man. He has then chosen over 800 species as being the ones travellers are most likely to notice, illustrated most of them with photos, a concise description and a distribution map. Eight hundred species may not sound adequate across such a vast landscape but of course the arid zone is not as species rich as other areas.

Last year I joined Philip for a 12,000 km trip through the region. We had a draft copy of the book and treated the excursion as a trial, a shake down cruise if you like. How well did perform? Very creditably. The distribution map was a great asset when it came to sorting out similar species. It didn't have absolutely everything but it had all the plants most people notice.

As for negatives, the innovative format will come in for some criticism from the more learned in the plant area as it has been laid out with the novice in mind. The plants have been divided into Major and Distinctive and Less Familiar sections. The major plants are grouped according to the common names so for instance Eremophilas and Myoporums are in a section titled Emubushes and Poverty Bushes. *Ptilotus* are in the Mulla Mullas, Foxtails and Pusstails section. It may be a boon for the novice but it takes people used to thinking in botanical names a short while to get into the swing of it. Each group has been colour coded for quick reference.

Another criticism is the size of the photos, because the book has been designed to fit into the glove box and kept to an RRP of \$50 some are too small. At this price it is good value but I would be willing to pay more and to clear a space beneath the seat for it to sit. Will it replace the entire crate of plant books on my next trip? Perhaps not - but it will be the first book packed.

* Philip Moore, a past president of the Australian Plants Society's Sutherland group, is probably best known for *Native Plants of the Sydney Region* he co-authored with Alan Fairley. That book has become a classic - this new one may well do the same.

Nyerimilang Heritage Park

Returning the Rainforest _____ Joe Stephens, Bairnsdale District APS Group

Nyerimilang Heritage Park is a 200 hectare property. It was purchased by the Victorian Government in the 1970's to prevent a large, inappropriate property development from taking place. Managed by Parks Victoria, Nyerimilang is situated on the shore of the Gippsland Lakes with superb views of the lakes, islands and Bass Strait beyond. The Nyerimilang Homestead is over one hundred years old and with its surrounding gardens and old farm buildings is open to the public most days of the year.

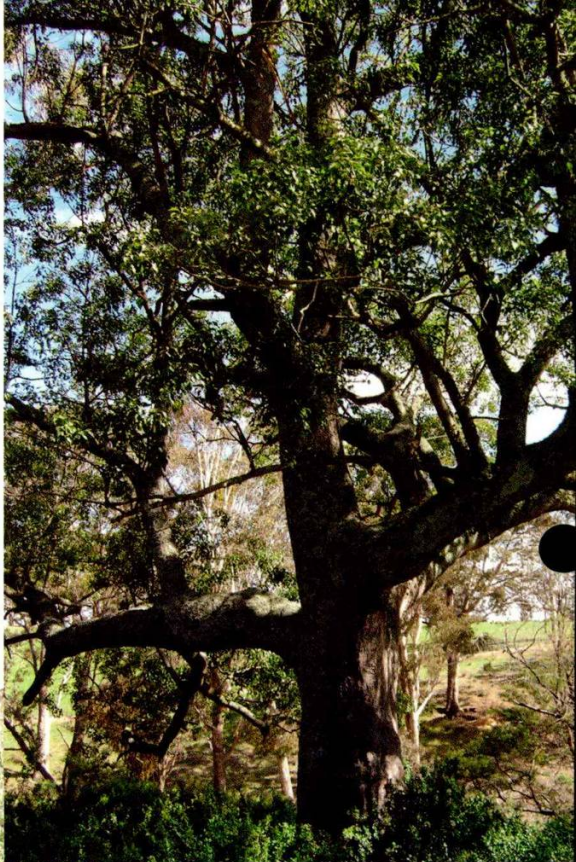
Visitors can also picnic on the lawns, throw a chop on the barbecue or go for walks through the remnant bush. Bird watching is a popular pastime; you can even sit on the wide verandas and watch the White-bellied Sea-eagles drift by on the thermals above the edge of the old sea cliffs. Nyerimilang visitors can also walk through the East Gippsland Garden, a cultivated forest exhibiting the indigenous flora of the region. The octagonal interpretation shelter in the centre of the garden has impressive panels painted by a local artist. The East Gippsland Garden is an ongoing project being developed by the Friends of Nyerimilang and the Bairnsdale branch of Australian Plants Society.

At this stage, about 70 hectares of the park is leased to an adjoining landowner who grazes cattle in the paddocks surrounding the homestead. The balance of the park is native vegetation in varying states of naturalness. In the altered environment of the Gippsland Lakes the now permanent salt water has killed off the Swamp Paperbark (*Melaleuca ericifolia*) dominated wetlands which have been replaced by salt tolerant Coastal Saltmarsh vegetation. The balance of the park mainly contains Limestone Box Forest dominated by the imposing Coastal Grey Box (*Eucalyptus bosistoana*) and Warm Temperate Rainforest with the most obvious species being Sweet Pittosporum (*Pittosporum undulatum*).

A number of VROT'S (Victorian rare or threatened species) occur at Nyerimilang, many of these are close to the western extent of their natural occurrence. Species such as the Yellow Wood (*Acrornychia oblongifolia*), Yellow Milk Vine (*Marsdenia flavescens*) and the Star Cucumber (*Sicyos australis*) occur in Rainforest remnants. Other VROT'S such as the Limestone Pomaderris (*Pomaderris oraria* subsp. *calcicola*) and Viscid Daisy Bush (*Olearia viscosa*) occur in Warm Temperate Rainforest margins and in areas that appear to have been Dry Rainforest. Natural hybrids between Limestone Pomaderris and Hazel Pomaderris (*Pomaderris aspera*) (photo p. 4) can be found at the northern end of the Kurrajong Walking Track. Within Victoria the Viscid Daisy Bush only occurs near the coast from Nyerimilang to nearby Lake Tyers. This sticky leafed daisy bush is widespread in Tasmania.

The Kurrajong Tree (*Brachychiton populneus*) occurs in reasonable numbers on the Homestead block and adjoining 'Callamondah' block. One stand of these trees that were ring-barked (the scars have grown over) just after white settlement are estimated to be about 500 years of age.

These trees are on the Victorian Register of Significant Trees.



Although the understorey has been largely cleared, the areas dominated by the Kurrajongs appear to have been Dry Rainforest. In East Gippsland, Dry Rainforest occurs on sites protected from fire by natural barriers in this instance the adjacent (also cleared) Warm Temperate Rainforest.

Above: *Brachychiton populneus* is over 400 years old.

Left: Rainforest Gully

Photos: J Stephens



Rainforests

The Different Faces of Rainforest

There are many different types of Rainforest in Australia, three of which are found in East Gippsland: Warm Temperate, Cool Temperate and Dry Rainforest.



The Rainforest Microclimate

The Rainforests found in East Gippsland vary in character. Cool Temperate Rainforest has a dense ferny understorey while Warm Temperate and Dry Rainforests have very few plants growing on the forest floor. Rainforests are different to the surrounding forest types because it sets up its own microclimate to protect itself. The Rainforest canopy is essential as it controls the amount of light entering the canopy by reducing the light intensity, wind and evaporation to produce a stable, humid, cool and shady microclimate.



Double Antennae

Antennae

A small, ground-dwelling marsupial found in the south of East Gippsland. It is a small, brown, furry animal with long, thin antennae. It is a very rare species and is found in the rainforests of East Gippsland.

It is a very rare species and is found in the rainforests of East Gippsland. It is a very rare species and is found in the rainforests of East Gippsland.



Above and Left: The octagonal interpretation shelter in the centre of the garden.

Below: Kangaroo Apples severely frost damaged during the second winter

Photos: J Stephens



Regeneration of the Site

The East Gippsland Catchment Management Authority (EGCMA) sought funding through the Natural Heritage Trust about 6 years ago. This funding was to trial re-establishment of Warm Temperate Rainforest in the Maringa Creek valley on the 'Callamondah' block. Originally the site was almost completely cleared with long established pastures and healthy stands of the noxious weeds Spear Thistle (*Cirsium vulgare*), Variegated Thistle (*Silybum marianum*) and Sweet Briar (*Rosa rubiginosa*). On the slopes to the north and south, the only remnant vegetation were a few Coastal Grey Box, Blackwood (*Acacia melanoxylon*), Burgan (*Kunzea ericoides*) and Tree Violet (*Hymenanthera dentata*).

With approval of this project the trial site of about 20 hectares was fenced to exclude the cattle that grazed the area for the past 100 years. In the first year trees, shrubs, ferns and climbers were largely grown by Bairnsdale APS members for planting in the trial site. Spots were sprayed and APS members and other volunteers gathered to plant the first 1000 plants. Some of these were planted on the top of the ridge and higher up the north facing slopes to the south; most of these plants have survived and are now 4 years old. The other early plantings, about 500 trees and shrubs on the valley floor were almost a complete failure with six Blanket Leaf (*Bedfordia arborescens*) (photo p. 4) surviving on a well drained south facing lower slope.

Bill Peel, a botanist and Bushcare Officer with EGCMA, investigated the causes and found that they were many and varied. He found that the silt on the valley floor retains very little moisture during the summer, especially during the almost permanent drought conditions now suffered by East Gippsland. Even though spot spraying took place, plants were out-competed by pasture grass and thistles. There was obvious grazing damage and stem damage to small remnant trees. There was also obvious frost damage to plants with low tolerance to frost.

In the second year some rabbit control work took place, grasses and thistles were more widely sprayed and there was a little more rain. Thousands of plants were planted on the valley floor most of these were species selected to provide cover to the less frost tolerant species. The main two species planted were Kangaroo Apple and Black Wattle (*Acacia mearnsii*), both did well during the spring summer and early autumn, there were some losses to grazing and ongoing stem damage. A few of the other species planted this time have survived; obvious ones are the Varnish Wattle (*Acacia verniciflua*) and the Snowy Daisy Bush (*Olearia lirata*). Spotlight surveys were done to see what our main grazing animals were. Rabbits, Wombats, Black Wallabies and Hog Deer were observed. Both Black Wallabies and Hog Deer were observed grazing on plants inside tree guards.

During the second winter, frost severely damaged and even killed many of the plants placed as a cover crop. It was observed that there were distinct zones of frost impact, there are three separate flats two to the north of the creek and one to the south. These flats drop in elevation from west to east by a few metres. The most westerly 'high' flat suffered the worst damage; Black Wattles showed frost burn, Kangaroo Apples were killed or at the very least were burnt back to ground level. The damage on the 'middle' flat was less

severe, with the Kangaroo Apple on the eastern 'low' flat showing frost damage but retaining partial healthy foliage.

A nine-wire electric fence was built around the perimeter to restrict access to grazing animals, good in theory, but at this stage we still have many grazers inside the fence. Because the intent of the project is to re-establish Warm Temperate Rainforest in the natural environment Wombats will not be controlled and Black Wallabies enclosed inside the fence will be tolerated. This spring, rabbit control work will take place both inside the fence and outside in areas of known habitat. Believe it or not, the introduced Hog Deer is a protected game species in Victoria. During April appropriately licensed hunters are allowed to shoot Hog Deer with permission from the land-owner. By this means two Hog deer were shot during the autumn. A wildlife destruction permit will be sought to remove remaining Hog Deer from inside the fence before this season's extensive planting.

The third planting was of both frost tender species planted in varying niches and different methods of guarding and of semi established 3 metre high cover plants such as Black Wattle (*Acacia meamsii*), Blackwood (*Acacia melanoxylon*) and Coastal Blue Gum (*Eucalyptus globulus* subsp. *pseudoglobulus*). Of the more established trees some Blackwood have died, as the distribution of the dead Blackwoods is scattered frost may or may not be the cause. Muttonwood (*Rapanea howittiana*) (photo p. 8) was one of the main frost sensitive species planted. The Muttonwood planted in the open in light cover from the Kangaroo Apple have died. Those planted in open top plastic guards, have also died. Those planted in plastic guards filled at the top with paper are still alive though obviously affected by the cold. The Muttonwood planted in naturally recruited Sea-berry Saltbush *Rhagodia candolleana* and near the base of lesser frost affected Kangaroo Apple appear to be unaffected by frost.

More than a dozen maximum and minimum temperature thermometers have been used by Bill Peel to regularly monitor the lowest winter temperatures. On the 'high' flat the lowest temperature recorded in the open this winter was minus 11° C and in the tree guards filled with paper minus 7° C, all Muttonwood appear to have died. On this flat a thermometer placed under a deciduous Weeping Willow (*Salix babylonica*) recorded minus 9° C on the same day as the minus 11° C, only ten metres away. On this same day temperatures recorded on the 'low' flat were minus 6° in the open, minus 4° C in the tree guard with paper and minus 3° C in the Sea-berry Saltbush clumps. The 'middle' flat temperatures are consistently just below the mean of the other two.

The Future

Another 150 cover trees will be planted this spring, with several thousand more plants going into the warm niches where available. It will be good to see how successful the Warm Temperate Rainforest re-establishment trial looks in 20 years time. At last there are promising signs, at the end of August 2004 many more naturally recruited Kangaroo Apples, Tree Violets, Sea-berry Saltbush and even two tiny Kurrajong seedlings were observed.



***Cycas* species**

near Dundee Beach, QLD.

Top: Demonstrates the frequent high density of the plants, the dryness and variation of stage of flush (p. 315)

Above Left shows an early stage.

Above and Below: show later stages
Photos taken September 1992
by K Rathie





Above:

Taken September 1992 and shows leaf colour of some plants in a 15 m diameter circle.

Left:

Taken nearby, in January 1990 when all the Cycads were a dull green.

Photos K Rathie

Colour Variation in Cycads

Kerry Rathie, Cycad Study Group Leader

It has puzzled me for the last two decades why no book or article gives a description of the seasonal colour variation in many species of Australian *Cycas*. Botanists cannot use colour to distinguish between taxa, of course, because they rely on dried archival material on herbarium sheets. However, they could say how gorgeous a newly flushing *Cycas maconochiei* (and many other species) is or at least hint at it. Of course they may never see them at the right time of the year, but this is unlikely.

Those that do mention it briefly, like David Jones' book, *Cycads of the World*, get quite a bit wrong. In his case, confusion between *Cycas conferta* and *C. maconochiei*, the latter known as *Cycas* sp. 'Fogg Bay', 'Finiss River' or 'Cox Peninsula', did not help. The description of *C. conferta* on pages 139–140 is actually that of *C. maconochiei*, but the photo on p. 139 is of *C. conferta*. The description on p. 162 of *Cycas* sp. 'Pine Creek' is that of *C. conferta*, which was previously known as *C. sp.* 'Pine Creek'. It is a most visually distinctive cycad, with a greeny-blue leaf colour unique in Australia and alters little over the seasons. It is also the only Northern Territory (and probably Australian) species that always has smooth petioles in the wild. Some other local species develop smooth petioles in cultivation.

All Northern Territory and Kimberley Cycads go deciduous at the end of the wet season and almost always put out the next flush of new leaves before significant rain has fallen.

The photos on page 24 were all taken on the same day, near what is now called Dundee Beach, on a property my brother then owned. The first photo shows the frequent high density of the plants, the dryness and variation of stage of flush.

Each individual Cycad takes 6 weeks or so for the leaves to emerge and stabilise in colour, but a 1–2 month variation between plants in date of flushing prolongs the visual show. Then many species slowly lose their silver or blue as rain and sand abrade the wax (e.g. *C. pruinosa*) or scales on their leaves.

One photo on page 24 shows an early stage with the blue colouration partly overlaid by the rusty tomentum, which soon falls off. The other photos show later stages and the photo at the top of page 25 shows leaf colour of some plants in a 15 metre diameter circle.

The above-mentioned photos were all taken in September 1992. The photo at the bottom of page 25 was taken nearby in January 1990 and all the Cycads were then a dull green.

Juveniles of *Cycas silvestris* lack the silver scales of older plants (photo p. 28). The silver of the latter wears off as the year progresses. As the scales are lost, the leaves are left a dull green.

Cycas cairnsiana remains the same colour until it goes deciduous or semi-deciduous, even in Brisbane. The photo on page 29 shows a plant in cultivation near Darwin. *Cycas ophiolitica*, commonly called Marlborough Blue, is 'Marlborough Green' in Brisbane, and *Cycas couttsiana* soon turns green also. *Cycas platyphylla* is an intermediate.

My *Cycas canalis* subsp. *carinata* comes out bluey-green (photo page 28) but turns greener with time. It is a sucker off the plant shown in Fig 103 on p. 44 of Hill & Osborne's *Cycads of Australia*, which has been reproduced on page 29. Other plants are lettuce green from the outset. Both colour forms occur in *C. armstrongii* and other species and are always distinct.

Almost no cycad in the Northern Territory retains an undamaged caudex. The photo below shows termite damage to *Cycas armstrongii*.

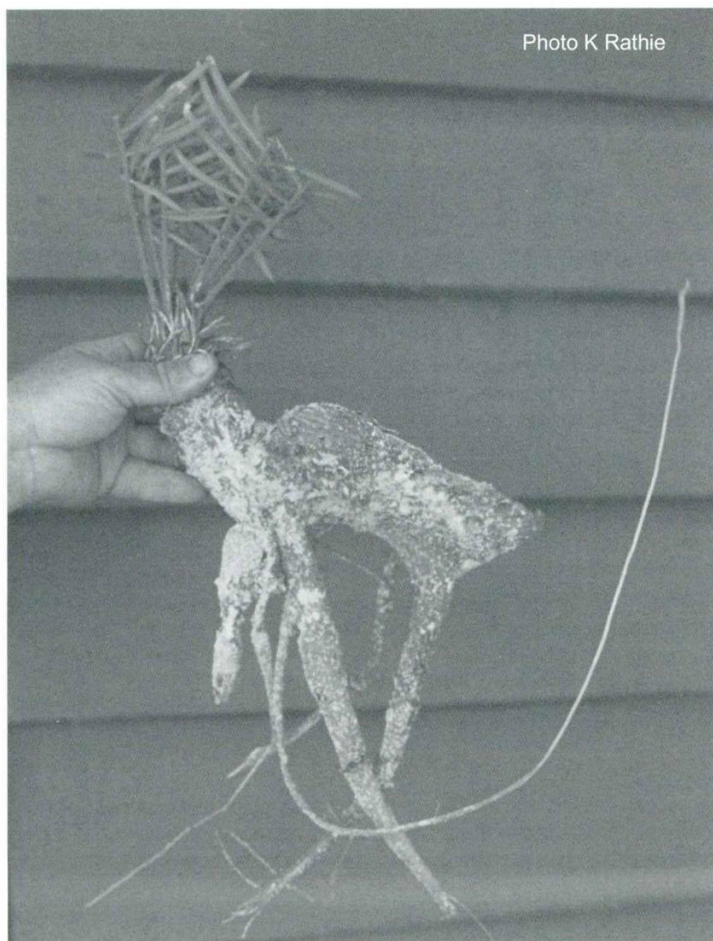


Photo K Rathie



Above: Juveniles of *Cycas silvestris* lack the silver scales of older plants (p. 26)

Below: *Cycas canalis* subsp. *carinata* in Kerry Rathies garden (p. 27). This comes out bluey-green but turns greener with time. It is a sucker off the plant shown opposite.

Photos K Rathie





Above: *Cycas cairnsiana* in cultivation near Darwin. (p. 27)

Below: *Cycas canalis* subsp. *carinata* (Fig. 103 on p. 44 of Hill & Osborne's *Cycads of Australia*)

Photos K Rathie



Aussie Plant Finder

Book Review by Gwen Elliot

In 1987 *The Plant Finder* was published in England and following its recognition as a valuable asset to gardeners world-wide, Margaret Hibbert combined with the publishers, Florilegium, to give Australians the *Aussie Plant Finder*. This book has now become a major reference in the libraries of many Australian gardeners.

The latest 2004 edition lists over 35,000 plants and where they can be obtained from approximately 400 nurseries in Australia. Natural species and cultivars of both native and introduced plants are included. It is pleasing to note that a large number of Australian native plant specialist nurseries are now submitting their stock-lists to the publishers for inclusion in this valuable paperback of 448 pages. The rear jacket indicates that approximately 4,000 Australian plants are included in this new edition.

There are two columns to each page, each with space for up to 70 different plants. To look at one Australian example, the genus of *Grevillea* occupies over 8 columns and if we take a look at *Grevillea diminuta* we find there are 19 different nurseries in five States carrying this species.

To maximise use of space in the book, each nursery is given a code reference, which starts with the State of origin e.g. ACTYAR, NSWBN, QLDCHA, TASRED and VICKUN. It is therefore easy to see those that are closest to your garden and one quickly becomes familiar with the individual nursery codes.

Some are retailers, some will send by mail order, and others are wholesale suppliers who can be contacted for further information as to where plants can be obtained. At the rear of the publication there is a comprehensive listing in regard to each nursery with address, phone, FAX, email and web contacts. Additional details include whether the nursery is retail or wholesale, opening times, whether they have a catalogue available and listing any specialist interests, such as the fact that the Banksia Farm at Mt. Barker in WA specialises in Banksias and Dryandras.

This isn't a coffee-table book filled with botanical illustrations or captivating colour photographs but it is certainly a book which keen Australian plant enthusiasts will refer to frequently, to provide the solution to where many of our sometimes difficult to obtain native plants can be purchased.

Congratulations to the author and publisher on their latest edition of this valuable reference. Copies are available through most SGAP / Australian Plant Society book suppliers as well as in libraries and all good book stores or contact the Garden Bookstore at Florilegium, email: florileg@tpg.com.au

Aussie Plant Finder by Margaret Hibbert.

Published by Florilegium (with the support of Gardening Australia). RRP: \$24.95

Revision of the broombush (*Melaleuca uncinata*) complex

Ivan Holliday, Tranmere

Melaleuca uncinata is one of the most common and most commercially important species of *Melaleuca* because of its use for brush fencing and for its oils which are virtually as rich as those of the two species from which Tea-tree oil is produced (*M. alternifolia* and *M. linariifolia*). As well, there is interest in its use in revegetation projects in salt-affected areas of WA as an agroforestry crop.

A common plant of south-eastern Australia, it was first described by Robert Brown from a specimen he collected at Port Lincoln. In WA, however, there is considerable variation in the complex and over the years, different opinions have emerged over their naming.

A 2004 revision of this complex now includes 10 species from WA apart from *M. uncinata*, which also occurs in that State. Of these, four species were described or discussed in *Melaleucas: A Field and Garden Guide* - viz. *M. concreta*, *M. hamata*, *M. osullivanii* and *M. stereophloia*. Keith Pitman has an excellent specimen of *M. hamata* at his Cockatoo Valley property, whilst *M. concreta* is a good shrub in my own Tranmere garden. Photos p. 32.

All species in the complex except *M. stereophloia*, differ from the characteristics of *M. uncinata* which features oil glands along the leaves in rows, twisted leaves and mostly, recurved leaf tips. *M. stereophloia* differs, among other features, by its hard, fibrous, persistent bark at the base of the main trunks.

The new species published in June 2004* includes *M. osullivanii* and six others - viz. *M. atroviridis*, *M. exuvia*, *M. interioris*, *M. scalena*, *M. vinnula* and *M. zeteticorum*. Briefly they can be described as follows:

(1) *Melaleuca atroviridis* - A tree or shrub to 12 m high with papery bark and yellow or cream flower clusters. It features dark green foliage, from which its species name is derived and flowers much later than the other species in the complex, usually December - February. Occurrence is the Coorow-Perenjori-Lake Moore-Yellowdine district southwards to the Beaufort-Pingrup-Varley district.

(2) *Melaleuca exuvia* - A tree or shrub to 6 m tall, the bark curling in the Minni - Ritchi manner but much coarser. It features bright yellow floral clusters and with its interesting bark, is a striking member of the group.

The species name is from the Latin *exuvia*, meaning 'coarse skin' and refers to the bark. It is distributed from the Lake Johnston-Upper Lort River

* For detailed descriptions refer *Australian Systematic Botany* 17, 255-271



Above and Left: *Melaleuca concreta*
(p. 31)

Below: *Melaleuca hamata* (p. 31)

Photos: I Holliday



district north-eastwards to the Queen Victoria Spring district, often in sand at the edge of salt lakes.

(3) *Melaleuca interioris* – A shrub to 3 m high with papery, flaking bark, yellow inflorescences and very small, loosely arranged or 'peg-like' fruiting capsules. Capsules for the other species in the group tend to be arranged in tightly compressed oval to rounded clusters.

Melaleuca interioris is the most widespread of all the species in the complex. It extends from the Wiluna–Lake Raeside district in WA eastwards through inland Northern Territory and South Australia to just over the New South Wales and Queensland borders.

(4) *Melaleuca scalena* – A shrub to 3 m with papery peeling bark and whitish to pale lemon flower clusters. In transverse section the leaves are elliptic to broadly elliptic, compared to those of *M. hamata* with which it often co-occurs. *M. hamata* leaves are circular to sub-circular in transverse section (a feature which I sketched but the publisher managed to omit from my book).

Melaleuca scalena is found in the Wyalkatchem–Mt Walker district south to the Woodamilling–Dumbleyung district.

The species name is from the Latin *scalenus*, meaning uneven, or odd, and refers to its discordant or poor appearance when compared with others in the complex, such as *M. hamata*. The common name of 'Scummy Broombush' has been suggested.

(5) *Melaleuca vinnula* – A shrub to 2 m or more high with peeling, papery bark and distinctly yellow inflorescences. It is distinguished by its flat leaves which are similar to those of *M. concreta*, but differs from that species in having shorter staminal filaments and caducous petals (i.e. they are shed very early) compared to the deciduous ones of *M. concreta*.

Melaleuca vinnula occurs in the Coorow – Tampus district south-eastwards to the Wyalkatchem–Muckinbudin–Southern Cross district.

The species name is from the Latin *vinnulus*, meaning 'delightful' and refers to this species' handsome appearance.

(6) *Melaleuca zeteticorum* – A shrub to 2.5 m tall with hard, fibrous or papery bark and distinctly yellow inflorescences. The leaves are generally greyish and silky-hairy, a feature which helps to identify this species.

It occurs from the Dowerin–Cunderdin–Beacon district eastwards to the Coolgardie – Norseman district.

The species name honours the many people who explore natural vegetation and share their findings. It is derived from the Greek *zētētikos*, meaning 'disposed to search'.

Apart from *M. atroviridis*, all species tend to flower in mid to late spring, commonly in November. Of interest, the underground orchid (*Rhizanthella gardneri*) has been found to be associated with *M. scalena* and probably *M. hamata*. Whether it is associated with the other species in this complex has yet to be discovered.

Boronia - Not Just Pretty In Pink

Part 1 of 2 _____ Marco Duretto, Tasmanian Herbarium

Introduction

Like many Australian genera *Boronia* became popular in horticulture soon after the first collections reached Europe in the 18th Century. Now, few plant enthusiasts (and not just native plant enthusiasts) and bushwalkers don't know *Boronia*. Some may be surprised that the genus is placed in the family Rutaceae that contains *Citrus* (oranges, lemons, finger limes etc), *Ruta* (Rue), and *Flindersia* (Australian Teak etc). Other well-known Australian genera of the family include *Correa*, *Phebalium*, *Philotheca* and *Zieria*. Indeed Australia is a major centre of diversity for this great southern Family with c. 40 genera and c. 470 species. *Boronia*, with 151 recognised species (+ >60 sub-specific taxa), is the largest genus of Rutaceae in Australia. *Boronia* and *Hakea* (Proteaceae) vie for the august position of the 9th largest genus of flowering plants in Australia (figures adapted from Orchard 1999).

When asked about *Boronia*, many would think about the brown and yellow flowers and perfume of *B. megastigma* (Brown Boronia). Others will associate *Boronia* with flowers that have four pink petals such as produced by *B. ledifolia* (Sydney or Showy Boronia) and *B. heterophylla* (Red Boronia). As would be expected in such a large genus the variation seen in the wild is quite amazing and pleasant smelling plants are certainly not the norm.

Below is a brief account of the diversity found in *Boronia* and an overview of the currently accepted classification. This text is adapted, in part, from an account given in the proceedings of the *Fourth Biennial F.J.C. Rogers Seminar - Boronias, Correas and Other Fragrant Friends* of the Australian Plants Society at Karwarra Gardens, Melbourne (Duretto 2002). Admittedly, a significant number of species do have pink flowers (with four spreading petals) and so, to illustrate the diversity of *Boronia*, photographs of herbarium specimens (the raw material of taxonomic research), smaller features, as well as the more traditional habit shots will be used here.

Taxonomic History (an abridged account)

James Edward Smith (1798) described *Boronia* together with four species that had come to his attention through Australian collections and plants cultivated in English hothouses. The genus was named to honour Francesco (Francis) Borone (1769–1794), a young Italian naturalist who had impressed Smith with his enthusiasm and ability. Over the next 60 years several other species were discovered and described, and two generic issues developed. Lindley (1839) described the genus *Cyanothamnus*, for some *Boronias* with blue flowers, and Mueller (1855) described a number of species of *Zieria* (a genus also described by Smith) under *Boronia* (e.g. *B. veronicea* = *Z. veronicea*). Neither of these generic concepts has survived.

The first infrageneric classification of *Boronia* was proposed by Bentham (1863) when he was writing his *Flora Australiensis*. In this account he listed 59 species (of which 13 he newly described) classified into seven series. One of the species he described was *B. alulata* from material collected by Banks and Solander 90 years previously when they travelled with Cook on the Endeavour! The next major reshuffle of *Boronia* was published by Engler (1896, 1931) who, reworking Bentham's classification, divided the genus into four sections, one with five series. Wilson (1971), in the next significant work on the genus, described five new species, three new subspecies, one new variety and one new series. He also made a number of new combinations.

Weston *et al.* (1984) completed a cladistic analysis of *Boronia* and *Boronella* (a New Caledonian genus) that showed that the currently accepted classification of *Boronia* was largely artificial, that is based on unnatural groups. In their analysis *Boronia koniambiensis* (New Caledonia) was more closely related to *Boronella* than it was to any other species of *Boronia* and *Boronella* was imbedded in *Boronia*. The results were not conclusive and further work is required to resolve the relationships of *Boronella* and *Boronia*. *Boronia koniambiensis* was transferred to *Boronella* by Hartley (1995) thus making *Boronia* endemic to Australia.

When revising *Boronia* for south-west Western Australia Wilson (1998) proposed a more natural classification for the genus: sections *Boronia* (with two series), *Cyanothamnus*, *Imbricatae* (monotypic) and *Valvatae*. In this study, Wilson (1998) described seven new species, eight new subspecies and one new variety, as well as making a number of new combinations. Species of *Boronia* sections *Boronia* and *Cyanothamnus* found in eastern Australia were revised by Neish and Duretto (2000), who described two new subspecies, and Duretto (2003), who described 10 new species and 11 new subspecies.

Boronia section *Valvatae* was revised by Duretto (1999, and references therein) and in this study 27 species, one subspecies and two varieties were newly described. A cladistic analysis using morphological characters was conducted on the section by Duretto and Ladiges (1999) and a novel infrageneric classification for the section, based on the cladistic analysis, was described by Duretto (1999). In this classification four species were removed from *Boronia* section *Valvatae* and two new sections, *Alatae* and *Algidae*, were described to accommodate them. Several species described in this study were collected for the first time in the 1990's. Since this revision five interesting species that can be placed in *Boronia* section *Valvatae* have been discovered: two in south-eastern Queensland and one in north-western Northern Territory (Duretto 2003); one in north-eastern New South Wales (Duretto *et al.* 2004); and another in the Kimberley Region of northern Western Australia (Duretto submitted). Some of these species are spectacular and are from areas not so far removed from major population centres. These recent discoveries in *Boronia* section *Valvatae* clearly illustrate that basic field surveys and research are still required before we get close to finishing documenting the biodiversity found in Australia.

It can be safely said that *Boronia* has been revised and we have a good understanding of the genus (see Wilson 1998; Duretto 1999, 2003). Much of this work was completed in anticipation of the publication of the *Flora of Australia* volume for Rutaceae. Currently 151 species and 63 sub-specific taxa are recognised and these are classified into six sections, which are outlined below.

Characters that are used to classify *Boronia* and will help in quick identification are: the presence or absence of stellate hairs; the position of the inflorescence (axillary and/or terminal); the aestivation (arrangement) of the sepals and petals in bud (valvate or imbricate); the nature of the petal tip (with an incurved hook, straight or subapical on the outer surface); persistence of the sepals and petals (persistent or deciduous [caducous]); and surface features of the seeds (e.g. smooth or tuberculate). Note that both buds and mature fruit (with seeds) are required to easily identify a plant. This can be problematic as for most species once the fruit have started developing most flowers have opened and, as with most Rutaceae in Australia, the fruit are explosive and so seed can be difficult to collect. Keys for the forthcoming account of *Boronia* for the *Flora of Australia* have been written with this in mind and alternative and regional keys will be given.

At the generic level *Boronia* has been aligned with a number of genera including *Zieria*, *Neobymesia* (a monotypic genus confined to the Northern Territory), and *Boronella* (a New Caledonian genus of four species). The position of *Boronella* is unresolved with some workers including it in *Boronia* while others such as Hartley (1995) indicate that *Boronella* is probably more closely related to rainforest and maquis genera such as *Brombya*, *Euodia*, *Medicosma* and *Myrtopsis* than it is to *Boronia*. The situation is complex and further research is required to determine the relationship of *Boronia* and its relatives.

Distribution and Habitat

Boronia is the most widespread genus of the family Rutaceae in Australia. The genus is found in all Australian states and mainland territories and is usually found in areas that receive more than 600 mm (south-west) or 800 mm (elsewhere) of precipitation a year.

There are three broad regions where species of *Boronia* are found, each of which contains distinctive biotas. These regions are the south-west of Western Australia, eastern Australia, and north-western Australia including the Kimberley Region (N WA), the 'Top End' of the Northern Territory and north-west Queensland.

The south-west region of Western Australian is very diverse in the number of species and subgeneric taxa present. In this area all six sections of *Boronia* are found with two confined to the region. Fifty-one species are found in the area, of which 49 are endemic. Minor centres of diversity include the wheat belt, the extreme south-west (viz. an area roughly bound by Bunbury, Augusta and Pemberton), between Albany and Cape Arid National Park, and the sand plains north of Perth. One third of the species found in the south-west of Western Australia are confined to an area roughly bounded by Perth, Augusta and Albany.

The eastern region extends from near the tip of Cape York to Tasmania and south-eastern South Australia. Found in this region are four sections and 76 species (74 endemic). The region contains several minor centres of endemism; e.g. Tasmania (11 species, 6 endemic), the coastal and near coastal region from Fraser Island (SE Qld) to the New South Wales/Victorian border (28 species, 18 endemic), the Granite Belt (SE Qld & NE NSW; 9 species, 6 endemic) and Cape York Peninsula (N Qld; 11 species, 9 endemic).

The north-west of the continent has 27 species, all of which are endemic to that region. The majority of species in this region have very restricted distributions and only four would be considered to be widespread. All but four (not the same four) of the species are placed in *Boronia* section *Valvatae* subsection *Grandisepalae* which is confined to the region. Three of the remaining species are placed in *Boronia* section *Valvatae* subsection *Valvatae* and the recently described *B. anomala* from the eastern Kimberley Region (WA) has been tentatively placed in *Boronia* section *Valvatae* though it may warrant its own section. The major centre of diversity in this region is the western edge of the Arnhem Land Plateau including eastern sections of Kakadu National Park. This area of approximately 50 x 200 km contains 17 species and two subspecies of which all but three were described in the last eight years. Twelve species, some of which are quite bizarre in appearance (see below), and one subspecies are narrow endemics confined to this region. The Kimberley Region is also a minor centre of endemism (9 species, 6 endemic).

Boronia is found in a large variety of habitats but the majority of species are found in open woodland dominated by *Eucalyptus* species or heath. Usually they are found growing in well-drained, often very poor soils derived from sand, sandstone or granite. Species are also found in alpine heaths, coastal dune communities, tall wet sclerophyll forests, rainforest edges, seepage areas, swamps, wallum, cliff communities, etc. They are also found on a variety of other substrates including limestone, spongerite (a rock composed of sponge spicules), serpentine, metamorphics, laterites, peat etc. *Boronia* can dominate habitats though populations tend to be small and widely spaced.

Classification

Boronia is classified into six sections: *Boronia* (58 spp.; SW WA, SA, Vic., Tas., NSW, SE Qld), *Imbricatae* (1 sp.; SW WA), *Alatae* (1 sp.; SW WA), *Algidae* (3 spp.; SW WA, SA, Vic., NSW), *Cyanothamnus* (23 spp.; SW WA, SA, Vic., Tas., NSW, E Qld), and *Valvatae* (65 spp.; SW & N WA, Vic., NSW, NW & E Qld, NT). *Boronia* section *Boronia* contains two series and section *Valvatae* contains four subsections, nine series, five sub-series and four informal species groups.

Research is being conducted to determine the phylogeny of the genus. One aim of this study is to produce formal classifications, based on natural groups, for the large sections *Boronia* and *Cyanothamnus* (similar to what exists for section *Valvatae*). Having a natural classification in a large genus enables a better understanding of relationships, easier placement of new taxa and greatly assists in identification.

Boronia section Boronia

Species that are placed in *Boronia* section *Boronia* do not have stellate hairs, have terminal and/or axillary inflorescences, petals that are imbricate in bud and usually do not persist with fruit and seeds that are smooth (even at high magnification). The section contains 58 species and is confined to southern Australia. Most species have pink flowers though there are some radically coloured species of *Boronia* series *Boronia* in south-west Western Australia.

There are two series that are largely differentiated on sepal and seed characters.

Boronia series Boronia

A series of 47 species that have sepals that are imbricate in bud and persist with fruit and seeds with a dorsal groove. Many of species of *Boronia* common in the horticultural and the cut flower trade belong to this series (e.g. *B. heterophylla*, *B. megastigma*, *B. muelleri* and *B. serrulata*).

Twenty-three species (22 endemic) are found in south-west Western Australia including *B. megastigma* (photo p. 41), the species most people associate with *Boronia* and interestingly one of the more unusual species. Though most species in the region have pink (to white) petals, several, like *B. megastigma*, have unusually coloured petals. Petals may be dark brown to purple-black outside and yellow within (*B. megastigma*), pale red to purple (e.g. *B. nematophylla*), red (e.g. *B. humifusa*), reddish-brown to green (e.g. *B. octandra*), yellow-green (e.g. *B. clavata*), yellow (e.g. *B. purdieana*) etc. Most flowers in the genus are more or less flat and face outwards. Several species (e.g. *B. megastigma*) have flowers that are pendulous and bell-shaped (campanulate). Others (e.g. *B. heterophylla*) take this one step further and have flowers that barely open. One taxon, *B. scabra* subsp. *attenuata*, from the Cape Arid area often has 5-petalled flowers. The pollinators of *Boronia* in the south-west must be varied because, apart from the above variation, there is intriguing variation in stamen and gynoecium (ovary, style and stigma) structure. Some species have only four fertile stamens and the antisepalous stamens may be much reduced (e.g. *B. tetrandra*) or large and black (e.g. *B. heterophylla*). Most *Boronias* have minute stigmas but a few species in the south-west are unusual in having stigmas that are massively swollen (e.g. *B. megastigma*), with lateral wings (*B. tetrandra*), or branched in a cross shape (*B. purdieana*).

Representatives of the series endemic to south-west Western Australia are *B. albiflora*, *B. capitata* (with 3 subspecies: viz. *capitata*, *clavata* and *gracilis*), *B. clavata* (photo p. 41), *B. coriacea*, *B. crassifolia*, *B. crassipes*, *B. crenulata* (with 4 subspecies: *crenulata* [with 2 varieties: *angustifolia* and *crenulata*], *obtusata*, *pubescens* and *viminea*), *B. gracilipes* (photo p. 41), *B. heterophylla*, *B. humifusa*, *B. inornata* subsp. *inornata*, *B. megastigma* (photo p. 41), *B. molloyae*, *B. nematophylla*, *B. octandra*, *B. ovata*, *B. oxyantha* (with 2 varieties: *brevicalyx* and *oxyantha*), *B. pulchella* (photo p. 41), *B. purdieana* (with 2 subspecies: *callicola* and *purdieana*), *B. scabra* (with 3 subspecies: *attenuata*, *condensata* and *scabra*), *B. stricta*, *B. tetrandra* and *B. virgata*.

Twenty-five species (24 endemic) are found in eastern Australia from the Fraser Island area (SE Qld) to the Eyre Peninsula (SA) and Tasmania. In this region species are common components of the near coastal heaths, woodlands and forests though many species have fairly narrow ranges. The series is dominated by a group of closely related and largely allopatric species with pinnate leaves and flat, narrow-elliptic leaflets. This species-group, which could be called the *B. pinnata* species-group, includes *B. citriodora* (photo p. 44), *B. gunnii*, *B. imlayensis*, *B. latipinna*, *B. muelleri*, *B. pinnata* (photo p. 44), *B. rivularis*, *B. saffrolifera* and *B. thujona*. A third of the eastern Australian species are found in Tasmania, of which six are endemic as are four subspecies. Two of the Tasmanian taxa, *B. citriodora* and *B. rhomboidea*, are found in alpine and subalpine habitats and tolerate a fair amount of snow each year. *Boronia citriodora* subsp. *paulwilsonii* and *B. elisabethiae* (both SW Tas.) live in areas that receive many metres of rain each year and this rain is received over the entire year. *Boronia rhomboidea* is biogeographically interesting in that it is found in a few small areas of Tasmania as well as in the Southern Tablelands of New South Wales. It is also unique in the section in having simple, almost circular leaves. Another unusual, simple-leaved and rare species from New South Wales is *B. serrulata* (Native Rose) that is confined to the Sydney area. It has simple serrate leaves and flowers clustered into a head. The leaves of *B. citriodora*, *B. citrata* and *B. hippopala* often have a lemon scent. The smell is due to the presence of the oils that are found in the leaves. Two species, *B. saffrolifera* and *B. thujona*, are named for the oils found in their leaves. *Boronia gunnii* (Tas.) is unusual in the genus in that it grows in rocky high-energy flood prone areas along rivers. The stems are very flexible and can almost be tied in a loose knot without breaking. The tallest species in the genus, *B. muelleri*, is sometimes a small tree and can reach 7 m in height.

Representatives of the series endemic to eastern Australia are *B. citrata*, *B. citriodora* (with 3 subspecies: *citriodora*, *orientalis* and *paulwilsonii*), *B. deanei* (with 2 subspecies: *acutifolia* and *deanei*), *B. elisabethiae*, *B. falcifolia*, *B. filifolia*, *B. floribunda* (photo p. 44), *B. galbraithiae*, *B. gunnii*, *B. hemichiton*, *B. hippopala*, *B. imlayensis*, *B. latipinna*, *B. microphylla*, *B. muelleri*, *B. pilosa* (with 4 subspecies: *parvidaemonis* [named after two mischievous little boys], *pilosa*, *tasmanensis* and *torquata*), *B. pinnata*, *B. rivularis*, *B. rhomboidea*, *B. rozefeldsii*, *B. saffrolifera*, *B. serrulata*, *B. subulifolia* and *B. thujona*.

Boronia inornata subsp. *leptophylla* is found from south-west Western Australia to just west of the South Australian/Victorian border. It is one of two taxa of *Boronia* that are found both east and west of the Great Australian Bight, the other is *B. coerulescens* subsp. *coerulescens* (*Boronia* section *Cyanothamnus*).

Boronia series Pedunculatae

Boronia series *Pedunculatae* contains 11 species that have terminal inflorescences, sepals that are valvate in bud and usually glabrous and deciduous with fruit and seeds with a raphe that is a cream to brown, pulpy mass at the base of seed.

The centre of diversity for the series is south-west Western Australia where nine species and four subspecies are confined, these being *B. anceps*, *B. denticulata*, *B. dichotoma*, *B. exilis*, *B. fastigiata*, *B. juncea* (with four subspecies: *juncea*, *laniflora*, *micrantha* and *minima*), *B. spathulata*, *B. tenuior* and *B. tetragona*. These species show some striking morphological variation and many of the features seen are unique in *Boronia*. For example: *B. anceps* has stems that are so compressed that they have only two broad sides while *B. tetragona* and *B. tenuior* have stems with four distinct ridges; *B. juncea* and *B. exilis* are usually leafless; *B. dichotoma* has glandular aculeate pedicels; and *B. exilis* has a dense indumentum of woolly hairs on the pedicels and sepals.

In eastern Australia there are two species, one, *B. parviflora*, which is widespread and found in all eastern states, and another, *B. barkeriana* (with three subspecies: *angustifolia*, *barkeriana* and *gymnopetala*), which is confined to New South Wales. *Boronia barkeriana* subsp. *gymnopetala* has the dubious distinction of being the only *Boronia* at present to be assumed to be extinct. The last collection was made in 1923 and the taxon appeared to have been confined to the area where Sydney is today. It had large flowers and would be hard to overlook. It may have been collected from Royal National Park and so there is some hope it survives. *Boronia parviflora* is very diverse and has a number of unusual forms. In Victoria and South Australia the stamens can be deciduous and flowers may have only four or six stamens. In south-west Tasmania there is a dwarf form that flowers when it is only a couple of centimetres high. This species is also unique in the section in having sepals that are often as big or bigger than the petals, a feature which is more common in tropical Australia (see section *Valvatae*).

Boronia section Imbricatae

This section is monotypic and confined to south-west Western Australia between the Perth and the Sharks Bay areas. The only species, *B. cymosa*, has a large terminal inflorescence and simple leaves like *Boronia* series *Pedunculatae* and a rugose seed similar to that of *Boronia* section *Cyanothamnus*. The inflorescence is on a very long peduncle (a feature shared with diverse groups that co-occur with it). The stems of *B. cymosa* are unique in the genus in that they develop a shiny spongy layer.

Boronia section Cyanothamnus

Boronia section *Cyanothamnus*, with 23 species, is present in all states though it is absent from the Northern Territory. Species of the section usually do not have stellate hairs (three species from WA do), have imbricate sepals and petals, sepals that persist with the fruit, petals with an incurved hook at the tip, and usually rugose seeds. Often the petals are blue or purple, at least on drying, and usually have obvious glands. Some species have bipinnate leaves, a feature shared only with *Boronia* section *Alatae*.



Boronia series Boronia

found in western
Australia (p. 38).

Above: *Boronia megastigma*

Right: *Boronia clavata*
Photos: R Elliot

Below: *Boronia gracilipes*

Below Right: *Boronia pulchella*
Photos: M Gray



Twelve species (11 endemic) are found in eastern Australia from Mt Mulligan of north Queensland to Tasmania and South Australia. In this region most species have pinnate or bipinnate leaves (e.g. *B. bipinnata*, *B. anemonifolia* and *B. anethifolia*). Only *B. anemonifolia* subsp. *aurifodina*, *B. nana* var. *hyssopifolia* and *B. polygalifolia* have simple leaves. Some of the tropical and subtropical species (e.g. *B. bipinnata*, *B. montimulliganensis*, *B. yarrowmerensis*, *B. warangensis*) have small white flowers with petals only 2–4 mm long! *Boronia anethifolia* is unusual in having quadrangular stems; the stems are almost circular in cross section in other species. *Boronia nana* 'stands out' in being a weak shrub that is often prostrate or supported by other species.

Representatives of the section that are endemic to eastern Australia are *B. anemonifolia* (with 4 subspecies: *anemonifolia*, *aurifodina*, *variabilis* and *wadbilligaensis*), *B. anethifolia*, *B. bipinnata*, *B. inflexa* (with 4 subspecies: *grandiflora*, *inflexa*, *montiazuræ* and *torringtonensis*), *B. montimulliganensis*, *B. nana* (with 3 varieties: *hyssopifolia*, *nana* - (photo p. 45) and *pubescens*), *B. occidentalis*, *B. polygalifolia*, *B. rigens*, *B. yarrowmerensis* and *B. warangensis*.

Twelve species (11 endemic) are also found in south-west Western Australia and here most species have simple leaves though bipinnate leaves (e.g. *B. ramosa* - photo p. 45) do occur. Many species have narrow or filiform leaves (e.g. *B. tenuis*). Unusual shapes include lobed leaves (e.g. *B. coerulescens*) and broadly boat-shaped leaves that hug the branch (*B. baeckeacea* subsp. *baeckeacea*). The leaves of *B. westringioides* are whorled (the leaves of most *Boronias* are opposite and decussate) while the leaves of *B. defoliata* and *B. busselliana* are frequently deciduous. The latter species also have lax green stems. Interestingly, *B. defoliata* and *B. busselliana* are found roughly in the same area as *B. juncea* and *B. exilis* (*Boronia* series *Pedunculatae*) that also have deciduous leaves. A few species have stellate hairs (e.g. *B. penicillata*) though these are different to the stellate hairs found in *Boronia* section *Valvatae*. Some of the taxa even have branches that develop into spines (e.g. *B. acanthoclada*). As with *Boronia* series *Boronia* petal colour is variable in the section in the south-west. For example, petals can be white (e.g. *B. acanthoclada*), pink (e.g. *B. baeckeacea*), white to blue or pink/purple (e.g. *B. coerulescens*), green to blue outside with a white margin (e.g. *B. subsessilis*), bright blue (e.g. *B. ramosa* subsp. *anethifolia*), and white turning green with age (e.g. *B. ramosa* subsp. *lesueurana*). Sometimes the colour on the inside of the petals differ from the outside and often, in these cases, the inside is white (e.g. *B. subsessilis*). Other taxa have a midrib that is a different colour to the remainder of the petal. For example petals can be white with a green (*B. fabianoides* subsp. *fabianoides*) or pink midrib (*B. fabianoides* subsp. *rosea*), or pale blue with a darker blue midrib (e.g. *B. defoliata*).

Representatives of the section endemic to south-west Western Australia are *B. acanthoclada*, *B. baeckeacea* (with 2 subspecies: *baeckeacea* and *patula*), *B. busselliana*, *B. coerulescens* subsp. *spicata*, *B. coerulescens* subsp. *spinescens*, *B. defoliata*, *B. fabianoides* (with two subspecies: *fabianoides* and *rosea*), *B. inconspicua*, *B. penicillata*, *B. ramosa* (with 3 subspecies: *anethifolia*, *lesueurana* and *ramosa*), *B. subsessilis*, *B. tenuis* and *B. westringioides*.

One taxon, *B. coerulescens* subsp. *coerulescens*, is unique in the section in being found on either side of the Great Australian Bight (in WA, SA, Vic. and NSW). The only other *Boronia* found in south-western and eastern Australia is *B. inornata* subsp. *leptophylla* (*Boronia* series *Boronia*).

Boronia section Alatae

A monotypic section confined to south-west Western Australia, but in this case (see *Boronia* section *Imbricatae*) to coastal areas and nearby islands south of Perth to the Esperance area. The single species, *B. alata*, lacks stellate hairs, has large, bipinnate leaves, terminal inflorescences, imbricate, persistent sepals and valvate, persistent, pink petals and dull seeds. The inflorescence is unusual in that it is a large panicle, and the petals are unique in the genus in being reduplicate, that is, in bud the edges are flush and turned outwards. *Boronia alata* also has an unusual preference for calcareous soils. Photo p. 45.

Boronia section Algidae

A section of three species that are characterised by a lack of stellate hairs, simple or pinnate leaves, terminal inflorescences, imbricate, persistent sepals, valvate petals, and dull seeds. The three species are: *B. algida* (photo p. 45.) of mostly alpine and subalpine areas of south-east Australia (NSW, ACT, Vic.); *B. edwardsii* of the Fleurieu Peninsula and Kangaroo Island (SA); and *B. corynophylla* of Frank Hann National Park (SW WA). This last species is known from very few collections and is unique in the section in having simple leaves and pale red petals. The eastern species have pinnate leaves and pink to white petals.

Continued in Australian Plants Volume 23, Edition 183



Boronia series Boronia

found in eastern Australia (p. 39)

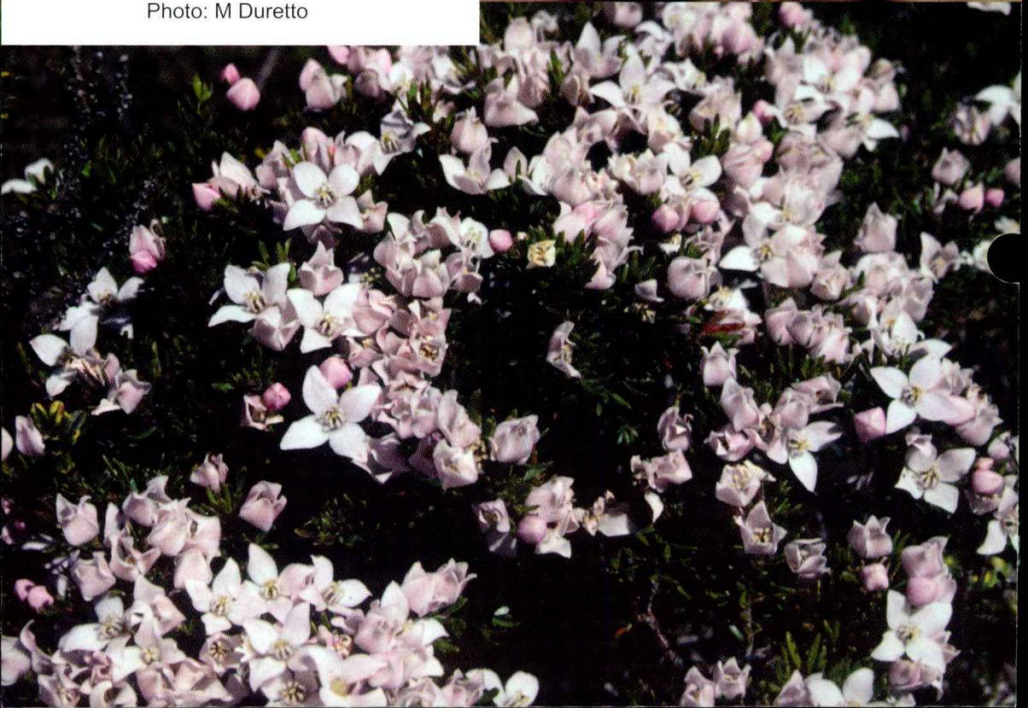
Top Left: *Boronia floribunda*

Top Right: *Boronia pinnata*

Photos: R Elliot

Below: *Boronia citriodora*

Photo: M Duretto





Top: *Boronia nana* var. *nana* showing incurved petal tips (p. 42)

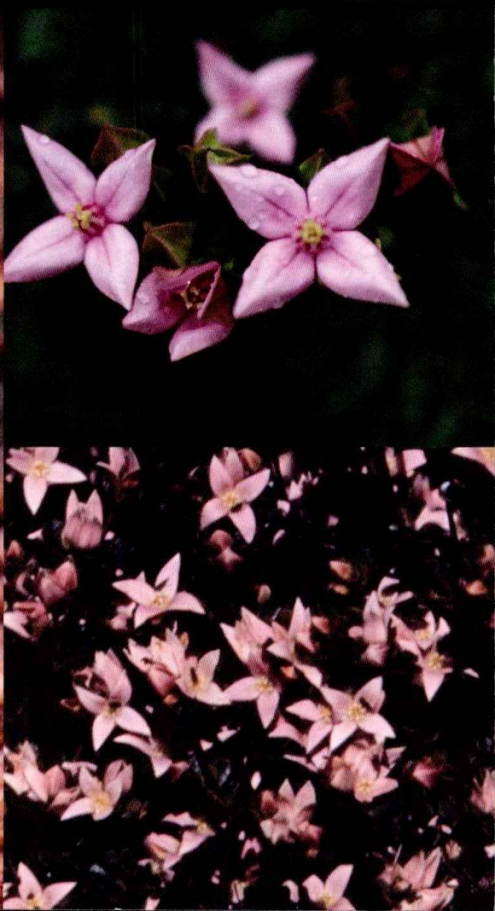
Left: *Boronia ramosa* (p. 42)

Mid Right: *Boronia alata* (p. 43)

Photos: M Duretto

Bottom: *Boronia algida* (p. 43)

Photo: R Elliot



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The Grevillea Book, volumes 1, 2 and 3 by Peter Olde and Neil Marriott, is a complete reference to all species of *Grevillea*. The Australian Plants Society NSW ensured that they were published to a very high standard with at least one large colour photograph of each of the 340+ species, an easily read description of each species and details of its occurrence and cultivation. They are available from the Australian Plants Society NSW, PO Box 744, Blacktown NSW 2148, at \$44 per volume plus postage and handling of \$9.00 for 1 volume and \$15.00 for 2 or 3 volumes within NSW.

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Rainforests in Victoria

Neil Marriott*

Introduction

What is rainforest? Is it a forest that develops only in the presence of high rainfall? As there are many examples of 'dry rainforest' growing in areas down to 900 mm (35") rainfall, this is not so. Perhaps it is a combination of rich soils and high rainfall that create a rainforest? The example of Fraser Island rainforests growing in pure sand would disprove this theory.

A definition of rainforest from *The Language of Botany* defines rainforest as 'a closed community dominated by trees which form a two or more layered dense canopy, in which lianas and epiphytes are, usually conspicuous, and a lower sparse assemblage of small trees, shrubs and herbs, including ferns'.

Perhaps, simply, a rainforest could be defined as 'closed forest, where densely spaced, mostly broad leaved trees form a closed canopy which excludes most sunlight and traps an increased humidity'.

However rainforest definition and classification is quite complex, depending on latitude, altitude, climate and soil type. Evidence suggests that prior to the last Ice Age, rainforest was far more extensive than at present in Victoria. Re-colonisation after glaciation was prevented by recurrent fires, possibly due to the arrival of aborigines or more likely due to the change to a distinctly Mediterranean type climate with its frequent, summer lightning strikes.

Today in Victoria, rainforest is found in limited pockets, mostly less than 100 hectares in size, throughout East Gippsland, the Strzelecki Ranges, Wilson's Promontory, the Central Highlands and the Otway Ranges.

Types of Rainforest in Victoria

There are three distinct types of rainforest in Victoria:

1. Warm Temperate Rainforest

Occurring mostly in East Gippsland with several small patches on Wilson's Promontory, this tropical origin rainforest is restricted to the sheltered gullies and alluvial flats of major rivers, from sea-level to approximately 700 m. This closed forest or 'jungle' has a relatively small variety of tree species. It has a maximum of two tree layers and the lack of a third lower layer clearly exposes the rather narrow (up to 60 cm in diameter) trunks which lack the distinct buttresses that are a feature of subtropical rainforests. Leaves are typically simple and small, tree ferns and ground ferns are usually abundant and rainfall is over 1,300 mm although soils are usually less fertile than in subtropical rainforests.

The dominant tree species is always *Acmena smithii* (Lilly Pilly) with *Acacia melanoxylon* (Blackwood) often co-dominant. Other common species are

* Neil needs no introduction to many members of the 'Society, being co-author of the Grevillea Books with Peter Olde, as well as the previous President of the Australian Plants Society in Victoria and the ASGAP representative of the ACRA. Most know him for his vast knowledge of grevilleas, however he has a keen interest in rainforests. This talk was originally given at the 1995 national ASGAP conference in Ballarat.

