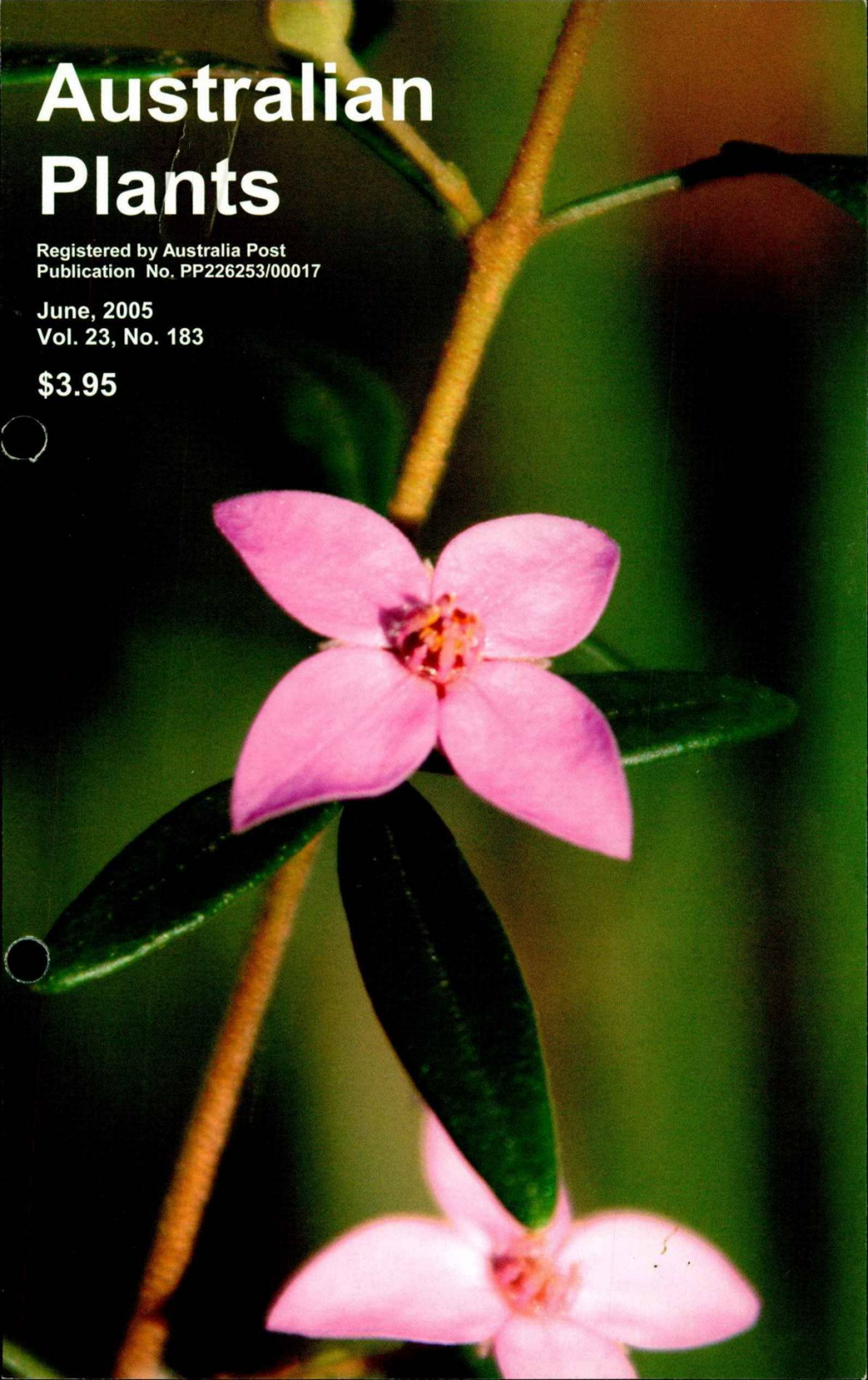
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Editorial

Joanne Caldwell

I hope you enjoyed part 1 of Marco Duretto's account of the diversity found in *Boronia*. The final part of this article includes some interesting photos of some rare species and some photos of some Kimberley species taken by Mark and Russell Barrett.

Colleen Keena encourages you to consider the bark and trunk of local trees when landscaping your garden. She has provided some wonderful ideas for sclerophyll gardens and, along with David Somerville some ideas for rainforest gardens as well. She is so keen for you to experiment with local plants that I had to twist her arm to get the names of the plants in the photos!

Neil Marriot's article on the Wimmera comes with some plants that you can propagate and cultivate in dry Mediterranean gardens, and Doug Rickard demistifies soil pH for us.

Blackdown Tableland in Queensland has some diverse and unusual flora. Ann Mchugh provides an overview of the History and flora of the National Park. The flora is so diverse that her article has been divided into two parts. Again you will have something to look forward to in the next issue.

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Front cover: ***Boronia ledifolia* flower - photo: Manfred Wagner** (p. 85)

Back cover: **Rainbow falls, Blackdown Tableland National Park, Qld - photo: Ann McHugh** (p. 59)

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Our Garden No 46: 'Mindarie'

Rosemary Verbeeten*

My garden is located 25 kilometres north of Launceston at Lanena in the West Tamar Valley. It is 20 metres above sea level and averages a yearly rainfall of 750 mm. The land was cleared approximately 100 years ago for apple orchards. It has gradually been subdivided down to its present size of one hectare.

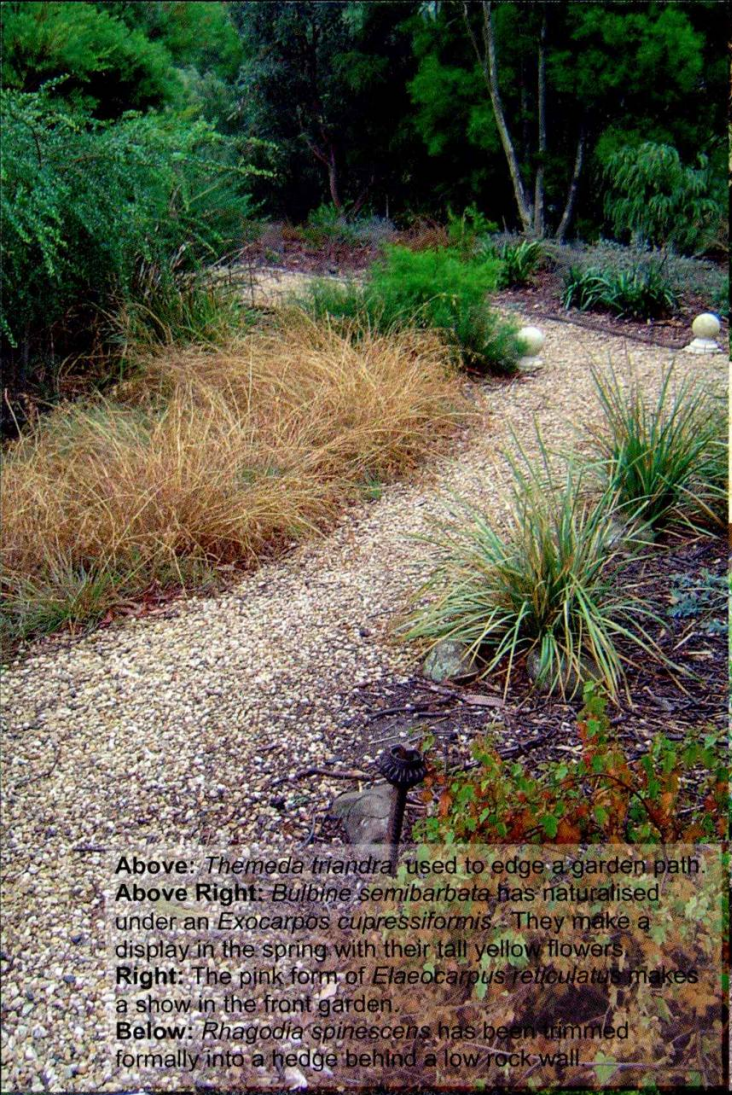
We purchased the property in December 1994 and carried out major renovations to the house during 1995 and 1996. The garden was cleared of unwanted plantings during this time. The work of converting a cleared patch of land back to an extensive 'natural style' garden was started in earnest in the autumn of 1996.

The garden has not been formally planned. The initial plantings were done to create privacy. This was achieved by planting windrows along the north and west boundaries with trays of Forestry Tasmania seedlings. Gardens were created around the house first with small paddocks being kept for sheep on the western side. As these gardens were developed, space became a premium and so sheep numbers were reduced, geese came and went, and fence lines were shifted. The chooks remain. Grassed areas are being retained for vehicular access and native grazing animals like bandicoots. There is an increasing emphasis on indigenous plants from Tasmania. We now propagate most of our own plants. I am always busy in the hot house after a field excursion.

We had to learn to garden with winter temperatures dropping to -5°C. As the garden has grown and matured the damage from frosts lessens every year. The soil is pH neutral and predominantly sandy. This makes very easy digging, but water retention in the summer is a problem. The soil is very hungry and over the years lots of mulch, compost and blood and bone have been worked into it to give it some body.

Not only did we experience frost for the first time, but also soaks and springs. The garden is very wet in the winter months due to soaks coming up. Normally by the middle of winter the water table is at its maximum and further rains create very boggy conditions. To alleviate this, drainage pipes have been installed and ephemeral ponds have been dug. I am always on the lookout for winter wet/summer dry plants. There is no installed watering system. The garden relies on rainfall except under very dry conditions and then some hand watering is carried out. The vegetables and fruit trees get a bit extra. Luckily we are on town water and so the down-pipe for the Northern side of the house is fed to the lined frog pond in the front garden. The beds are all mulched and topped regularly.

* Rosemary has been president of ASGAP for the past 3 years and had her garden open at the ASGAP conference in January 2004.







Above: *Themeda triandra* used to edge a garden path.
Above Right: *Bulbine semibarbata* has naturalised under an *Exocarpos cupressiformis*. They make a display in the spring with their tall yellow flowers.
Right: The pink form of *Elaeocarpus reticulatus* makes a show in the front garden.
Below: *Rhagodia spinescens* has been trimmed formally into a hedge behind a low rock wall.









Above: The frog pond surrounded with planting of *Poa*.
Above Right: *Orthrosanthus multiflorus* is the making a show with *Libertia paniculata* in the foreground.
Right: Nine years old *Eucalyptus viminalis* alongside a garden path
Below: The blue flowering form of *0learia phlogopappa* in the front of the "Chook House" garden.

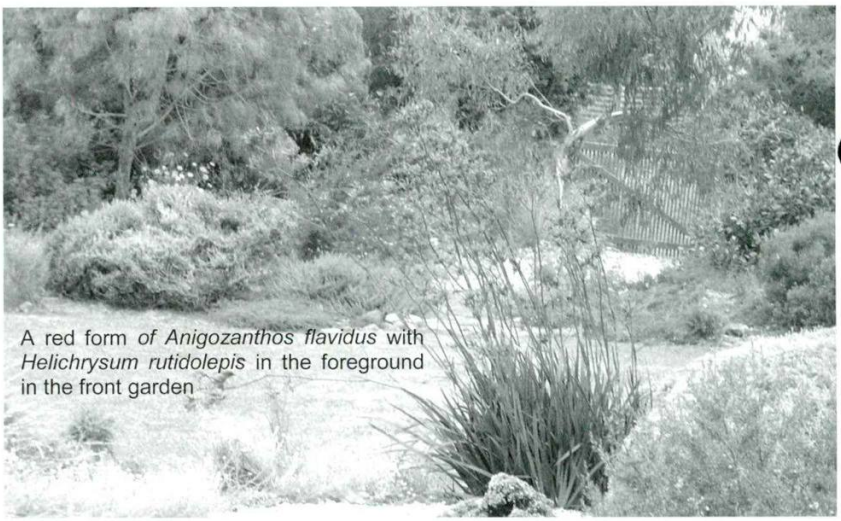
Photos R Verbeeten



This year we suffered in the 'storm' in February like everyone else in the Tamar valley. The damage has been compounded by the prolonged dry of the summer and autumn. It has been the driest summer/autumn since we have lived here. Some locals say the driest ever. The electricity authority has just taken down a large *Eucalyptus* and this has opened up another area to plant with smaller plants.

The garden reflects my increasing interest in monocots. I have planted various forms of Poa throughout the garden. They can be single plants or as a long border. They are an excellent plant for birds, bandicoots and butterflies. I love seeing the rich brown seed heads of the *Themeda triandra* (Kangaroo Grass) waving with a summer breeze. *Anigozanthos* species are another favourite. Only the larger species survive the winter down here and they must have full sun. In the spring the blue of the *Orthrosanthus multiflorus* is a showstopper and in one bed I have offset it with the white *Libertia paniculata*. Bulbines, Dichopogons, Diplarrenas, Thelionemas and Lomandra are just some more of the strappy plants I grow. Another genus that is prominent throughout the garden is Asteraceae (the daisy) family. *Olearia phlogopappa* is a very easy plant to use as long as it is kept out of the badly drained sections. Helichrysums are a lovely annual that pops up everywhere and puts on a spring and autumn display.

With the garden maturing we are able to enjoy the increasing bird life. Over a 12 month period, 30 different species can now be observed. The fauna includes a wombat that has regularly visited us now for over two years. To eliminate fence damage a 'gate' has been installed in the south-western corner behind the dam. Echidnas, Eastern barred bandicoots, Southern brown bandicoots, pademelons, possums, quolls, blue tongue lizards and skinks are just some of the other native fauna that visits us. A pair of Tasmanian native hens nested this year in the reeds on the edge of the dam. Brown tree frog, smooth froglet and common froglet are the frog species noted so far.



A red form *of Anigozanthos flavidus* with *Helichrysum rutidolepis* in the foreground in the front garden

Sclerophyll Bark and Trunks

In an Australian Garden — Colleen Keena

When we returned to Australia in the mid 70s, one of the first books on Australian Plants that we purchased was *All about Australian Bush Gardens* by Betty Maloney, Jean Walker and Barbara Mullins (P1). Having gardened in the tropics for fourteen years, we were used to the colourful foliage of bushes such as Crotons and the bold blooms of plants like Bougainvilleas. However, *All about Australian Bush Gardens* reminded us that there was more to a garden than bright foliage and flowers.

We read comments such as "our flowers are modest; they do not swagger" and we saw illustrations that highlighted aspects of gardening with Australian plants that we had not considered, especially the texture of bark. There were many appealing images that we found stunning but it was the bark and the trunks that made the greatest impression on us, along with descriptions such as "the eucalypts' greatest diversity lies in the trunk; these vary not just according to species, but with the time of the year as well. Some look perfectly unreal, blotched with powdery spots and painted patterns, waxy smooth, blazoned with beads of blood-red amber and dripping liquid wines on wet and rainy days. Bare arms; wild abandoned raiments thrown curling to the feet... And the shapes! Such liquid majesty!" (ibid).

We found the bark and the trunks of eucalypts so impressive that in the thirty years since seeing those images, it has been the textured trunks of the gums that have captivated us when deciding on the purchase of new property.

The other book we purchased at the same time as *All about Australian Bush Gardens* was *Landscaping with Australian Plants* by Glen Wilson (P2). We found bark and trunks mentioned again: "one thing, almost above all else, enables us to landscape in a unique style with Australian trees – the magnificent trunks of so many species: the eucalypts, ranging from the white-grey smoothness of the Lemon-scented Gum, through so many attractive variations, to the rugged grandeur of the ironbarks; the casuarinas, with the fluted trunk of the River She-oak and the intricate pattern of the bark on C. torulosa; paperbarks, the bigger callistemons, the angophoras. Any of these combined with low shrubbery or grass can form a superb landscape".

As we have come to know more about Australian plants, we have come to admire the bark and the trunks of many other species as well. While those enormous eucalypts have been a feature of each of our gardens, we now make sure that we include other species with interesting bark and trunks and photos of some of our favourite textured trunks are attached.

The photos on page 56 are of plants that grow well in sub-tropical south-east Queensland. However, for those in other areas who are interested in distinctive bark and trunks, the suggestion by Glen Wilson of five basic landscaping genera should be noted (P2).

BASIC LANDSCAPING GENERA IN S.E. QLD.

EUCALYPT BARK (below)



Smooth (top) Fissured (below)

ACACIA BARK (below)



GREVILLEA BARK (below)



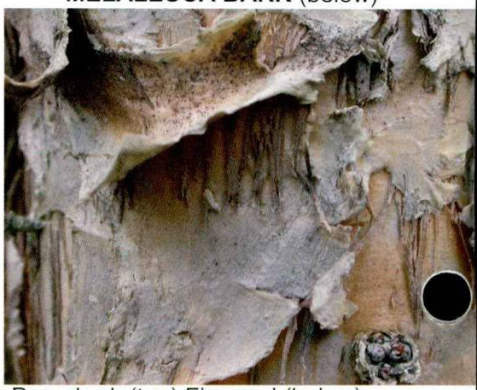
CALLISTEMON BARK (below)



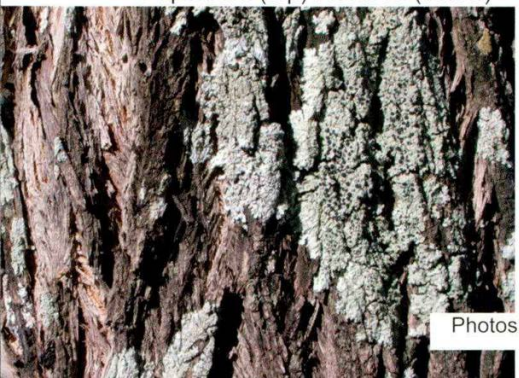
MELALEUCA BARK (below)



Paperbark (top) Fissured (below)



Paperbark (top) Fissured (below)





Photos: G Keena

These are: *Acacia*, *Callistemon*, *Eucalyptus*, *Grevillea* and *Melaleuca* and the reason given for considering these as basic is that simply there is a large number of species (and varieties) from each of these genera that will grow without much fuss under varying conditions, and at the same time contribute gentle foliage and form. He continues that there is no doubt that other genera provide plants of great worth in the landscape and lists *Angophora*, *Banksia*, *Casuarina*, *Hakea*, *Leptospermum* and *Prostanthera*. The photos illustrate the basic genera.

We have enjoyed the bark and the textured trunks of a number of the plants noted by Glen Wilson. We have been fortunate in all our gardens to have some remnant vegetation with magnificent bark and trunks. Other species in our current garden have been planted by previous owners and these are now large enough for us to benefit from the variation in colour and texture of the bark and the trunks of a range of species.

Barrie Gallacher, in Australian Plants Online (W1), suggested that as few plants have the ability to produce flower displays in all seasons, plants should be chosen for their total contribution and consideration should be given to other attributes such as texture of foliage or bark and the overall form of the plants. He wrote that texture is a characteristic of either bark or foliage and that bark texture can range from smooth to rough or deeply fissured and noted that Australian plants exhibit a wide range of bark textures. He concluded that the diverse textures and forms of Australian plants are of greater importance in plant selection than other features such as flowers, fruit, fragrance or bird-attracting qualities, since they can provide year-round interest.

For those interested in finding species that provide all year interest through the different character of their bark and trunks, the challenge is to choose plants that are appropriate for the particular location. Not only will the human inhabitants enjoy such beauty, but a variety of creatures will benefit also when textured trunks become a feature of their environment, especially the birds that probe the bark for insects and spiders and the nest-making birds that source papery bark from species such as *Melaleuca* and *Leptospermum* and string-like bark from some Acacias or Allocasuarinas and the stringy-barked eucalypts (P 3).

References:

P=Print

1. Maloney, B, Walker, J & Mullins, B, (1973) *All about Australian Bush Gardens*, Mulavon Publications, Sydney.
2. Wilson, G, (1975) *Landscaping with Australian Plants*, Thomas Nelson (Australia) Ltd
3. Elliot, R, (1994) *Attracting wildlife to your garden*, Lothian, Victoria.

W=Web

1. http://farrer.riv.csu.edu.au/ASGAP/APOL19/sep00-2.html

Note: The author did not want to include details of the species photographed. All these species occur in many parts of Australia. She hoped that you would consider which of the 'basic landscaping' species occur in their own area.
For this who are interested the photos on page 56 are *Eucalyptus tereticornis*, *Acacia maidenii*, *Eucalyptus crebra* (Ironbark), *Grevillea robusta*, *Callistemon salignus*, *Melaleuca quinquenervia*, *Callistemon viminalis*, and *Melaleuca bracteata*.

Understanding Soil pH

Doug Rickard, Sutherland District Group

I'm sure that at one time or another we've all picked up a book and come across a section talking about the pH of soil. Most folk quickly move on to the next chapter, as all the scientific jargon about pH seems far too complicated - but it need not be. So let us try to get rid of the mystery using simple English to get a basic understanding what soil pH is and what it means to the health of our plants.

How Do Plants Feed?

Plants can be looked on as pumps. The heat from the sun evaporates moisture the leaves, this in turn causes the plant to draw up more moisture in the form of sap from the roots and this lowers the pressure in the roots so that the plant sucks in more moisture from the soil. Remember plants do not have teeth – they can only drink so it's the nutrients in the soil moisture that are important. (I can hear folk that drool over Droseras and gaze in awe at epiphytic Orchids muttering in their beards!)

Why Is pH Important?

The pH of the soil has a bigger effect on soil chemistry than soil moisture, soil air, soil temperature and soil life. Having the correct soil pH for the plants that you are trying to grow may improve your garden more dramatically than any other soil-building effort. Too high or too low soil pH is the most common reason that nutrients present in the soil become locked out of the soil solution and thus are unavailable to the plants. The availability of nutrients to plants changes as the soil pH changes. Acid soils with a pH of less than 6 commonly have deficiencies in calcium, magnesium, phosphorus, potassium and molybdenum. Even more acid soils with a pH of less than 4 commonly have toxic amounts of aluminium and manganese. With alkaline soils having a pH of more than 7 iron, manganese, zinc, copper and boron may be unavailable. To high or too low soil pH will also kill off many of the bugs, worms and other organisms that live in the soil and are so important for its health. But what is pH and how do you find out the pH of the soil in your garden or bushcare patch?

What Is pH?

In plain words it is the measure of acidity or alkalinity. For the technically minded, pH is the negative logarithm of Hydrogen Ion concentration, i.e.

$$pH = -\log_{10}H^{+}$$

In other words, soil pH is a measure of the hydrogen ions (H^{+}) in the soil. The more Hydrogen Ions there are, the more acid the soil. But what are ions?

Continued on page 82

Blackdown Tableland

An Overview _____ Ann McHugh, SGAP Rockhampton

Geography

Blackdown Tableland National Park is situated at the convergence of the Expedition, Shotover and Dawson Ranges, in Central Queensland between 23° 35' and 23° 58' S Latitude and 148° 55' and 149° 15' E Longitude. It is 185 km south-west of Rockhampton, 60 km south-east of Blackwater and 20 km south of the Capricorn Highway. The National Park rises above the surrounding countryside to a height of up to 938 metres at the highest point, with sheer cliffs of 350 metres.

Geology

Blackdown Tableland is an isolated northern part of the Queensland Sandstone Belt, which originated in the Mesozoic era about 200 million years ago. These Sandstones were ancient sea beds in the time of Gondwana Land, and many layers of sandy sediments were deposited over millions of years. The area lifted during the Triassic period and for a time was flat and dry. Later, this area sank again but was no longer covered by the sea but by a large fresh water lake, collecting sands and sediments from rivers flowing from the surrounding ranges. The sandstone belt was beginning to form, and this process continued during the Jurassic period. The tableland is unique in its isolation, its sandstones are mainly of fluviatile origin. The folds forming the three ranges occurred when immense pressures caused a folding, compressing and uplifting of the sedimentary bed-rock, as the earth's crusts shifted and came together. This can be seen today in the convergence of these ranges.

Blackdown is composed mainly of Clematis Sandstone overlaid by Precipice Sandstone, with a thin layer of Tertiary sediments in some areas. These sandstones, in turn, overlay the older Rewan formations and ancient shales. As there is very little, if any, Basalt evident on the tableland, it is reasonable to assume that these ranges were above the level of Volcanic activity about 65 million years ago and therefore higher than other sandstone areas to the south, where Basalt outcrops are more evident. The softer sandstones surrounding the three ranges eroded away, leaving the harder, more compressed areas at the convergence of the syncline, in the ridges and troughs of Blackdown, as we see the tableland today. Isolated for millions of years, this high, remote outcrop was left to evolve its own unique eco-system. The softer Precipice sandstones split and eroded and can be seen on the tableland in many strange forms. The harder Clematis sandstones, eroded by the wind and rain, form the stunning cliffs we know so well. The Tertiary sediments weathered into laterite, red loams and pea gravel in some areas.

The Blackdown Tableland is an amazing place, like an elevated oasis in an otherwise very dry flat area, surrounded by Brigalow scrubs and cleared grazing land. Ann presents an area of great biological diversity.

Above: Approaching Blackdown Tableland from the east.
Below: Stoney Creek escarpment on the north west side of the tableland.
Photos A McHugh



All this activity happened over 200 million years - the history and evolution of the tableland as we know it, spans only about 150 years - a mere particle of sand in the river of time.

The National Park today consists of a deeply dissected and eroded Sandstone Plateau with rocky ridges and sheltered valleys containing light textured, sandy soils and red sandy loams. These are covered by tall open forests, low woodlands, open heath lands and damp seepage heath areas. Many creeks and gullies drain from the plateau along rocky creeks, down through spectacular gorges and drop sheer from beautiful waterfalls. Mimosa and Hazelmere creeks flow south and east into the Dawson River, whilst Planet Creek flows south and west into the Comet River. Stony, Blackwater and Two Mile creeks drain west and north into the Mackenzie River. Numma and Charlevue creeks drain north-east towards the Mackenzie River below its junction with the Isaac River and provide water for the town of Dingo. All this water then enters the Fitzroy River system.

Indigenous History

The first humans on the scene were the Aboriginal people, maybe 20,000 or more years ago. They brought fire and used it to flush game on the lower country, thereby altering forever the evolution of these previously isolated plant communities. Fires are still a significant factor in this respect. The coming of Man to the Tableland is lost in the mists of the Dreamtime. The local people, the Gungaloo, are thought to have been the first to discover and appreciate the permanent waters and unique flora of the area. These sandstone escarpments throughout Central Queensland were places of wonder and mystery to these people. Many were used as burial grounds or for tribal gatherings, and many records were made with ochre on the sandstone overhangs and caves.

European History

The History of the coming of the European white man is a little better documented. The first white man known to explore the area was the German, Dr. Ludwig Leichhardt, on his expedition to Port Essington. From his journal, on 27th November, 1844 he writes: - *Ranges of mountains with conspicuous peaks, cupolas, and precipitous walls of rock, were observed extending at various distances from west by north to north-west. The most distant range was particularly striking and imposing; I called it "Expedition Range".* On the 9th December Leichhardt named Mimosa Creek, and crossed the southern part of the range with difficulty between the 10th and 13th December. Leichhardt noted the similarities of the Expedition Range with the Sandstone Escarpments he had encountered to the South, and that these ranges were interspersed with black soil plains of "Bricklow" Scrub.

During the early 1860's Moses Wafer, an Irishman who came to the Dawson Valley, saw the need for a direct route for his bullock wagons from Rockhampton to Springsure. He found a way through the northern part of the Expedition Range, which became known as Wafer's Gap. Along this route he carried all the wool from the west, and north to Cloncurry till a port was established at Burketown about 1864. Engineer of Roads, Frederick John Byerley built the road through the Gap about 1865. This road was used by Cobb and Co and the western settlers until after the railway went through to

Blackwater. Parts of the road can be seen today with stone pitching and culverts still in working order, a tribute to past engineering feats. In 1865 Moses Wafer and Fredrick Cook built a Hotel on the Eastern side of the Gap, known as the Gap Hotel. In 1868, Sanders Station was divided and sold to Moses Wafer and Fredrick Cook. Moses Wafer named his block Charlevue. Wafer grazed cattle on the tableland, using a track not far from where the present road is today, known as Wafer's Way. He later founded the town of Dingo in 1872.

Another chapter of history comes from Taroom Station which was owned by William Yaldwyn. M.L.C. It was sold in 1863 to Walter Davidson, but repossessed by Willie Yaldwyn, the younger. In the drought of 1868, Taroom station was overstocked and Willie Yaldwyn was forced to take up two blocks of "relief country". They were described as *an extensive area of elevated but inferior tableland country at the convergence of the Expedition, Shotover and Dawson Ranges*, which Willie Yaldwyn named Blackdown 1 and Blackdown 2, after Blackdown House in Sussex, England, the place of his birth and early childhood. Yaldwyn later abandoned these blocks, although the name remained.

As the land around the tableland was divided up into grazing properties, many different families used it. It soon became evident that the country was lacking in some essential ingredient, as cattle grazing there for long periods developed brittle bones (*osteomalacia*) and were often in poor condition. This was considered to be a Phosphorus deficiency. However the rich mountain valleys were used for shorter periods to take advantage of the lush grasses and plentiful water. The McKenzie family purchased Charlevue Station from Wafers in 1919 and held the grazing rights to the Tableland for many years. Then the Homer family of Planet Downs took over the lease in 1944 and made use of the area.

Below: Rainbow falls area circa 1914. Photos taken by the MacKenzie and Wafer families.



Many of the menfolk, on returning from mustering trips, told tales around the dinner tables of the beauty of the many creeks and waterfalls and the magnificent views from the escarpments that they had seen. In time the women persuaded their men to take them to see these sights for themselves. Easter 1914 is possibly the first time the tableland was used for purely aesthetic and adventurous reasons. A party of 6 women and 18 men left Charlevue Station on an organised camping trip. The party was mounted on horses with their gear on packhorses and donkeys. Many stories of this trip have been handed down through the various families, how the riders had to dismount and lead their horses single file around a large jutting rock known as "Devil's Elbow", and how the ladies swept the tents using a large cabbage palm leaf as a broom. The tall timbers, ferns and waterfalls proved to be a source of wonder for all those involved.

Another family expedition was undertaken in April, about 1924 or '25 by five members of the McKenzie family. The older members drove to the foot of the range in a buggy while the younger members rode and led the riding horses. The buggy was left at the foot of the range, and the horses packed with camping gear and food for the ride up. In a beautifully descriptive account of this trip, published in the "Capricomian", Mrs Alice McKenzie tells of the lovely waterfalls and ferny creeks so different to the homestead area. She mentions camping near stockyards and the remains of a hut which she says were built about 30 years before.

A party of 13 Scouts were the next recorded adventurers. They journeyed from Rockhampton by train, and with the help of the McKenzie family, camped on Mimosa Creek on Monday 28th December, 1925. On the afternoon of Tuesday 29th, a smaller party of six and a local guide set out for a short walk up the creek. This party subsequently became lost, and wandered around on top of the tableland, eating lizards and a Goanna, and trying to boil some leather hat bands with Grass Trees and Palms. They finally found their way back to their camp on Friday, New Year's Day 1926. Their guide, who had left them to get help, became completely lost, and was found next day in a very weak condition.

Planet Downs Station grazed about 1,500 head of cattle on the tableland for the summer months, then mustered and removed them in June-July. The track used was on the southern side, between the Shotover and Expedition ranges. Around February 1953 the stockmen from Planet Downs erected a hut, a fire galley, and a new set of stockyards on the tableland, with Morris Ellis the head stockman in charge. A large Stringybark was selected, and it took a day and a half to fell the tree with a 12 ft cross cut saw. By the time the tree fell the scarf was big enough for a man to stand upright. The trunk was cut into 12 foot lengths and then split with wedges to make yard rails and posts. The remains of these yards are still standing to this day. The hut was built with the thick bark cut from the stringybark on a frame of split timber from the limbs, all wired together. This hut, which was large enough for seven men to sleep in, was burnt down in a severe fire a few years later.

Botanical History

The identification of the Flora of Blackdown Tableland has been a continuing process since 1844. Leichhardt had collected some botanical specimens on his expedition, and these were subsequently described by Bentham in the 1860's in *Flora Australiansis*. Some plants were collected by Inspector Twine of the Lands Commission on his visit in April, 1924. These were identified by C. T. White, the then Government Botanist. The unique Flora of the Tableland was beginning to attract interest when Mr H. George Simmons from the Rockhampton Botanical Gardens visited the area in Sept-Oct 1937. Specimens from this expedition were sent to the Queensland Herbarium, causing a great deal of interest. In September 1959, Dr. R. Johnson of the Qld Herbarium spent two days in the Two Mile Creek area and collected about 180 specimens. Mr. Cliff Gittens of Sydney visited the area in 1961, 62, 64 and 65 and added further to species known from the area. During the 1960's Dr. L.A.S. Johnson from the Sydney Herbarium explored the northern escarpments in search of specimens. The Queensland Herbarium conducted two expeditions to Blackdown in April and again in September 1971. The Botanists involved were R.J.F. Henderson, B. Andrews, P. Sharpe and Miss L. Durrington. These people collected extensively and so increased the number of plants listed for the area. Steve Pearson and fellow National Park Rangers continue this work to the present day. The number of identified plants grew and now numbers in excess of 700.

Management By The Crown

As early as 1906 the Land Commission was aware of the timber assets on the Expedition Range. Some surveys were conducted and several attempts were made to auction rights to the resource. However, because of the absence of any usable road and the rough nature of the country, nothing eventuated. As the timber on the more accessible areas of Central Queensland was being used up and the towns required more timber for building, the Lands Commission began to look further afield for a sustainable, usable timber supply. Wilson, Hart and Company, a local timber merchant paid a deposit on the purchase of the timber-getting rights in 1947 but the Company lost interest and was granted a refund. In January 1950, Forest Road Engineer J. Good did a comprehensive survey, and estimated the cost of a road to be between 40,000 and 59,000 Pounds. Eventually in 1969–71 a road was constructed. This required extensive maintenance in the first three years, because of washouts and floods during the summer rains. Since then many thousands of super feet of timber has been recovered from Blackdown, and the Department of Natural Resources continues to monitor the area, although no timber is being taken at the present time.







Above: *Acacia gittinsii*
Photo B J Plumb

Top Right: *Acacia leichhardtii*

Right: *Acacia storyi*
Photos A McHugh

Below: *Acacia polifolia*
See Page 67 Photo B J Plumb



In 1978 discussions were had with the Homer family with the aim of establishing a National Park on the tableland, and the first parcel was transferred from a Forestry Lease. The Government Gazette notes on 26th January 1980 about 6,359 hectares of land were acquired for National Park. This was Section 181, Parish of Wattle, with an average height of 390 Metres. It was further reported in the Government Gazette on 13th November 1982 that a further 17,430 hectares were added - making a total area of about 23,000 hectares with a maximum height of over 900 metres. Signatures were required from 17 different lessee landholders around the perimeter of the Park. A third area of about 8,280 hectares south west of the existing Park, in the Ballamoo Cliffs area, was Gazetted on 25th February, 1994, thus the total area now set aside is just over 32,000 hectares. All grazing leases have now expired. The Park is in the process of being fenced wherever practical, and when this is complete all cattle will be removed. This will then allow the Department of the Environment, in conjunction with the Department of Natural Resources, to plan long term management of the whole area, with particular attention to controlled burning, weed control and visitor impact.

Camping was allowed during the Forestry's era. Unfortunately, many of the early visitors removed loads of Ferns, Elkhorns and Orchids. The escarpment behind the present Mimosa Creek camp area was said to have been covered with Orchids and Elkhorns, none of which remain today. Most campers used the area above Rainbow Falls as the main camp ground and up to 1,000 campers were there at one time. This was closed during the later part of the 1970's to stop the pollution and serious erosion that was occurring. However camping was still allowed up to 2 km from a road or track. The Forestry Department was still responsible for all the roads for their logging activities and managed the area in conjunction with the then Qld National Parks and Wildlife Department. There have been three Chief Rangers appointed to Blackdown to the present time - Steve Pearson, Michael O'Connor and the present Ranger Chris Artimiew.

The present camp site at South Mimosa Creek has a capacity of 200 in 28 camp sites and a day picnic area. Horseshoe Lookout has a day picnic area with Barbecue fireplaces and toilets. There is also a picnic table at Charlevue Lookout along the North-eastern escarpment. There are several well maintained walking tracks giving access to waterfalls, many lovely lookouts and most of the flora and birds of the Tableland.

Flora

The Flora of Blackdown is remarkable. Because of its height, the many deep gorges which face in all directions, and the many waterfalls and sandy creeks, Blackdown Tableland has a great variety of different plant communities, and this is why there is such a huge number of different species in this one area. Even the heathlands are diverse. Some are open rocky and rather dry areas, others are wet swampy areas and still others are where the shallow sandy soils cover sandstone bedrock with water seepage after rain.

There are over 700 species now listed, spread over 112 families of plants and some 20 families of ferns and fern allies. Of these some 35 species are endemic to the area. The higher parts of the Tableland, on the Expedition Range receive up to1,000 mm or more of rainfall in a good season, and support tall eucalypt forests, while Mimosa and Rainbow creeks feature ferns and palms. The Dawson Range abuts the Expedition Range in an east-west direction near Horseshoe Lookout. Heath vegetation, a highlight of the National Park, is the main feature here, in the sandy soils. The Shotover Range runs parallel to the west of the Expedition Range, south of Stony Creek. Rainfall in this area is less than the higher areas and drier woodland communities occur.

Of the larger trees the Eucalypts number about 19. Most significant being the beautiful *Eucalyptus sphaerocarpa*, the Blackdown Stringybark. This tree and *E. mensalis* are two stringybarks endemic to the Tableland. Of the two Angophoras, the Smooth Barked Apple, *Angophprpa costata*, is to be seen around the camp ground. The other Angophora is the beautiful Rusty Gum, *Angophora leiocarpa*. Of the three Casuarinas the one most common is *Allocasuarina torulosa*. Other significant trees are *Corymbia leichhardtii* (syn. *Eucalyptus leichhardtii*), the yellow jacket, and a form of *E. saligna*, which is considered a provenance variation, interbred with *E. grandis*, although no Rose Gums occur on Blackdown.

The Proteaceae family is well represented with about 14 species in 9 genera. Fabaceae are represented by many genera, the most notable are about 42 Acacias of which at least 2 - *Acacia gittinsii* (rare) and *Acacia storyi* are endemic. The rare Blackdown Cabbage Palm, *Livistona fulva*, as with many of these Livistonas, has its own variations. Also the endangered *Macrozamia platyrhachis*, a relic from the days of the dinosaurs, is unique and quite different to any of the species elsewhere.

Of the great variety of beautiful heathland flowers, shrubs, grasses, rushes and forbs many families are represented, notably Asteraceae, Dilleniaceae, Epacridaceae and Rutaceae. These can be seen in great profusion along the Peregrine Lookout walk and also in the walks to the Aborigine Art Gallery via the Mimosa Culture Track, Officer's Pocket and above Rainbow Falls.

To be continued...



Top Left and Right:
Angophora leiocarpa
Photos B J Plumb and A McHugh
Right: *Eucalyptus sphaerocarpa*
Photo A McHugh

Below:
Macrozamia platyrhachis
See Page 67 Photo B J Plumb



Above: *Corymbia leichhardtii*
Photo BJ Plumb
Right: *Corymbia leichhardtii*
Photo A McHugh
Below: *Livistona fulva*
Photo BJ Plumb





Rainforest Bark and Trunks

In an Australian Garden _____ Colleen Keena and David Somerville

The term 'sclerophyll' is traditionally used for the open woodlands and scrubs dominated by eucalypts, acacias, etc. (W1) and these were the plants mentioned in the previous article 'Sclerophyll Bark and Trunks' (see page 55). It was noted that texture is a characteristic of either bark or foliage and that bark texture can range from smooth to rough or deeply fissured. It was also noted that Australian plants exhibit a wide range of bark textures (Gallacher:ibid).

This section will indicate some of the features that are useful to consider when designing with the bark and/or trunks of Australian Rainforest plants. Rainforest has been defined as being composed of densely-spaced woody vegetation, which is frequently referred to as closed forest because the dense canopy intercepts most sunlight (P1).

When looking at the bark and/or the trunks of rainforest plants, some features such as the texture of the bark are still important but there are other characteristics that can make designing with rainforest plants very different. It should be noted that while rainforest species can be established in a wide range of conditions, best results are likely on sites to which they are naturally adapted (P2). The text and images identify examples of rainforest plants that are found in south-east Queensland. It is important to note that in general, rainforest plants in cultivation grow to only about a third of their height in the forest (P3). The authors have grown most of the plants mentioned in the text.

Not all books dealing with rainforest plants mention bark and/or trunks in detail, but one of the books that does is *Australian rain-forest trees* by W.D. Francis. This book has been used as a reference, as has the *Rainforest Guide* produced by Brisbane Forest Park which illustrates and describes species which occur within the park (P1).

Perhaps one of the most memorable features of a visit to rainforests in the tropics and sub-tropics, is seeing the peculiar flattened extensions of the roots and stems of some species of trees. These flattened extensions are known as buttresses (see image). We were so impressed with the buttresses on *Elaeocarpus grandis* that this has been one of the first species that we have planted in our gardens. It is fast growing and its buttresses can be observed at an early age.

Buttressed Australian rainforest trees include *Ficus* spp. and *Syzygium* such as *Syzygium australe*, *S. luehmannii* and *S. francisii* and the *Toona australis* (Red Cedar). According to Francis (ibid), this peculiar structural feature is not confined to any particular family of plants but occurs in species and genera of families which are often widely separated from each other. Local rainforest plants can have flanged (see image) or channelled stems. These are angular or sub-angular in section. Species with flanges at the base include *Acmena ingens* and *Ehretia acuminata*.

The bark is also a feature of many of the trees in the rainforest and there is a considerable degree of diversity in appearance, thickness and structure.

The commonest colours are greys and browns. The most noticeable type of bark is the very smooth, green or brown-coloured, thin bark. One of the most attractive smooth barked trees is *Austromyrtus bidwillii* (Python Tree), which has blotched orange-brown and green, snake-like bark (see image). *Elaeocarpus eumundi* has colourful figured bark (see image) and *Flindersia collina* has distinctive greenish grey bark, which is shed in rounded or irregularly oval pieces which leave very prominent depressions on the surface, hence the name Leopard Tree. Some species have white or pale grey bark, some have deeply fissured or furrowed barks. The rough bark of *Araucaria cunninghamii* (Hoop pine) often has transverse wrinkles or fissures. *Brachychiton* species such as *B. discolor* and *B. acerifolius* have fissured bark. *Baloghia inophylla* has tessellated bark. Scaly-barked species are fairly common with species such as *Rhodosphaera rhodanthema* having very scaly bark. Other species such as the *Glochidion ferdinandi* (Cheese Tree), has flaky bark. Papery bark can be found on *Elattostachys xylocarpa*. *Melicope micrococca* has rough, corky bark. Corky bark is also found on *Erythrina vespertilio*, along with thick spines on the trunk and branches. *Zanthoxylum brachyacanthum* has prickles that become thorns (see image). The appearance of the bark is influenced to a great extent by the manner in which it is shed. In *Flindersia australis*, the brown bark is shed in rounded flakes, leaving circular depressions. In *Tristaniopsis laurina*, the pale, smooth light grey bark sheds in thin strips to a lovely deep red. The bark of a number of species exudes a milky sap when cut. *Ficus fraseri* (Sandpaper Fig) possesses a clear sap, and this sap is very obvious when harvesting the fruit.

Another noticeable aspect of the rainforests of south-east Queensland is the presence of lichens that can be found on trunks (see image). These may show as lighter-coloured blotches on species like *Alectryon tomentosus*. *Podocarpus elatus* (Native Conifer) has scaly, tan, longitudinally fissured bark which frequently has roundish, white patches of lichens. Lichens can be found on *Ficus* spp., even those isolated in remnant vegetation.

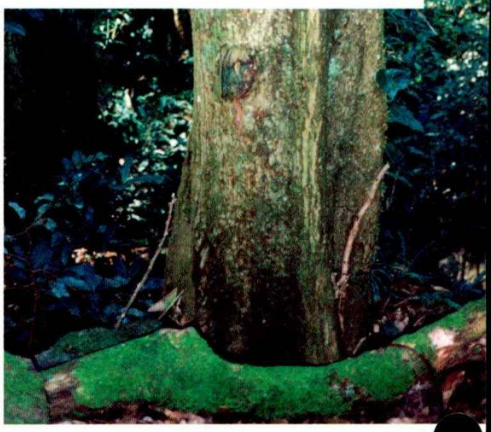
A further characteristic of rainforest plants is that the flowers may occur on the stem of a plant, in which case the plant is described as cauliflorus (see image). This occurs in species such as *Hedraianthera porphyropetala*. The flowers may also occur on older branches. This is known as ramiflorus (see image) and is found in species such as *Castanospermum australe*. We have planted species which flower on either the stems or older branches and have enjoyed this feature in the garden.

Yet another memorable feature in the rainforest is the sight of aerial roots. Some forms of *Ficus virens* can have large branches supported by aerial roots and where there is space to plant such a large tree, the aerial roots can be seen on even quite young plants. *Ficus watkinsiana* is generally a strangler fig, with a hollow trunk. The tree on which it germinates is eventually killed by the enclosing roots and stem.

SOME RAINFOREST SPECIES OF S.E. QLD.



Buttressed TRUNK of
Pseudoweinmannia lachnocarpa



Flanged TRUNK of
Ehretia acuminata



Smooth BARK of
Austromyrtus bidwillii (above)
Dimpled BARK of
Flindersia collina (below)



Mottled, Coloured BARK of
Elaeocarpus eumundii (above)
Orange BARK of
Syzygium corynanthum (below)





Photos: D. Somerville

SOME RAINFOREST SPECIES OF S.E. QLD.





Smooth, coloured BARK of
Choricarpia subargentea (above)

Tessellated BARK of
Notelaea longifolia (above)





Zanthoxylum brachyacanthum (above)
TRUNK with prickles
Hedraianthera porphyropetala (below)
TRUNK with Flowers

Jagera pseudorhus (above)
TRUNK with Lichens
Castanospermum australe (below)
BRANCH with Flowers





Photos: D. Somerville

There are a number of deciduous rainforest species and the beauty of their bark can be readily appreciated when the branches are bare. The authors have planted *Melia azedarach* (White Cedars), right along the north of the house. In less than five years, they are shading the house in summer and allowing sun to warm the house in winter. The bark, which is dark and very prominently furrowed, becomes a feature throughout the colder months.

In June 2000, Brisbane City Council selected an initial five indigenous rainforest species for a formal street tree trials program. This has been extended to sixteen trial species. Details can be seen at W2. While features such as the attractive flowers of rainforest species like *Brachychiton acerifolius* (Flame Tree) or *Buckinghamia celsissima* (Ivory Curl Tree) and the colourful new foliage of species such as *Syzygium luehmannii* are well known in the streetscapes of Brisbane, the addition of so many plants in the street tree trials with distinctive bark and/or trunks may lead to an even greater appreciation of the contribution that the bark or trunks of local rainforest species can make in the landscape. Species being trialled include Alectryon tomentosus, (radial rings, fluted, flanged trunk), *Aphananthe philippinensis* (brownish-grey, scaly bark), *Brachychiton discolor* (grey, fissured or furrowed bark), *Elaeocarpus eumundi* (colourful figured bark), *Dissiliaria baloghioides* (bark may shed in flakes or strips, base of trunk somewhat flanged), *Elaeocarpus obovatus* (bark grey, slightly rough but not scaly, often buttressed at the base), *Flindersia collina* (mottled green and brown bark marked with irregular dimples), *Flindersia xanthoxyla* (bark grey or grayish-brown, scaly, shed in oblong pieces) and *Rhodosphaera rhodanthema* (very scaly bark shed in scales).

When either bark or trunks are featured in a rainforest landscape, there are many distinctive characteristics of both the bark and the trunk from which to select. Incorporating a variety of plants with these interesting and aesthetically pleasing qualities will add to your present and future enjoyment of your garden.

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P=Print

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Wimmera Woodland Plants

Neil R Marriott

The Wimmera Plains

The Wimmera plains is a large area of deep cracking grey to red alluvial clays laid down by former marine incursions into this western Victorian region. Originally covered in beautiful open Buloke, Box and Yellow Gum Grassy Woodlands with patches of Plains Grassland, the region is now largely cleared and modified by agriculture.

However priceless remnants can still be found - there are several small to medium sized reserves and numerous patches of private bushland. As Regional Manager for the Trust for Nature I am in the fortunate position of being paid to visit these remnants and work with the landowners to encourage them to permanently protect them with Conservation Covenants. In several contracts with the Federal Department of Environment and Heritage I also carried out extensive surveys of grassland remnants in the region. These jobs have led to the discovery of many beautiful and often rare plants, plenty of which have proven to be ideal for cultivation in dry Mediterranean gardens.

Gardener's Tip: Many of these plants are ideal for Cultivation in dry Mediterranean gardens.

The Saltbushes

Being a former seabed in times gone by, the Wimmera Plains support numerous Chenopods or 'saltbushes'. Many of these make great drought tolerant foliage plants, that also have the advantage of being fire retardant. The best of these for garden cultivation would have to be *Chenopodium desertorum* ssp. *microphyllum* (**Small-leaf Goosefoot**) which makes a delightful silver leafed mat to around 0.5m across with tiny little leaves and a great big scientific name. Readily propagated by cuttings. Photo page 76.

Enchylaena tomentosa (**Ruby Saltbush**) is a vigorous groundcover 1–2 m across with dense linear grey-green leaves and massed orange, yellow or ruby red berries for many months of the year. Ruby Saltbush is excellent for establishing under big old trees where little else will grow, and it is a popular with berry eating birds and honeyeaters that relish its succulent berries. Readily propagated by seed or cuttings. Photo page 76.

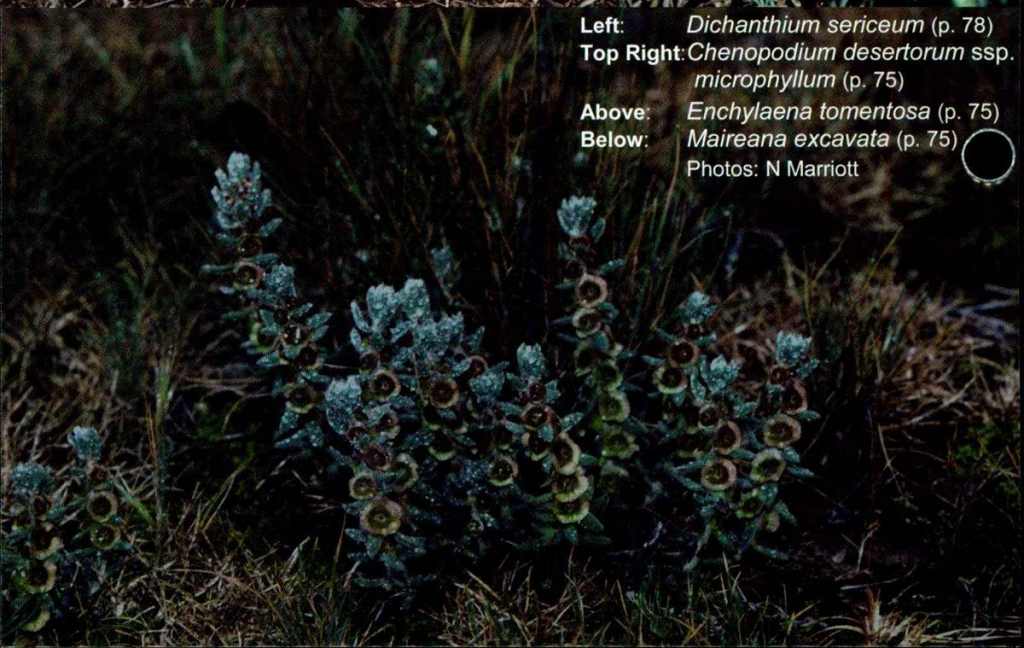
Maireana excavata (**Bottle Bluebush**) is a beautiful little grey leaved plant to 0.2 x 0.3 m with the most attractive pink-bronze winged fruits. Sadly this plant is now rare in the region, being all but wiped out by over-clearing, grazing and rabbit destruction. Propagated by seed. Photo page 76.





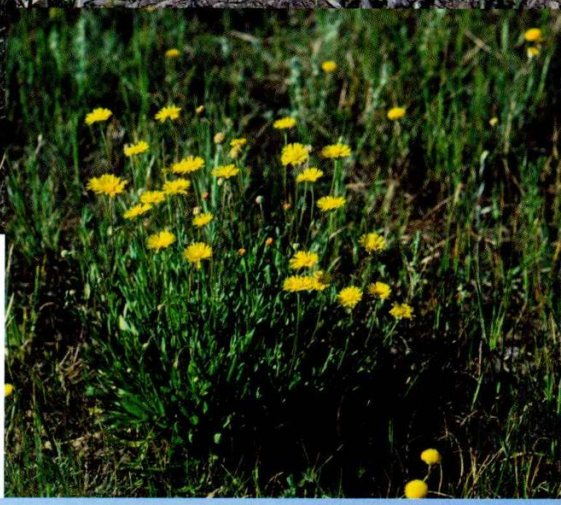


Left: *Dichanthium sericeum* (p. 78)
Top Right: *Chenopodium desertorum* ssp. *microphyllum* (p. 75)
Above: *Enchylaena tomentosa* (p. 75)
Below: *Maireana excavata* (p. 75)
Photos: N Marriott









Above: *Calocephalus citreus* (p. 78)
Top Right: *Brachyscome dentata* (p. 78)
Right: *Brachyscome chrysoglossa* (p. 78)
Below: Wimmera Buloke Woodland
Photos: N Marriott



The Native Grasses

Native grasses dominate the majority of the ground flora of the Wimmera plains. The most common are the Wallaby Grasses (*Austrodanthonia* spp.) and Spear Grasses (*Austrostipa* spp.). Some of the best would include:

Austrodanthonia bipartita (**Leafy Wallaby-grass**) is nowadays rare on the plains – it is a robust, large leafed grass with flower spikes to 1 m that are soon followed by showy silver-haired seeds that look beautiful when placed where they can be seen with back-lighting.

Dichanthium sericeum (**Silky Blue-grass**) is another uncommon grass in the Wimmera these days. It is a most attractive blue foliaged tussock with numerous silver-grey flower/seed spikes that arise over the warmer months depending on summer rainfall. However care must be taken as it can seed freely and if planted near bushland where it does not belong this could be a problem. Photo page 76.

The Daisies

After the beautiful native grasses and saltbushes, it is the daisies that are a real feature of the grasslands and grassy woodlands of the Wimmera Plains. There is a multitude of annual as well as perennial species and some of the best for cultivation are

Brachyscome dentata (**Lobe-seed Daisy**) is a hardy and very showy small herb to 0.3 m with large white flowers during spring. It seeds prolifically to form delightful swathes both in the wild and in the garden in well-drained loamy soils. As with all Brachyscomes they propagate readily by seed once you have two different plants for cross-pollination. They also strike readily by cuttings, however two cutting grown plants from the same parent plant will not outcross to produce seed. Photo page 77.

Brachyscome chrysoglossa (**Yellow-tongue Daisy**) is one of Victoria's rarest daisies and unique in the Wimmera for being the only one with showy yellow flowers. Growing in winter-wet grey clays and loams that set like a rock in summer, Yellow-tongue Daisy is an extremely hardy and showy small herbaceous shrub to 0.3 x 0.5 m with simple to divided green leaves and massed yellow flowers for many months of the year. This species propagates readily from seed or cuttings. Trim back after flowering for a long-lived compact plant. Photo page 77.

Calotis scabiosifolia var. *integrifolia* (**Rough Burr-daisy**) is a root-suckering small herb with rough green leaves and massed showy large white or occasionally mauve flowers during winter-spring. This plant is an excellent hardy coloniser of harsh dry sites under or between *Allocasuarina luehmannii* (**Bulokes**) in the wild, and performs well in similar situations in the garden. Due to the irritating burr seeds it should not be planted close to paths. Propagates readily by seed, cuttings or division.

Calocephalus citreus (**Lemon Beauty-heads**) is a beautiful summer-flowering grey foliaged herb to 0.3 x 0.4 m with terminal lemon button flower heads. Tolerant of winter wet soils that dry hard in the summer, Lemon Beauty-heads makes a versatile garden plant readily propagated by cuttings or seed. Looks best when mass-planted. Photo page 77.

The Peas

There are a number of delightful small pea flowers that make a brilliant display in the garden. My favourites are from the Wimmera are:

Eutaxia microphylla (**Common Eutaxia**) - a really tough little groundcover with tiny grey leaves and massed orange flowers in late winter-spring. Common Eutaxia grows naturally in heavy winter-wet soils and makes an excellent and adaptable showy garden plant. Readily propagated by seed or cuttings.

Pultenaea pedunculata (**Matted Bush-pea**) is a well-known hardy groundcover that becomes more common where the plains run into the foothills of the Grampians. Variable in colour from pure yellow through to the deepest orange or occasionally pinkish, Matted Bush-pea is an excellent rich green carpeting plant that grows readily under trees and open shrubs to form an excellent living mulch. Propagated readily by cuttings.

Templetonia stenophylla (**Leafy Templetonia**) is a rare low open sub-shrub with the most beautiful large pale lemon flowers during the winter months. Rarely cultivated, this plant grows well as an understorey plant in the garden. In the wild it is normally found growing in the wild under *Allocasuarina luehmannii* (**Bulokes**) and *Eucalyptus leucoxylon* (**Yellow Gums**) and is happy in a similar situation under cultivation.

Larger Shrubs and Trees

Whilst grasslands and grassy woodlands as a rule have very little midstorey, occasional shrubs do appear, particularly where creeks meander their way across the extensive plains.

Allocasuarina luehmannii (**Buloke**) is the dominant tree over most of the Wimmera Plains. It forms a large erect branched tree and is capable of growing to a great age, with some specimens recorded being 600–800 years old. Sadly the vast majority of Buloke Woodland is now gone and the community is now listed as nationally endangered, with few big old specimens remaining. However it grows slowly but steadily under cultivation from seed to form a beautiful tree full of sighing music when the wind blows.

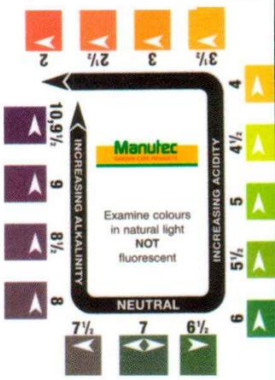
Amyema linophylla ssp. *orientale* (**Buloke Mistletoe**) is a spectacular, but nowadays rare native shrub that demands discussion when talking about Bulokes. Buloke Mistletoe is a wonderful hemi parasite that must have the Buloke for its survival (although it can also be found on the closely related Belah). Being a hemi parasite, Buloke Mistletoe produces its own sugars by photosynthesis but gets its water and minerals from its host. As a result, so long as the host tree is in a healthy state, the two plants grow together without any problems. Buloke Mistletoe is a mass of bright pinky-red flowers in the heat of summer, providing a valuable nectar supply to Honey-eaters and other birds and some animals. Plants can be established in the home garden by collecting the fresh sticky berries and placing them on the lower surface of a branch on your Buloke. Photo on page 80.

Above: *Callistemon wimmerensis ms* (p. 81)
Below Left and Centre:
Amyema linophylla ssp. *orientale* Buloke Mistletoe (p. 79).
Photos N Marriott

Below Right: A typical Colour Card from a pH Test Kit (p. 82).







Bursaria spinosa (**Sweet Bursaria**) is most aptly named, as it is a wonderful mass of richly perfumed white flowers during early summer. These attract a host of native butterflies, bees and wasps to the shrub, and one of these wasps is a valuable controller of caterpillars on young eucalypts. Sweet Bursaria is an excellent dense medium to large shrub for harsh dry sites, and its prickly branches and dense green leaves form an excellent retreat and nesting site for our small birds. Propagate from stratified seed.

Callistemon wimmerensis ms (**Wimmera Bottlebrush**) is a strongly erect large shrub to small tree to 10 m that I recently discovered growing in a small area to the south of Horsham. It is amazing that this region which has been settled for over 150 years is still revealing plants new to science – it makes you wonder just how many species we have lost before we ever knew of them! Wimmera Bottlebrush is interesting in that it grows side by side with *Callistemon rugulosus* and yet there is no sign of hybridisation. The flowering is in early summer with massed lavender-pink flowers. Untried as yet in cultivation, but certain to be hardy to hot dry summers and cool wet winters.

Conclusion

This is but a tiny selection of some of the wonderful plants that occur naturally on the Wimmera Plains. I hope it encourages locals and those in similar climates to try out some of these plants in your gardens or revegetation projects. Better still though to look at what is growing in your own area and try out some of them.

 continued from page 58

Take the example of common salt or sodium chloride (NaCl). When it dissolves in water it splits into two ions – an electrically positively charged sodium ion (Na^+) and a negatively charged chlorine ion (Cl^-). Evaporate the water and the two ions recombine to form little grains of salt. Similarly water (H_2O) is made up of two ions – a negatively charged hydroxyl ion (OH^-) and a positively charged hydrogen ion (H^+). How big are these ions?

They are very, very small - you can easily pack about 100,000,000,000,000,000,000,000 ions into 1 cubic centimetre.

The pH Scale

The pH scale runs from 0 (most acid) to 14 (most alkaline). Acids have a pH between 0 and 7; alkalis have a pH between 7 and 14 whilst pure water is neutral with a pH of 7.

Because the scale is logarithmic, going down the scale from 7pH (neutral), each number is 10 times more acid than the one before it. A soil with a pH of 6 is 10 times more acidic than a neutral (7pH) soil; a soil with a pH of 5 is 100 times more acidic than a neutral (7pH) soil. Similarly each 1pH going up the scale is 10 times more alkali that its predecessor.

The pH of sulphuric acid is about 0 and the acid in your stomach is about 1.5pH. On the other hand the pH of caustic soda is about 14 and lime about 12pH. Your blood is slightly alkaline (pH = 7.2) but cow's milk is slightly acid (pH = 6.5). On the basis of its acidity alone there seems to be a case for drinking beer (pH = 4.8) rather than tea (pH = 4 when hot, dropping as it cools).

How Many Hydrogen Ions Are There?

As a rough guide, there is about 1gram of hydrogen ions in a litre of sulphuric acid (pH = 0). At the other end of the scale, you would need 100 million, million litres of caustic soda (pH = 14) to end up with 1 gram of hydrogen ions. In the middle of the range pure water (pH = 7) has 1 gram of hydrogen ions in every 10 million litres.

What Is Normal For The pH Of Soils?

It depends on where you live. In the average garden the pH of the soil ranges between about 5 (acid soils) up to a little under 8 (alkaline soils). Go into the desert and you will find that the soil pH is usually strongly alkaline and can range from about 7 up to over 10. However, if you go to a swamp and check the pH of sphagnum moss or peat you will find that they are strongly acidic with a pH between about 2.2 and 4 – this is about as acidic as vinegar or lemon juice but not as acidic as the acids in your stomach or Coca Cola! Bush soils on the East Coast generally are acidic whilst those on the other side of the Great Divide, and particularly in Western Australia, are alkaline - thus most WA plants grow better on the East Coast if they are grafted onto local rootstock.

Does The pH Of The Soil In My Backyard Remain The Same?

The short answer is no. The pH of your soil can change by up to 1 following periods of heavy and prolonged rainfall or drought. In the short to medium term the addition of lime and fertilisers to the soil will change its pH. Also It has been found that over the past few decades the pH of soils in the inner suburbs of our cities have fallen due to the effect of acid rain as a result of motor vehicle and industrial emissions (including emissions from homes with wood-fired heating systems).

On a more local scale remember that a couple of metres can be a long way in a garden. If, in the past, builder's waste or cement has been dumped in an area, the soil may look like that nearby but its pH can be vastly different. A patch that is subject to continued stormwater run-off from a concrete driveway will quite likely be more alkaline than other areas in your garden.

Bushfires will also change the soil pH, although after a while it will return to its natural level. The immediate effect is that the soil pH will rise by up to 1pH (i.e. the soil becomes more alkaline). But a bushfire also releases vast quantities of smoke, ash, water vapour (steam) and carbon dioxide (CO_2) into the air. As it rises the water vapour cools and condenses back into water droplets that combine with the CO_2 to form carbonic acid that then falls as acid rain thereby reducing the soil pH.

Measuring Soil pH

Two main methods used to determine the pH of soil are a simple pH Test Kit or a pH Meter and its associated Electrode System. Unless you are a chemist or an experienced user of pH Meters and understand concepts such as buffering and the calibration of the meter, then the use of a pH Meter is far too complicated for the average gardener. If you send your soil sample to a Soil Test Laboratory they will determine its pH using a pH Meter. The simple low-cost pH test meters that you find in many garden centres have not proved to be very accurate – I have found up to 4pH difference in the readings obtained when repeating the test on a single sample.

The Simple Fizz Test

There is a very rough and ready test that you can carry out in your kitchen to find out if the soil in your backyard is a potential disaster zone. Dig up a handful of soil; remove any pebbles and large bits of plant debris and then let it air-dry. Crush any large lumps of soil, then scoop up a tablespoonful of dry soil and add several drops of vinegar. If this makes your soil fizz then your soil pH is greater than 7.5 and is too alkaline for most plants. If it doesn't fizz scoop up another tablespoonful of dry soil, add water until it is very moist then add a pinch of baking powder. If this makes your soil fizz then your soil pH is less than 5 and is too acid for most plants.

Using A Soil pH Test Kit

So your soil doesn't fizz but you still would like to know its pH a little more accurately. The easiest way to do this is to go along to your local garden centre soil and get a pH Test Kit. First you have to get a representative sample of your topsoil. To do this, scrape away any mulch on the surface then dig a hole and take a sample from the side of the hole - each sample should extend from the surface to a depth of about 10 cm. Remove all

pebbles and the larger bits of organic matter then thoroughly mix the sample. Put a level teaspoonful of soil from your sample on a clean, dry non-absorbent surface (i.e. the test plate in the Test Kit, a kitchen plate or piece of glass), add the indicator fluid from the Test Kit and stir until the sample is a thick paste. Next dust the sample with the white powder in the Test Kit and wait about 1 minute. The white powder will change colour. Compare the colour of the powder with the colours on the colour card. The colour nearest that of the sample will be the pH of your soil sample. A typical Colour Card from a pH Test Kit is shown on page 80.

Laboratory Soil pH Tests

This is the most accurate but most complex and expensive method. Soil Testing Laboratories determine the pH of soil samples using a pH Meter and Electrode System using the method specified in Australian Standard AS1289 Part 4.3.1 - Methods of Testing Soils for Engineering Purposes - Soil Chemical Tests – Determination of the pH Value of Soil - Electrometric Method (phew, that sounds complicated – but this part of AS1289 is only one page long!).

In the laboratory, soil pH can be measured in calcium chloride ($CaCl_2$) or in water (H_20). Most soil scientists prefer the $CaCl_2$ method as this generally more accurately reflects the actual soil pH found in the field. Soil pH measured in water is 0.5 to 0.8 higher than if measured in $CaCl_2$. The accuracy of the results is normally +/-0.1pH. When you get your Test Report back from the Laboratory it will state whether the pH was measured in $CaCl_2$ or water. The Test Report will often also state the 'Buffer pH'. This indicates the soil's capacity to resist pH change when acidic or alkaline materials are added to it. It takes more lime to raise the pH of a soil with clay or organic matter present than it does for a sandy soil containing very little clay or organic matter. The reason for this is that when you add lime you raise the pH of the soil solution by removing hydrogen ions from it. There is now an imbalance between the hydrogen ions in the soil solution and those in the clay and organic matter. Hydrogen ions then come out of the clay and organic matter to replenish those lost from the soil solution.

The Difference Between Active and Reserve or Stored Acidity

You may come across these two terms, so what do they mean?

Active acidity is mainly the acidity of the soil solution and so it's the acidity that the roots of plants see.

Reserve or stored acidity is the acidity locked up in clay particles and organic matter in the soil and so the plant roots do not see it.

And In Conclusion

It's best to know what soil you have in your garden and work within its limitations. Remember that it can take years to really make a change to your soil (although you can ruin it really quickly!) and you are unlikely to permanently change its pH. But make a start - grow local plants that thrive in your soil and add organic matter - then at least the people who live at your place after you've moved on could have soil at least as good as nature intended.

Boronia - Not Just Pretty In Pink

Part 2/2 _____ Marco Duretto, Tasmanian Herbarium

Boronia *section* Valvatae

This last section is the largest and contains 65 species and over the last decade many undescribed species have been collected for the first time (on average this has occurred once a year). Some of these, as expected, are from fairly remote areas, but some have been collected from areas close to large urban areas. The section is defined by the presence of stellate hairs, axillary inflorescences, sepals and petals that are valvate in bud and persist with mature fruit, and by the usually shiny, black, tuberculate seeds. The section is the only section found in all regions and the only section found in the north-west (N WA, NT, NW Qld). It is absent from South Australia and Tasmania and only one species, *B. ledifolia*, is found in Victoria.

The section is classified into four subsections, nine series, five subseries and four informal species-groups. Most species have pink petals.

Boronia anomala (E Kimberley Region, WA), a recently collected and described species, is tentatively placed in section Valvatae as it has valvate petals, axillary inflorescences and stamens that are similar to the stamens of *Boronia* section *Valvatae* subsection *Grandisepalae*. It differs from other species of the section in having deciduous petals and lacking stellate hairs. The aestivation of the sepals and seeds are unknown. It has very narrow leaflets that can reach 5 cm in length but are only 0.5–0.75 mm wide.

Boronia *subsection* Ternatae

This subsection contains all four species of *Boronia* section *Valvatae* found in south-west Western Australia and is characterised by the usually ternate leaves, with scattered wax platelets and spreading stellate hairs, and reniform (kidney shaped), dull seeds. The subsection is divided into two series, each with two species: series *Ternatae* (*B. adamsiana* and *B. ternata* [with six varieties: *austrofoliosa*, *elongata*, *foliosa*, *glabrifolia*, *promiscua* and *ternate*]) with flattened, broad, isobilateral leaves or leaflets; and series *Ericifoliae* (*B. ericifolia* and *B. revoluta*) with narrow, dorsiventral, revolute leaflets. Members of *Boronia* series *Ternatae* are usually found on sand-plains while the two other species are found on hills. *Boronia adamsiana* is unusual in having woolly hairs and sepals that are almost as big as the petals. This species was, until the 1990's, thought to be extinct but is now known from several populations. Photos on page 89.

Boronia *subsection* Bowmaniorum

This subsection is confined to Cape York Peninsula (Qld) and contains two species (*B. bowmanii* and *B. squamipetala*). Both species have pinnate leaves and stellate hairs with fused rays. At times these hairs are almost peltate, especially on the petals, as found in *Phebalium* and *Nematolepis*. The petals are white to green. Photos on page 89.

Boronia *subsection* Valvatae

This large and taxonomically problematic subsection contains 35 species that have a raised midrib on the abaxial surface of the petals. All but three of the species are confined to Queensland and New South Wales. The subsection is divided into four series. Most species are very showy producing a spectacular display of flowers that have large, pink to white petals.

Boronia series *Erianthae* with eight species (Qld: *B. eriantha*, *B. grimshawii* and *B. repanda*; Qld & NSW: *B. granitica*; NSW: *B.* aff. *granitica*, *B. rubiginosa*, *B. ruppii* and *B. wurrumbunglensis*) is found in inland regions from Cape York Peninsula (N Qld) to a little west of Sydney (NSW). The series is characterised by glabrescent leaves without prominently raised midribs on the lower surface. Four members of this series are narrow endemics of the Granite Belt while *B. grimshawii* was only recently collected from a well-botanised area near Brisbane (photo p. 92).

Boronia series *Fraserorum* contains two rare, large leafed species from the Sydney area (*B. fraseri*) and the Cooloola Sand Mass of south-east Queensland (*B. keysii*). The series is characterised by large glabrescent leaves with prominently raised midribs. *Boronia keysii* was once thought to be extinct but was rediscovered in the 1970's and is now known from few populations.

Boronia series *Rupicola* is monotypic and confined to two disjunct areas on the western escarpment of the Arnhem Land Plateau (NT). *Boronia rupicola* is a pendulous shrub that is found only on vertical cliff faces. It has yellow-green petals that reach only 2.5 mm in length. It is probably most closely related to series *Valvatae*. Three species of *Boronia* on the Arnhem Land Plateau are cliff specialists and all have different habits (see *B. suberosa* and *B. viridiflora*, *Boronia* subsection *Grandisepalae*). *Boronia hoipolloi* (*Boronia* series *Valvatae*, of NW Qld) is the other species of *Boronia* that is a cliff specialist.

Boronia series *Valvatae* contains 24 species that usually have two types of stellate hair on the lower surface of the leaves. This large group is problematic which is why only informal species groups were identified and not formal subseries. Three species (*B. chartacea*, *B. hapalophylla*, *B. ledifolia*) could not be placed in any of the four informal species-groups. *Boronia hapalophylla* is a recently discovered and described species from near Grafton (NE NSW). It has spectacular flowers that can be over 3 cm in diameter.

The *B. alulata* species-group has eight species, some quite rare, from the tip of Cape York to the Sydney region (Qld: *B. alulata*, *B. amabilis* - photo p. 92, *B. obovata* photo p. 92, *B. quinkanensis*; NSW: *B. angustisepala*, *B. mollis*, *B.umbellata*), and in north-west Queensland (*B. hoipolloi*). The group is defined by the very (usually) narrow sepals and pinnate leaves. The *B. lanceolata* species-group (Qld: *B. duiganiae*, *B. odorata*; NT & NW Qld: *B. lanceolata*) has large simple or pinnate leaves and acute sepals. The *B. rosmarinifolia* species-group (Qld: *B. beeronenis* - photo p. 92, *B. forsteri*, *B. palasepala*, *B. splendida*; Qld & NSW: *B. glabra*, *B. rosmarinifolia* - photo p. 92) has small sessile leaves. The *B. foetida* species-group contains four rare

species (*B. bella*, *B. excelsa*, *B. foetida*, *B. jensziae*) from Queensland with large, simple, attenuate leaves that do not smell very nice. One collector noted, on a herbarium label, that the leaves of *B. foetida* have a smell reminiscent of dead possum! Only two Boronias are found in the humid wet tropics (NE Qld): these are *B. excelsa* which is found on the Mount Windsor Tablelands along rainforest margins above 1000 m, and *B. jensziae* which is confined to Hinchinbrook Island.

Boronia *subsection* Grandisepalae

The final subsection is, I think, one of the most exciting groups within *Boronia*. There are a good number of excellent characters defining this subsection including that most have sepals that are equal to or larger than the petals. In some species, e.g. *B. grandisepala* and *B. lanuginosa*, the sepals can be more than twice as long and wide as the petals! When flower colour is discussed in this group often what is being referred to is the colour of the sepals and not the petals. Other characters that define this subsection together include features of the inflorescence, seed and stamen, e.g. the antipetalous anthers are much larger than the antisepalous anthers.

There are 23 recognised species in the subsection and all are found in north-western Australia. Some of the recognised species are not formally named as they are known from few and poor specimens. Seventeen of the species have been described in the last eight years; 13 species are found on or near the western escarpment of the Arnhem Land Plateau (11 of these are found no where else).

The subsection is divided into three series.

Boronia series *Quadrilatae* contains two very rare and bizarre species from the Arnhem Land Plateau (NT) that were both collected for the first time in the 1990's. The series is characterised by bluish, glaucous, glabrous, simple leaves and quadrangular stems. *Boronia quadrilata* is an upright shrub known from a population of 15 plants on one ridge, while *B. viridiflora*, known from three populations over a limited area, is a cliff specialist that grows horizontally from the cliff face. The sepals of both species are green and the tips of the sepals of the latter species are sometimes deep purple.





Above and Left:
Boronia quadrilata
Photos: M Duretto

Boronia series *Grandisepalae* contains 10 simple-leafed species scattered over the Arnhem Land Plateau (NT) with one, *B. grandisepala*, found also in the Victoria River area (W NT). The series is characterised by simple leaves with a distinct stellate indumentum and there are two subseries.

Boronia subseries *Verecundae* has large, stalked hairs that give the new shoots a pink (*B. verecunda*) or yellow (*B. xanthastrum*) appearance (photo p. 92).

Boronia subseries *Grandisepalae* (*B. amplectans*, *B. grandisepala* [with 2 subspecies: *acanthopsida* and *grandisepala*], *B. laxa*, *B.* aff. *laxa* 1, *B.* aff. *laxa* 2, *B. prolixa*, *B.* aff. *prolixa*, *B. suberosa*) has striate seeds. In this subseries there is a subgroup of lax shrubs (e.g. *B. laxa* and *B. prolixa*) that require the support of other shrubs.



Above: *Boronia proxila*
Photos: M Duretto



Boronia suberosa is unique in the genus in having massive cork development on the older branches. The sepals and petals of the series are usually white or pink or deep purple though they can become green on ageing. The flowers of *B. xanthastrum* though are yellow-green (photo p. 92)

Left: *Boronia suberosa*
Photos: M Duretto





ove:
Boronia adamsiana

ove Right:
Boronia ternata
var. *austrofoliosa.*

ght:
Boronia revoluta

elow:
Boronia bowmanii

ee Page 85. Photos: M Duretto



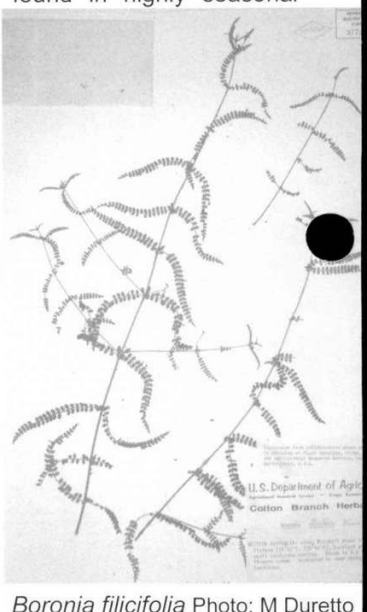


Boronia series *Lanuginosae* contains the pinnate leafed species of the subsection and all species of *Boronia* (except *B. anomala*) from the Kimberley Region (WA) are placed here. Flowers of these species are usually white or pink and some of the larger flowered species (e.g. *B. lanuginosa*) can have burgundy flowers. All species have restricted ranges except *B. lanuginose* (NE WA, NT, NW Qld) and *B. wilsonii* (N WA, NW NT). There are three subseries: subseries *Lanuginosae* (*B. lanuginosa* and *B. wilsonii*) with very hairy, pinnate leaves; subseries *Jucundae* (NE WA & NW NT: *B. jucunda*; NT: *B. procumbens*, *B. tolerans*) with sessile glabrescent leaves; and subseries *Filicifoliae* (Kimberley Region, WA photos p, 93: *B. barrettiorum* ms., *B. filicifolia*, *B. kulumburuensis*, *B. minutipinnae*, *B. pauciflora*; NW NT: *B. gravicocca*) usually with sessile leaves and mottled seeds. Species placed in *Boronia* series *Lanuginosae* have pinnate leaves but *B. pauciflora* has simple mature leaves and rarely trifoliolate leaves and *B. barrettiorum* ms., which has both simple and trifoliolate leaves. *Boronia filicifolia* has beautiful leaves with an extraordinary number of leaflets, up to 55 leaflets per leaf!

Conclusion

Boronia is a fabulously diverse Australian genus found in a wide variety of habitats. It is perceived as a difficult genus to grow by many, including myself. This could, in part, be due to the small number of taxa, many of which are fussy, that are available on the market. It is also due to people like myself not planting suitable plants in the areas they live. So as I now live in Hobart I will forgo my plans to build an Arnhem Land Plateau sandstone cliff garden and develop a bed suitable for wet peat and snow specialists instead. Admittedly many of the 151 species of *Boronia* would hold little interest to many gardeners, except enthusiasts, and most of the spectacular species are not readily available. Species are found in a variety of habitats ranging from the very wet to the very dry. Most species are found in highly seasonal environments including summer and winter wet areas. There are also specialists on a wide variety of substrates for those who don't live on sandstone cliffs, granite domes or sand. But all of that aside, I believe one of the most rewarding ways to see these species is in the wild. So persevere and look for the bizarre and unusual when you are next on a walk and remember not all Boronias are small, upright shrubs bearing flowers with four, pink petals, and certainly not all are pleasant to the nose.

All the species of Boronia are more or less interesting, and attract attention from the neatness of growth, and their pretty pink blossoms. Their dwarf habit and compactness peculiarly fit them for glasshouse culture, and for growing in pots; as they can be placed on any kind of stage, and will, if judiciously treated, bear to be exposed to view on all sides. Paxton (1841, p. 123).



Boronia filicifolia Photo: M Duretto

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Top Left: *Boronia grimshawii* (p.86)
Top Right: *Boronia beeronenis* (p.86)
Above Left: *Boronia beeronenis* petal
Above: *Boronia xanthastrum* (p.88)
Left: *Boronia rosmarinifolia* (p.86)
Below Right: *Boronia bella* (p. 87)
Bottom Right: *Boronia amabilis* (p. 86)
Photos: M Duretto
Bottom Left: *Boronia obovata* (p. 86)
Photo: BJ Plumb













Boronia subseries Filicifoliae
Kimberley Region WA (p. 90)
Top Left: *Boronia minutipinna*
Left: *Boronia barrettiorum*
Photos: R Barrett
Above: *Boronia kalumburuensis*
Below: *Boronia wilsonii*
Photos: M Barrett



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