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Australian Plants



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Photographs are by the authors of each article, unless otherwise noted.

Front cover: Juvenile grey headed flying fox in blossom of *Eucalyptus ficifolia* hybrid. Photographer Sarah Curran.

Back cover: Buds and flowers of the *Eucalyptus gunnii* x *caesia* ssp *magna* hybrid. Photographer John Purse

Australian Plants articles

Australian Plants is published quarterly to promote knowledge of Australian plants. Contributions and offers to produce an issue are welcome. Please contact:

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Editorial

Merle Thompson

Diversity: We use the term “biodiversity” to reflect the range of fauna and flora of the globe or of a particular area. The last ANPSA conference had the theme of “Diversity is in our Nature” to reflect the wonderful variety of plants which our island continent contains – or more specifically in that instance the multiplicity of plant species and their habits within the state of Queensland.

The term diversity can also be applied to the interests, studies and activities of our members and subscribers. For some, their interest is horticultural whether this is related to garden design, growing species of particular interest to them or wishing to have a wide range of species or perhaps to succeed in growing those species which are more challenging to cultivate or maintain.

For others, their interest in Australian plants relates more to plants’ place in the natural environment. This can include such interests as the conservation of plants and their habitats, understanding their role in the eco-system and relationship with fauna, studies of specific families or genera, vegetation mapping and understanding where plants grow and why or finding rare and endangered plants. Naturally it is possible for an individual to have such diverse interests personally.

We do, as a Society, need to accept that such diverse interests exist and can actually be in conflict. This presents challenges.

In those issues of *Australian Plants* which are not specifically themed but contain miscellaneous article, such as the current issue, this range of interests can be seen. We explore such diverse topics as the relationship between flying foxes and plants; an interesting beetle, studies of a family and of a genus, developing hybrids to suit different climates, developing a very large garden and a botanic garden, the problems which can come from landscaping which went awry. Truly a diverse selection of topics.

There is, however, some things on which there is no difference between the authors – they all enthuse on their theme, they love to share their knowledge and enthusiasm and, for those who are writing about their own home and its garden, they regard their personally created space as a ‘Garden of Eden’, ‘Paradise’ or my own patch at ‘the Centre of the Universe’.



Flying foxes and why we need them

Sandra Guy

Sandra is a member of Sydney Metropolitan Wildlife Service, which rescues, rehabilitates and releases all native wildlife species in the Sydney area and is actively involved in educating the community about the importance of our native fauna.

So: what gives with an article on bats in a magazine devoted to native plants? Fear not, gentle reader. Trust in the editor and read on...

My interest in our natural environment led me to join APS and I'm also a licensed wildlife rescuer/carer (with Sydney Metropolitan Wildlife Services) and give educational talks on flying foxes, with the live beasts on display. I've been professionally engaged in the 'green collar' sector for almost two decades; and volunteer with two local BushCare groups.

However, I learnt most about the interdependence between plants and animals during my most challenging volunteer project; revegetating a 5ha-site on a friend's Hunter Valley property (150 kms from home) labouring weekends over three years. This involved clearing 20 years of weeds; then identifying and reinstating the five endemic native plant communities originally on site. As the native vegetation had first been cleared some 150 years ago it was remarkable that remnants still existed; and I used these to propagate seedlings from seeds and cuttings.

To revegetate the site I first identified the pioneer species of each of the five different plant communities; planting approximately 2,000 tubestock during spring and autumn (half on steep slopes in an abseiling harness for safety). The site was badly neglected, but a 'hot spot' of biodiversity, and well worth protecting.

However, all my work only reinstated the bare scaffolding of the original plant communities; which will only fully recover and become self-sustaining when birds and mammals bring in the seeds for the hundreds of other plant species needed to 'fill out' the pioneer species I planted initially. Given time and opportunity, nature will do with ease what people find impossible.

While I also see the beauty of native plants as replacements for exotic garden plants I'm more keenly excited by observing native plants in their natural setting; which is the study of 'plant communities' or 'veg types'; and which intrinsically involves the interdependence of plant and animal species.

A plant community is a naturally-occurring ecosystem specific to a given

area; and is formed by a cluster of thousands of interdependent species of flora, fauna, microbes and fungi which have evolved to symbiotically ensure the ongoing health of that ecosystem. But many people 'Can't see the plant community for the trees' – because 'plant community' is a bit of a misnomer. Counter-intuitively, the animals that make up a 'plant community' are every bit as important as the plants.

While all the requisite species form part of the dynamic whole in these ecosystems; some species are known as 'keystone species' and are critically important; and are 'keystone' because their presence supports the structure of the ecosystem. They are essential: no other species performs their specific ecological role; and without them the ecosystem will collapse. Even before a keystone species disappears from an area it can become 'effectively extinct'; meaning there are insufficient numbers present to perform its ecological role effectively.

Many people are aware the cassowary is an endangered species native to Australia's northeast rainforests; and many might be aware that clearing and fragmentation of the rainforest is threatening its survival. Not as many are aware that, vice versa, the existence of the rainforest depends on the cassowary; it being the only extant species that can distribute the very large seeds of many rainforest trees.

The cassowary, he's not a clever bird; but he does what no other animal in our north-eastern rainforests does. He eats big seeds; he eats and walks; eats and walks; eats and walks and defecates. And his lovely long gut holds each seed long enough to deposit it far enough from the source tree; so as a healthy adolescent tree the genes it mingles with won't be its own. The cassowary thereby ensures the genetic diversity and health of the forest – earning it the title 'keystone species' for our northeast rainforests. Hurrah for the cassowary.

However, the bad news for us is that if we lose the cassowary, we lose our rainforests; and listing it as 'endangered with extinction' hasn't yet stopped its numbers declining. Perhaps a little less urban development in the rainforests might help.

Now finally, we come to the flying foxes; eight species of which have a combined range covering most of mainland Australia. They earn the title of 'keystone species' for most types of native forests across the continent; from north to south; east to west; inland to coast; and including those famous north-eastern rainforests. So while the cassowary is the hero of the rainforests, it pales into insignificance next to the flying foxes which do the heavy lifting across the continent; pollinating and ensuring genetic diversity of many hundreds of species of trees.





Juvenile flying fox enjoying the blossom of *Stenocarpus sinuatus*. Photo: Mandi Griffith

However, despite their essential role, all species are in decline and in some quarters there is concern that the main species on the south eastern seaboard, the Grey Headed Flying Fox (GHFF), will be effectively extinct in the wild within 20-30 years. This is in spite of its being listed as 'vulnerable to extinction' in 2001 on both NSW and Federal statutes.

Firstly, pollination: Many native trees have blossoms which are only receptive to pollination at night. The only nocturnal pollinators of any significance are flying foxes which, in spite of their other common name of 'fruit bat', actually prefer to feed on nectar from native blossoms.

Secondly, genetic diversity: The birds, bees and butterflies we see during the day on native trees are generally not aiding pollination; and even those that do, they simply can't carry the pollen far enough to ensure the genetic diversity of the forest. So without flying foxes we would lose the structure that provides the essential microcosms supporting thousands of other flora and fauna species; yet very few people realise their key role in the environment.

I fear that one day we will look around and notice there are no saplings in our native forests; realise it's because we lost the flying foxes in significant numbers; and it will be far too late to redress the situation. So, for any native plant enthusiast, perhaps it's time to examine the ecological role of flying foxes now and see what can be done to save them, before that day arrives.

Bats and humans are both placental mammals with striking similarities yet bats seem so foreign to us. Inhabiting the night skies; a realm so diametrically opposed to ours, it is not surprising that myths and misunderstandings dominate our attitudes. It is only relatively recently that study has led to an even cursory understanding of their biological roles and complex behaviours.

Bats have existed for over 55 million years and they are one of the most successful and abundant Orders of mammals. Their scientific name Chiroptera (pronounced kirop-tera) means hand-wing; and we clearly see our own hand and arm structure in their wings; with highly elongated finger bones providing structure to the skin membrane.

Bats fall into two main types: the microbats (Microchiroptera) and the megabats (Megachiroptera). Fruit bats, or flying foxes, belong to this latter group and it is these with which I have had the most experience, particularly the Grey Headed Flying Fox, which is the most abundant species in Sydney.

Flying foxes do not use sonar; and their eyes and ears function exactly like ours; just a whole lot better. It is only the insectivorous microbats that use sonar as a means of locating their fast-moving prey. Blossoms and fruit being stationary targets, the fruit bats never evolved complicated sonar.

Flying foxes are remarkably intelligent and have highly sophisticated social structures. They are more intelligent than dogs and, in captivity, easily learn their own names and the routine of the house or aviary. Some experts feel their intelligence might even approach that of chimps.

Mothers form tight emotional bonds with their pups; teaching them grooming and social skills; and nurturing them intensely for about five months before they become independent. Until three weeks old the pup holds onto the mother's belly and teat as she flies out for food each night but thereafter is too heavy and is left behind in the maternity colony. Some adult bats always remain behind at night to guard and supervise the young, much like bat babysitters.

When orphaned pups are raised by people the foster mother must duplicate this relationship with the bat pup or, like a neglected human child, the pup won't develop into a well-rounded, emotionally-stable adult that fits properly into society. This is the only wild animal that requires such a tight emotional bond as replacement for its own mother; and in fact with other species it is detrimental to 'imprint' the young while raising them.





As long as the pup goes into a crèche aviary before adolescence it will effectively dehumanise, forgetting its human foster mother as it gains emotional independence, and can be re-released into the wild with no 'hangups'. Bats which have been kept too long in human company will forever identify humans as a source of food and affection and can't be released into the wild; so timing is critical.

Raising an orphaned flying fox pup is an enormously enriching experience. They cuddle, play and 'talk' to their 'mother' and show displeasure when they don't get their own way. They call out when their 'mother' is in the room with a little cry that sounds remarkably like "Mum! Mum! Mum!" and are fed with a formula designed to replicate flying fox milk; initially with six tiny feeds a day; reducing in frequency until they're eventually weaned at about three months old onto fruit with a high-protein supplement



The photo shows Sandra feeding 'Chipper', a female Grey Headed Flying Fox at just 10 days old; with a tiny teat and bottle in her mouth. She was orphaned in November 2012 and released successfully in March 2013. Photo: Sandra Guy.

Grey Headed Flying Foxes are highly nomadic within their range, but are not migratory; although changes to their normal range have been noticed in the last decade and it is postulated this may be due to climate change; but the jury is still out.

Bats can travel up to 100 kms a night foraging for food; returning each morning to an established camp site where they rest, nap and socialise during the day. They use their camp sites more like hotels than apartment blocks; moving within their natural range by stopping off temporarily at a sequential series of camp sites. This way they can move away from food shortages to areas of greater abundance; causing bats in the receiving camps to shuffle into other camps to accommodate the new arrivals.

These camp sites (also called roosts or colonies) tend to cause the most conflict with people because they can be both odorous and noisy. Unfortunately, the ideal location for a bat camp is also exactly the type of location people prefer; being a sheltered gully near fresh water; with tall trees, rich soil; protected from desiccating westerlies and frigid southerlies. As people move in, clearing bat habitat for their homes and farms, flying foxes are quickly losing both food sources and camp site habitat.

Better planning decisions, such as not approving new developments too close to existing bat camp sites, would be the simple way to prevent more problems occurring; but the problem of existing camp sites is difficult. An initiative to plant up 'replacement' roost sites has recently commenced in the NSW Hunter Valley, the hope being that bats will leave problematic roosts in the middle of urban areas; but it will be 10-15 years before we know whether this will be successful.

Misinformation about the disease risk from bats is another hurdle which can cause concern; and is largely fuelled by misinformation in semi-hysterical media reports. Disease is the one issue people feel confident they know about bats; "Bats are filthy disease-ridden vermin and I'll die if I get close to one". Simple; but incorrect.

In fact bats can carry only two viruses which people might acquire; and only one of those can be transmitted directly from bats to people. People can only acquire the second, Hendra, from an infected horse and as a vaccine is now available for horses; Hendra no longer need pose any risk for people or horses.

The first, Australian Bat Lyssavirus (ABL), is a rabies-type disease which can be fatal in humans. However, only three deaths have ever occurred in Australia so it is very rare. People can only catch ABL from the bite (or perhaps a scratch) of an infected bat; and as bats don't attack humans, this can't occur unless an unvaccinated person tries to handle a bat. Even so, it is estimated that less than 0.05% of the bat population carries ABL and a post-exposure vaccination is available to ensure an accidental bite doesn't cause any illness.

Bites usually occur when trying to free a bat from fruit netting or barbed wire. However, as all trapped bats must be kept in captivity for at least two weeks for observation; and as an untrained person can inadvertently cause serious injury by mishandling a bat (requiring euthanasia); only licensed rescuers should handle trapped bats. Don't risk it; report the bat urgently to your local wildlife rescue group.

Most bats caught in fruit tree netting are euthanased because their injuries are too severe to survive; but most people don't realise there are two types of netting. The dangerous netting looks similar to a fishing net and doesn't even protect the fruit and should not be used. The correct netting is safe for wildlife and also protects fruit from fruit fly, codling moth and wildlife. It looks like fly-screen or mosquito netting and is endorsed as 'Wildlife Friendly'. You can ensure you don't inadvertently cause harm to possums, birds, snakes and flying foxes by using only wildlife-friendly netting and fencing.





While flying fox populations continue to decline; largely due to ignorance, misunderstanding and open hostility; we must do our best to overcome these problems by informing people of our need for their survival. With high mortality and low fecundity, populations cannot quickly recover from stressors such as heat waves, severe storms, loss of habitat and culling. As populations approach 'tipping points' from which there is no recover, the problem becomes more urgent.

The global problems affecting flying foxes, like climate change, might be beyond us in the immediate future; but our individual actions can help. Promote sensible planning decisions to preserve existing flying fox habitat; and halt the fragmentation of that which remains. Join a wildlife rescue organisation or donate to one; and educate people about our need for flying foxes. These positive actions will cascade.

Unless we take urgent steps to successfully halt the decline in flying fox populations, I fear we'll see the day when people look around our native forests and realise there are hardly any saplings. By the time we work out why; that we have lost the keystone species responsible for the forests' pollination, seed dispersal, genetic health, sapling recruitment and forest structure, it will be too late.

For educational presentations to community groups or schools please contact your local wildlife group or in Sydney contact Sandra direct on 0425 211 040.

*Netting of garden fruit trees – guidelines to protect wildlife, March 2003:
www.environment.nsw.gov.au/threatenedspecies/NettingOfGardenFruitTrees.htm*

Wildlife Friendly Fencing/netting; www.wildlifefriendlyfencing.com



"Britney" and "Eddy" in eucalypt blossom. Photo: Sarah Curran

Turning Seven Acres of Horse Paddocks into Paradise

Phil Hempel

Phil is a native plant tragic who had to retire from work to pursue his desire to collect, propagate and grow native plants. Grafting is one of his interests as well as speaking at many district group meetings to spread the word.

Support for turning all of a 7.5 acre cleared block of land into a garden paradise was extremely thin, so with a few deep breaths and armed with only a vague idea, a smile, a mattock and with a little experience I was slowly gaining from APS Yarra Yarra members I commenced the task initially with assistance with my wife, Diane. It was her idea originally but the task was soon left only one man standing. To understand the property size it is 100m wide and 300m long, I reckon it equates to more than 40 standard house gardens.

The property had been an orchard, dairy, horse stud and then we turned it into a family hobby farm which lasted for 20 years while the kids were here. All the post and rail horse fences that divided the property into five paddocks were removed as they were harbouring tens of thousands of Harlequin bugs *Dindymus versicolor* (Shield bugs). The marshmallow weeds, *Malva parvifolia*, had taken over following years of horse use and these took many years to get down to a manageable level. This weed was the host plant that allowed the Harlequin bugs to breed. Although the old horse yards were removed, one fence with two farm gates was left as a reminder of the past.

Fortunately I have a little tractor and a rotary hoe attachment that I used to dig the garden pods and turn over the grass. Plants were planted directly into this cultivated soil, guarded and mulched. The mulch proved to be the greatest benefit in establishing the plants during the drought. Initially the mulch was just placed around each plant but as time went on the whole pod was mulched.

Looking back at old photos and seeing how dry and bare the paddocks were, I can understand why I had so many people making disparaging remarks about the project. One neighbour would look into the guards and laugh; he could see only the tiny struggling plant whereas I could see that plant fully grown and flowering in all its glory. Now he comes over with his friends and family to wander through and enjoy the result.

The driveway was not much better than a laneway, potholed, muddy in the wet and dusty in the dry. After a bit of bitumen, removal of all





the weed species of exotic plants and replanting them with a range of natives it now looks so inviting, funneling you into the property guided by the white trunked *Eucalyptus mannifera*.

The basic plan was to develop garden pods approximately 20 m x 5 m staggered across the hill with sufficient grassed areas for the kangaroos to move through without jumping on the plants; however someone forgot to tell the 50 odd kangaroos of the plan. The staggering of the pods was also to prevent heavy rain scouring. I soon realised that the number of plants required to plant out 40+ pods was going to cost more than I had budgeted for so the old glasshouse that the original orchardist built in the early 1920s was put to good use. A shade house was built as well as a small poly house. Family members refer to this as the “hospital”. This started another adventure of learning how to propagate native plants and so I became more deeply involved with APS members to draw on their considerable knowledge.

Plants were placed to provide two-metre wide pathways north/south through the top garden on the flat area. Unfortunately you can't always rely on a label for the size of the plant, like *Grevillea intricata* that has a range of 1-3m wide x 1-3m high. I picked the wrong end of the size range and ended up with a 3m wide x 1 m high plant. It was not for a few years that I started to notice that the tractor with the slasher appeared to be getting too wide for the pathway, then the ride on mower



started to get too big. But with a bit of judicial pruning a happy balance was finally reached and a lot of experience gained.

I was keen early on to see the plants get to maturity and flower as soon as possible so I didn't prune them. I just couldn't bring myself to cut back a plant that had taken me so long to source material, get the graft to take and nurse it for six months before planting. I now realise that some native plants perform and look much better if pruned lightly early in their life, especially most of the broom forms of *Eremophilas*.

What was originally the main paddock of five acres was the last major project that is still ongoing today. It faces and slopes down to the north so it provides some drainage and plenty of sun. Three quarters down it meets the gully and then rises quickly to the boundary. A main central 10 m wide clearway was left so the dam would stand out as a feature when viewed from the old dairy. I have never counted the number of plants I have grown but I used over four thousand guards, some were two-litre drink cartons, plastic guard and 300 mm high rabbit wire formed into a 40 cm diameter. On busy days I managed to plant 80 plants but as the garden became more established this number dropped to 10–20 per planting day.

This project was commenced just prior to the long years of drought that descended on this part of the country and no water was given to plants after the initial planting. The drought directed me to get interested in *Eremophilas* as these just loved the hot dry weather and since they are grafted onto a local rootstock they never looked back, the hotter it got the better the garden looked. Losses were high in the gully where the kangaroos gathered. They would jump on and totally destroy the guards which allowed rabbits to get at the plants. They are not called *Macropus giganteus* for nothing. It has been a slow progress, moving the garden forward, a bed at a time into the kangaroo territory. There were no kangaroos here when I purchased the property 35 years ago but local housing development has pushed them onto me. They add a very special interest in the garden that I do not share in relation to rabbits and hares.

My initial interest was in mallee *Eucalypts* from Western Australian and these were planted first. The next genera that I found interesting was *grevilleas* followed by *acacias*, *eremophilas*, *correas*, *hakeas*, *melaleucas*, *brachychitons* and many other miscellaneous plants. I would love to grow more *banksias*, and other than during the drought when many species thrived, but they were eventually dealt with severely when the persistent heavy rains came and the heavy clay subsoil held the water. With the extremes of weather we have had over this time I





have worked out what areas of the property hold water or drain well and am getting an understanding of “grow what where”.

Some of the garden pods have 20–30 plants in number that do not exceed 2 m in height. Other pods have one or two 4–5 m tall species amongst the smaller ones and two other larger areas have all tall eucalypts, allocasuarinas, acacias and hakeas. The tall trees have allowed nesting boxes to be fitted to house fauna that are attracted to the plants.



There are also many heavily scented plants distributed around to add interest such as the local river mint, *Mentha australis*, which has the strongest smell and is suited to boggy ground. Others include *Darwinia citriodora*, *Corymbia citriodora*, *Backhousia citriodora*, *Correa baeuerlenii* and more. To be able to get all these wonderful plants that generally come from deserts or deep sandy areas to grow in the heavy clay over mudstone soils here led me into grafting, something I had done casually with my father on fruit trees many years ago.

I visited every specialist native plant nursery in Victoria as well as some in other states. I was attracted to the unusual and rare native plants that several of these nurserymen had collected and were selling. I also joined Study Groups of all the genera that interested me and this is another very informative source of learning, joining the field trips and having discussion with some very experienced native plant people. My passion grew and grew and soon the nursery trade couldn't fully

satisfy my interest and so began the many field trips across Australia to seek out plants that I was after. There is something magical in seeing a long time desired plant growing in its natural environment. These experiences make particular plants more interesting in the garden, for example to get *Eremophila flacida*, I travelled from Melbourne to just south of Paraburdoo in WA to find and see this plant. I now have several growing and although they suffer badly from frost I just have a special connection to them for the journey they took me on.

Most of the garden is taken up by true species but I have a slight leaning towards hybrids as many of these, having more vigour, grow on their own roots in my soil. It took many years before the more interesting small birds appeared. I always wanted to see the New Holland Honeyeater in the garden and finally they arrived along with Spinebills, Superb Wrens and heaps of other species adding another interesting dimension and really bringing the garden alive as they call and dart all through the bushes. Wherever you wander there is a bird nearby. The garden is home to many other small creatures where they live and thrive. It is a paradise to them and I certainly get a great deal of enjoyment seeing them, particularly the Emperor Gum caterpillar, the Potter Wasp, the Blue Banded bee and even the galls that appear on the leaves.

The enjoyment of studying small details should never be overlooked - colour changes in a leaf, the bud cap slowly opening to reveal the flower, the shape and size of fruit and even small droplets of rain glistening in the light. Every day is different.

Every species has a different colour, shape and construction. Beauty, in this case, is not in the eye of the beholder, but is just beautifully complex without explanation or definition. The variation that is within just one species can be an interest in itself. Since I have sufficient space I can attempt to grow as many species and variants as possible to have plants flowering all year round.





One of favourite plant genera, *Eremophila*, brings a great deal of enjoyment from just a few plants of one species with the amount of flower variation that is available. Everyone likes to grow species with the brightest coloured flower. I have these, but beside them I also have the plainer coloured forms that I have collected. I love grey leaf plants; they can be put in front or behind green ones to great effect. Even the local *Banksia integrifolia* provides a constantly changing show whatever the season with the flowers and different colour on each side of the leaves showing in the breeze. It doesn't get much better than views of all these magnificent native plants on a warm summer's day, the hotter the better for them. It doesn't matter which way you look at any time of the year, you are surrounded by a Garden of Eden.

Paradise wasn't built overnight. Some native plant species take many years to flower but they are well worth the wait. Good things come to those that wait. This *Brachychiton acerifolius* (Illawarra Flame Tree) and the *Stenocarpus sinuatus* (Firewheel Tree) took seven years to flower and what a show.

Work in the garden still continues at a high rate with the glasshouse, shade house and hardening off area always full of plants at various stages. Sometime in a moment of weakness I sell or give some away, but mostly all the plants are used as replacements or replanting areas where I have removed a plant that was not suited. I had in the past, through ignorance, grown potentially weedy species and these are now being removed. Any plant that needs to be removed or dies is an opportunity to fill that spot with new species so a loss is seen as a gain, it's all good either way. There is still so much more to learn.

The garden has featured in the ABC's TV gardening program, it has been in the Open Garden Scheme several time and has been visited by numerous APS Groups and Garden Clubs. However, the most satisfaction and enjoyment I get comes from simply walking through the garden several times a day.



My garden in Penguin, four decades on – a tale of patience and consequences of enthusiasm

Dick Burns OAM

Dick moved from Sydney to Tasmania in 1970 as a high school teacher. He bought his Penguin home in June 1976 and, in the family tradition, he is still there in 2014. When a local group of the Society for Growing Australian Plants Tasmania (now APST) started in 1978, Dick joined, and he is still there too. Dick has been honoured with Life Membership of APST, the Australian Plants Award (amateur category) and in 2013, the Medal of the Order of Australia for 'service to botany, as an author and conservationist'.

In the beginning

My home is a drab, grey cement rectangular lump on a sloping double block that faces west. In 1976, as pictured, it was mostly grass around the house, with a few remnant trees of *Eucalyptus obliqua*, Brown-topped Stringybark, and *Acacia mucronata*, Narrow-leaf Wattle. The previous



owners had planted some shrubs, including roses and cotoneasters. They had tried to establish a border hedge of privet right round the property 'but only two are still alive'. With my Sydney origins, those two did not have much chance of living either.

This being my first garden, I was willing to try anything: fuchsias, irises, proteas, bulbs, anything new to my Sydney eyes. Daffodils still pop through the shrubbery every spring. But I also searched for old Sydney favourites. My *Xylomelum pyriforme*, Woody Pear, and *Persoonia linearis*, Narrow-leaf Geebung, grew from seed and I found plants of *Doryanthes excelsa*, Gynea Lily, *Ceratopetalum gummiferum*, NSW Christmas Bush, *Lambertia formosa*, Mountain Devil, and *Angophora costata*, Sydney Red Gum. Not everything performed in a Sydney way: my Gynea Lily has flowered only once in thirty years and the NSW Christmas Bush is more Tasmanian Autumn Bush. I wanted my angophora to have the spreading twisting branches that I remembered, so I nipped the vertical leader every year but the plant kept going straight up. Thirty years on, it now looks right.

By a fluke, I planted the Woody Pear on the north side, below my kitchen window. After about a decade of remaining 10 cm tall, the plant grew rapidly and about eight years ago it started flowering. Then two





years later, some insect worked out how to get the nectar and a single woody 'pear' formed. There are now six fruits in all that I can check every morning.

Another project I started in 1976 was to plant some Tasmanian trees suitable for a large garden; I had few reference books and was dependent on what I could see or remember. Often on NSW bushwalks, I'd gone to sleep with the sighing of the wind in riverbank sheoaks, so I decided to have a grove of them. The coastal *Allocasuarina verticillata*, Drooping Sheoak, looked a good garden size. I made the same mistake with *A. littoralis*, Black Sheoak that I grew later using seed collected from a dwarfed group on the Tasman Peninsula. The height in the wild of both species was controlled by wind rather than genetics. Likewise, the Tasmanian form of *Eucalyptus pauciflora* grows much larger than the snow gums I could remember around Mt Kosciusko.

But I like trees, and over the years many more found their way to my garden as I experimented with banksias, hakeas, tea trees, Tasmanian species, and so on. For a year or so, I thought it would be interesting to try waratah-related plants. But *Telopea truncata*, Tasmanian Waratah, regularly failed and I was relieved that *Embothrium coccineum* had failed after I saw the way it suckered at the Tasmanian Arboretum.

Designing my garden (it is the thought that counts, after all)

In the 1970s, there were lots of plant nurseries around, all trying different and interesting plants. (They are mostly gone now or absorbed into supermarket-style chains and cooperatives. Four nurseries currently specialise in Tasmanian plants, but new mainland species, once brought into Tasmania after inspection and/or spraying, are now difficult to find.) With the formation of the local SGAP group in 1978, a multitude of new plants was available. So there was a great diversity of interesting plants to gather into my garden. As exotics die they have been replaced by dinky-di plants.

An accumulation of books on garden design formed on my shelves and I drew up a master plan. On Saturday mornings, I'd set up form-work for concrete to mark the edges of my planned beds. But the income of plants occurred at a much faster rate than any proper design work, and beds expanded. Now, when I dig a hole to put some new treasure, the mattock often strikes a line of concrete buried under thirty-plus years of accumulating humus. Having since seen the TV fad for three-day makeovers by experts, I know now that the most interesting gardens are not those that match the picture books, but those that are part of the owner's personality.

Other Saturdays, I would go for a drive to search the Penguin hinterland for rocks to make retaining walls and paths. I found good-sized and often weathered rocks in disused quarries of granite, basalt and the beautiful local red-pink-and-white conglomerate. Some of the basalt and dolerite from further afield had natural flat jointing planes, making ideal pavers.

I scrounged 2-litre ice-cream buckets from friends and poured a few inches of coloured concrete into each to make other pavers. Another weekend project. The family that built the house in 1970 had bought a load of old fired bricks and started laying a pathway and retaining wall along the back of the house, finished by yours truly.



Garden in 2014 with 'ice-cream' paving, *Leptospermum petersonii* and *Clivia* beyond.

Wildlife in the garden (the good, the bad and the delightful)

I grew up in an inner suburb of Sydney and my bedroom looked onto a brick wall. So the delight of having green and sky from all windows in Penguin continues into the fourth decade. As well, the dawn chorus of birds is a mighty improvement on the chirping of Sydney sparrows. Admittedly, the most pleasant birdsong is that of the exotic Blackbird. The introduced Kookaburras add to the chorus. Natives include Grey Shrike-thrush, Little Wattlebird, Pardalotes and Blue Wrens, particularly in summer. I used to have a family of wrens nesting here, but one (or several) of those people that let their cats wander to try and save on cat food eliminated the wrens one year. Butcher Birds come through occasionally, signalling their presence with their melodies. Yellow-tailed Black Cockatoos visit at times to feed on the hakea and banksia seeds. A night-time occasional visitor is the Southern Boobook, with its repeated calming boom-call.





Soon after I moved in and was wandering barefooted in the grass, I found a snake skin. The resident Tiger Snake was given a rapid assisted departure. It is years since Blue-tongued Lizards and Bandicoots have been spotted – cats catch them as well. In Tasmania, the Tasmanian Government passed cat control legislation, but made it the responsibility of the local councils to enforce it. So cats still wander around Penguin.

For most of my time here, I had Ring-tail Possums tightrope-walk along the power line and play on my flat skillion roof. I hear their pleasant chirping on and off now – now more often the screeching and heavy plodding of Brush-tailed Possums disturb the night. It's as well I'm not a fan of horror movies, or the possum perched outside my bedroom window hissing would become a heavy-breathing monster waiting for my blood.

Another arrival in the past ten years is Paddymelons, also called Rufus Wallabies. I boasted that one had taken up residence in my garden, until I found recently-planted daisies were disappearing. As did several correas; and *Microsorium pustulatum*, Kangaroo Fern, that was developing as a groundcover; and young waratahs. Etc.

Trees and shrubs are ideal perches for birds, so constant vigilance is required for seedlings of cotoneaster, holly, ivy, hawthorn, sweet pittosporum and, of course, blackberries. There is an extremely vigorous form around Penguin with stout firm stems that seem to grow metres every year, bearing rigid thorns close to 1 cm long.

A consequence of liking trees (a series of fallings)

Acacias are not long-living plants, so the Narrow-leaf Wattles gradually disappeared, small enough for me to drop with my bowsaw or electric chainsaw. The smaller stringybarks were cut down by friends who took the timber away for firewood. The largest stringybark, though, had the house telephone line attached. Its removal started with another friend offering to drop an *Acacia melanoxylon*, Blackwood, which I had planted in 1976. Instead of falling onto the adjacent vacant block, the tree turned 90° and took the street telephone line with it. Telstra decided to put the replacement underground. So now I could remove this large tree. One in the team of tree-fellers brought along a portable mill: the treads of my stairwell are made from that timber.

In the sheoak grove planted in 1976, there were two females and six males. One female was never a strong grower and fell over some years ago. About four years ago, I noticed that the other female had a branch extending over a neighbour's roof, and there was a multitude of young sheoaks in another neighbour's paddock. So it's only lonely males in the grove now.

Another favourite small tree, a bronze-leaved *Leptospermum polygalifolium*, was self-seeding into another neighbour's place. Other self-seeders that had been removed previously were *Kunzea ambigua* and the climbers, once called *Sollya heterophylla* and *S. drummondii*. Tall shrubs and trees planted along the back of the house had been giving me grief for years by blocking my roof-guttering. Then the Tasmanian bushfires of January 2013 introduced the scare factor. One of the male sheoaks was developing a dangerous lean toward the house. So the tree-feller came calling again. Fifteen small to large trees were removed.

A second beginning

The big tree clearance had left about a quarter of the garden open. My writing of books and developing the Tasmanian section at the Tasmanian Arboretum, as well as the local Coastcare work, led to the neglect of the Penguin garden. There were gaps where plants had died in the past few years and others had grown too ugly or lanky.



Resting during the 2013 garden revamp

I started the rejuvenation in August 2013. New beds were formed, using the cut branches from the fallen trees. Nurseries from Wynyard to Launceston were visited and the nursery of my North West Group of APST was raided for plants. This time a single tree was allowed in each bed that is well clear of the house. Guards were placed around any specimens that the paddymelons chewed.





Part of the rejuvenation through the 'granite' bed

One plant that I had never tried in Penguin was the species that had been my first Australian plant in the family Sydney garden, *Chamelaucium uncinatum*, Geraldton Wax. It is the main plant in one bed. A wet spring and summer meant that I didn't have to water too frequently.

Unfortunately, the years of neglect means there is an accumulation of seeds in the ground. So the warm humid weather has not just boosted along the plants I want. Every day or so, I patrol the new open areas pulling or hoeing blackberry, cotoneaster, fumaria, chick-weed, thistles, dandelions - all the usual stuff. It seems as if, as I walk along the paths, new cotyledons spring up behind me.

But it is all worth it. As I wander between the old mature garden and the new sections, I feel a sense of pride in what has become my own patch at "the Centre of the Universe".



Leptospermum turbinatum, a favourite shrub, with large pure white, well-formed flowers

All photos by the author

Tondoon Botanic Gardens – a personal experience

Julie Keyes

Julie is a horticulturalist at the Tondoon Botanic Gardens in Gladstone, Queensland. The Gardens feature the plants of the Port Curtis area.

My story begins in 1996, a bright, clear day in November when I, Julie Keyes, skilled as a horticulturalist in exotics, began in the Tondoon Botanic Gardens nursery. During the years I developed an overwhelming passion for the gardens, for the native flora and the natural environment which the Botanic Gardens embodies.

The curator and volunteers would take field trips and return with seedlings, seeds and cuttings so I could then grow my babies until they were ready to take their place in the public beds. These beds were mirror perfect of the actual habitat from which they were taken. You can, for example, go to the Bulburin State Forest for a picnic or hiking and there you would see, incredibly, the Bulburin Bed right before your eyes! Every plant takes up relative positions to each other as is natural in the bush. This amazing feature extends to all the beds which I work on - Mt Castletower, Eurimubla, Mt Larcom Peak, Littoral 2 and SubTropical Rain Forest 3, 4 and 5 beds - all of which I grew from seeds or cuttings, planted, weeded and cared for over the years. I have so many stories of weeding these beds, rolling down steep inclines, falling in mud, being drenched by rain, chased by brush turkeys, sat upon by kookaburras looking for garden treats. Every day an adventure,



Lagoon in the Kroombit Tops beds.





every season a greater understanding of the natural environs of the Port Curtis area.

Every plant in the Botanic Gardens has a story of which I am the narrator. I become easily inflamed with my passion to introduce the gardens to everyone, showing how each differing environment is portrayed by a number of associated beds, that the Gardens are not merely the sum of the plants contained within.

Along the way I also grew all the plants needed for the median strips and parks of the Gladstone area. I adored driving around town, seeing all my babies growing up, looking healthy and beautiful for the community and visitors. I became so passionate about our local flora I taught myself how to grow and care for the Gladstone Floral Emblem, the *Barklya syringifolia*. To this day this beautiful native is growing and flowering around town.



Barklya syringifolia planted in median strip.

Some years passed and I was invited to take part in the field trips. I was so excited! Now I could see my babies in their natural environment and I developed a full conceptual knowledge of the role the Botanic Gardens play in our community.

From 2004 I began correcting and logging the data of every plant collected and grown in the whole of the Botanic Gardens with some treasured plants dating back to 1987. These records include who collected the plants, what material they were collected from eg seed, cutting, where they were collected from and when and where they were planted within the Botanic Gardens. A huge undertaking yet critical to making us a true Botanic Garden.

My knowledge in identifying plants has increased tenfold from my hands-on work within the Gardens. There is certainly no exotic plant that holds a candle to our wonderful native flora.

In 2002 I was devastated to learn my nursery work would be reduced to just one day each week. I now worked exclusively within the scientific area, ensuring through weeding and removal that beds retained their endemic natures.

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Erratum

In Vol 27 No. 214 Autumn 2013 a picture was incorrectly captioned.

On page 23 the caption *Leucopogon pimelioides* should have read *Conospermum taxifolium*.

Over the years I have been very lucky to enjoy the pleasure of training horticultural trainees, providing training and also mentoring with my love and passion of all natives of our area and within our Botanic Gardens. I gained immense enjoyment from entertaining school children with the simple lesson of sowing a seed and showing the enormous tree that comes from the tiniest speck which is the eucalypt seed.



Brachychiton bidwilli planted in Castletower display area.

The Tondoon Botanic Gardens, at this quarter century mark, has reached magnificent growth and importance. For myself, after sixteen years of crawling around on hands and knees, patiently watching my babies grow in the nursery, gently transplanting them and carefully weeding the nine huge beds which, I feel, are both my legacy and my joy, I thank the Gardens for their beauty, knowledge and community spirit.

Photographs by John Deno except p.216 by Ruth Crosson



Queensland palm bed.



Grevillea venusta – planted in Castletower display area.





Cold-hardy hybrids of Western Australian eucalypts

John Purse

John is a plant scientist who has worked in eucalyptus forestry for many years. He now runs his own business in the UK, which includes breeding Eucalyptus hybrids for hardy ornamental nursery stock, cut foliage and forestry. He has visited Australia many times, and is fascinated by its flora.

Anyone who is familiar with some of the more ornamental eucalyptus species from the south-west of Western Australia (WA) will wish they had at least a couple in their garden. The varying combinations of shrubby habit, interesting foliage, extraordinary flower buds and large red or yellow flowers almost inevitably appeal in some way. Add to this the attractiveness of the nectar-rich flowers to wildlife and there would seem to be a whole set of species with attractive features. If only.... There is, of course, a reason why they are unfamiliar in cultivation outside parts of Australia and a few other locations – they are adapted to a Mediterranean-type climate but have very little tolerance of the frosts that are characteristic of most such locations.

Despite their marked differences from the hardy eucalypts from south-east Australia, many of the species from the south-west corner of WA are related to them taxonomically. The possibility of producing interspecific hybrids between such species was reported in 1956¹, but was not followed up. In 2004 I had the opportunity to try to create further hybrids of this type, and this article is a short account of some of the findings and a description of several of the hybrids I've produced.

The rationale for such hybrids is that there is the potential to create novel and attractive varieties that have some frost hardness. For them to have any potential in horticulture, they also need to be rooted easily from cuttings because hybrids cannot be expected to produce seedlings that resemble the parent. Clearly, the evaluation of any hybrids is necessarily a lengthy process, with poor results at any step being a good reason to discontinue the evaluation of the hybrid concerned. However, the techniques for creating eucalyptus hybrids have been well-developed by the forestry industry, so the initial step of controlled pollination is technically fairly straightforward.

Taxonomically, the genus *Eucalyptus* is divided into several sub-genera and sections. The majority of hardy species that are familiar as exotics in north-west Europe, and very many of the ornamental species from the south-west of Western Australia, are in the sub-genus *Symphyomyrtus*.

However, these two groups of species are in different taxonomic sections within this sub-genus, so my crossings have attempted to produce intersectional hybrids. Such hybrids are 'wide' taxonomically, and precedents from other breeding work involving wide hybrids indicate that the proportion of crosses that produce vigorous seedlings will be low. This has certainly proved to be the case in my work – the majority of crosses produce no seed, or seed that fails to germinate. But some crosses do produce a small amount of viable seed.

By good fortune, the shape of the cotyledons (the seed leaves) is very different in the two sections (*Maidenaria* and *Bisectae*) that have produced hybrids. The obvious hybrids have an intermediate cotyledon shape that is unlike that of either parent, and so are very easy to identify as soon as they have germinated – a huge advantage for me! However, as would be predicted, many of the hybrids lack vigour. Despite much care, they die within a few weeks or months of germination. Fortunately, there are a few exceptions, and these seedlings become the focus of my attentions.



The intermediate Y-shaped cotyledons of a *Eucalyptus gunnii* x *caesia* ssp. *magna* hybrid seedling (left), and the typical bilobed cotyledons of a *E. gunnii* seedling (right) from the same mother tree.

The first of these exceptions was one seedling out of seven hybrid germinants from an *E. gunnii* x *caesia* ssp. *magna* cross that I made in 2005. Cuttings from this plant do root, though the strike rate is low, and so I've produced only about 20 plants of this selection. I've planted these in various locations and they produce handsome young plants. However, they faced challenging winters, and today the only outplanted survivors over two years old are two plants on Guernsey, planted there in 2011. These two plants have initiated many flower buds. Several other plants have initiated buds previously, only for the buds (or the entire plants) to be frosted. However, a plant in a frost-free polytunnel flowered in March 2013. The flowers are a delicate pink, about 30mm





across, in inflorescences of between three and seven flowers. The flowers produce copious quantities of nectar, so should be attractive to wildlife, though in Britain's dank March last year only ants found them.

This hybrid is happy in cool wet winter conditions, but is damaged by frosts below -6°C , which is not sufficient frost tolerance for it to be a practical proposition in mainland Britain. In any case, its poor rooting would make propagation on any scale unrealistic. So this hybrid will become an interesting but rare curiosity, though it may have potential as a parent for further breeding.



Buds and flowers of the *E. gunnii* x *caesia* ssp *magna* hybrid, growing under cover in Kent, UK.



Tree (left) and flower buds (above) of one of the *E. gunnii* x *caesia* ssp *magna* hybrids on Guernsey, October 2013

My second wide hybrid, produced from a cross made in autumn 2006, is a *Eucalyptus gunnii* x *loxophleba*. The *E. gunnii* mother is moderately vigorous and highly floriferous. *E. loxophleba* (York Gum) interested me because its inflorescences are unusually well-displayed for a eucalypt in this sub-genus. But one unexpected feature of the hybrid selection soon became apparent – its foliage and young stems become an attractive pink and eventually red in response to cold weather. This hybrid also roots very readily. Its Achilles Heel in Britain is its modest cold tolerance – again to only around -6°C , or short periods at lower temperatures, without damage. The easy rooting has given me no shortage of plants for trialling, but of course the severe winters have taken their toll on many of these. The oldest plants outdoors are two on Guernsey, planted there in 2011. They are growing well, but fail to produce much stem and foliage colouration there – presumably this is a consequence of the mild climate. Plants outdoors in south-east England and south-east Ireland have survived the most recent two winters despite some damage, and have the attractive colouration. No flower buds have been initiated so far.



loxophleba hybrid

My third success in hybrid creation are two (*Eucalyptus gunnii* x *pulverulenta* 'Baby Blue') x *cernua* three-way hybrids, which were the only two germinants from two different *E. cernua* pollen parents. One of these hybrids has no trace of the glaucous foliage of the mother, and looks very much like the *E. cernua* father, even in flower. It is vigorous, flowers freely when still small, and roots exceptionally easily. However, its similarity to its *E. cernua* parent extends to its lack of cold-tolerance, so it is of little practical interest. The other hybrid does not root well and has not yet initiated flower buds.





One of the better 'runty' hybrids: the sole surviving *E. vernicosa* x *cernua* hybrid at 6 months from germination.

The latest hybrid seedlings were eight *Eucalyptus vernicosa* x *cernua* that germinated in April 2013. Nine months later, just one of these survives, and it doesn't look vigorous or particularly healthy. However, the *E. vernicosa* parent is of only moderate vigour, and the surviving hybrid seems to be happy enough in a cool greenhouse in the depths of a British winter, which is unusual for the less healthy hybrids. Thus it may yet prosper.

So, after 10 years I've had a plenty of frustrations and no outright successes. I do not plan to make any more hybrids of this type, but I will continue to evaluate the hybrids I have produced, and use them as parents if they prove fertile. The *E. gunnii* x *loxophleba* hybrid deserves to be trialled in Mediterranean climates that are subject to frosts, and I have already planted some in southern Italy. Whether it will prove sufficiently ornamental to attract interest remains to be seen.

In this article I've hardly touched on the scientific implications of this work, though there are several aspects that deserve some consideration. But one important point with many practical and scientific implications is as yet unclear: are these hybrids themselves fertile? I'm hopeful that the *E. gunnii* x *caesia* plants on Guernsey will start to answer this point in 2014.

Reference

1. Pryor, L D (1956) An F1 hybrid between *Eucalyptus pulverulenta* and *E. caesia*. Proc. Linn. Soc. NSW, Vol 81, 97-100

Calothamnus: the Beautiful Plants

Jim Barrow

Jim spent nearly 40 years working for CSIRO and "retired" as a Chief Research Scientist in 1992. Post retirement he continued his scientific work but also devoted time to his wildflower interests. He is a past president of the Wildflower Society of WA and recipient of the Wildflower Society Award.

Calothamnus is a genus of some 41 species, and several subspecies, all confined to Western Australia. They are commonly known as "One-sided Bottlebrushes". That is a pity. It makes them seem like a half-baked version of something else, whereas, as the genus name indicates, they are indeed beautiful plants (from Greek *kalos* (beautiful) and *thamnos* (shrub)).

They are shrubs with showy, usually-red stamens grouped together in bundles, or "claws" that bend downwards (see photos). This anatomy is well adapted for bird or mammal pollination. It is structurally similar to that of Kangaroo Paws.

The first species described was *Calothamnus sanguineus*. The species name comes from Latin *sanguineus* (blood) and the official common name is "Silky-leaved Blood-flower". This makes it the "type" species for the genus. It was named by Labillardière and that is why the full name of the genus is *Calothamnus* Labill.



C. sanguineus is an open shrub with a long flowering season (from March to November). It grows from near Albany in the south to north of Geraldton. The two upper claws are fused for most of their length and the two lower ones are reduced to a single filament.

Labillardière was one of the important figures in early Australian botany. He was born in Alençon, Normandy, France in 1755, the 9th of 14 children of a lace merchant of modest means. The surname Labillardière originated with Labillardière's grandfather, who, in an affectation of nobility, appended the name of the family's estate, La Billardière, to his surname. Labillardière retained only this part of his name in both his publications and his signature.

In 1791 Labillardière was appointed as a naturalist to





d'Entrecasteaux's expedition to Oceania in search of the lost ships of La Pérouse. They failed to find any trace of the missing expedition. Their ships visited southwest Australia in 1792 and he collected specimens at Observatory Island (just off-shore and about 15 km west of the present location of Esperance) and other locations at the Archipelago of the Recherche.

While the expedition was exploring Oceania, the French Revolutionary Wars had broken out in Europe, and when the ships reached Java, Labillardière's scientific collections were seized by the British as spoils of war. Labillardière despaired at the loss of three years' painstaking work, but he had an ally in Joseph Banks, who successfully campaigned for the return of the collections.

Between 1804 and 1806 he published *Novae Hollandiae Plantarum Specimen*, the first general description of the flora of Australia. It has been praised for the accuracy of its descriptions and for the elegant scientific names coined therein – but criticised for its imprecision and occasional errors in collection locality and habitat. The preface describes the journey “from Cape of Good Hope to Australia”, an example of the continent being named as “Australia” before its popularisation by Flinders. It was in the second edition (1806) that he described *Calothamnus sanguineus*.

For the second three species, we are indebted to Robert Brown. The rest of the world knows him as a pioneer microscopist, the first to observe the cell nucleus and the first to see the busy movement of tiny particles – which we now call Brownian movement. Australians who are interested in plants know him as a remarkably observant botanist, acknowledged by the many species with “R. Br.” appended to the name, by the several species called “*brownii*” and by “*Brunonia*”, from the latinised form of his name. This reputation arises from his journey to Australia with Flinders on the *Investigator*.

Flinders was not really supposed to call in at King George Sound (the name he used and the name subsequently adopted, rather than “King George the third's Sound” as it was previously known). He referred to it as a ‘slight deviation’ from the plan! Nor did he intend to call at Lucky Bay. Brown laconically remarks in his diary: “...our situation rather dangerous. And even with the finest weather the navigation so intricate that it was judged prudent to run in with the land with a slight probability only of shelter.” That is why Flinders subsequently named it “Lucky Bay”. Flinders intended to push on but was persuaded to stay for “two or three days by the scientific gentleman”. The entries in Brown's diary

are very brief; mostly he just records the day's activities. It was only subsequently, in a letter written to Banks from Sydney that he remarked that the western part was “by far the richest in new and remarkable plants that we have yet seen, and would, I am convinced amply repay a second examination”.

It was at Lucky Bay that Brown collected specimens which he recognized as belonging to *Calothamnus*. He named three species, one of which was *C. gracilis*. It has five staminal claws but the base of the flower is buried within the stem, giving a rather different appearance. As the photo shows, the plant has thick robust stems, belying its “gracile” name – from the Latin *gracilis* meaning thin and graceful.



C. gracilis is a robust spreading shrub that grows close to the south coast.

Another species he named was *C. villosus*, which also had its flower parts in “fives”. The third species he collected must have struck him as unusual in that the flower parts were in fours rather than in fives as is more common in Dicots. He was not to know that four flower parts were common in the genus. The name he allocated, *C. quadrifidus*, meaning split into four parts, while of course accurate, does not distinguish the species.

C. quadrifidus, is a very widespread species. It ranges from east of Cape Arid, along the south coast west to Cape Naturaliste, north to Shark Bay and inland to just beyond Southern Cross. It is also a very variable species. George and Gibson (2010) argued that there weren't sharp transitions from one type to another and so it was best to allocate them to sub-species. They recognised eight sub-species. This includes two that were previously referred to as species (*C. asper* and *C. homalophyllus*).





C. quadrifidus ssp. *quadrifidus*



C. quadrifidus ssp. *asper*



C. quadrifidus ssp. *homalophyllus*

The several sub-species tend to geographically separate. Sub-species *quadrifidus* is the most wide-spread of the subspecies and occurs south and west of most of the other sub-species. Sub-species *asper* mostly occurs at the north end of the range as far north as Shark Bay. Sub-species *homalophyllus*, the Murchison claw flower, as the name indicates, occurs in the Murchison district including Kalbarri.

Cultivation of Calothamnus

Several species of *Calothamnus* are now in cultivation. Propagation is fairly easy. The seeds are retained in persistent nuts. If a few of these are removed, placed in a paper bag and allowed to dry, the seeds fall out and can be easily collected. Although the seeds are tiny, they germinate well as is shown by the widespread use of *C. quadrifidus* in WA for roadside direct seeding, and by the potential of several species to invade areas to which they do not belong.

Older plants are likely to become rather woody and “leggy” but they respond very well to pruning, shooting vigorously from cut branches.



C. rupestris reshooting five weeks after pruning.



C. graniticus ssp. *graniticus* pruned to a low hedge at the Royal Botanic Gardens Melbourne. Personally, I don't like it. This species has a very interesting natural architecture, like a Japanese pine, but with red flowers. If you do like hedges, several species can be so used. (Photo Shirley Martin)





Flowering *Calothamnus* plants are valued real estate to honey-eaters. Grow some and you will be entertained by aerial battles between different species. Here, a brown honey-eater has (temporary) possession of a *C. graniticus* ssp *graniticus* branch.



The other reason is for the jewellery. When the sun comes out on a wet winter's day (as it does in Perth), your garden will sparkle with diamonds (on *C. graniticus* ssp *leptophyllus*).

There are at least two further reasons for growing *Calothamnus* in your garden. One is for the visitors they attract.

Here are some notes on species that are widely cultivated, or should be.

As you can see above, *C. graniticus* comes in two subspecies, one has rather narrow leaves (*leptophyllus*). Both are vigorous shrubs, with the narrow-leaved subspecies tending to be rather taller. Both have a fairly restricted natural distribution. Subspecies *graniticus* is restricted to a small area near Meelup beach. Both are now fairly widely grown and seed is commonly available from cultivated plants.



C. torulosus



C. hirsutus

C. torulosus is a small shrub with rather unusual flowers - the central two claws are fused at the base and folded to give a wedge-like appearance. It grows on rocky granitic land. It is an attractive plant that deserves to be more widely grown. *C. hirsutus* was sometimes sold as *C. villosus*. It is a small shrub with hairy leaves. The flowers have five claws but are not prominent as they are borne within the canopy. Its natural habitat includes seasonally wet areas, so it would be expected to grow in heavy soils.



C. rupestris



C. gilesii

C. rupestris is a vigorous shrub to small tree. It has pinkish flowers and rather short leaves with a fairly sharp point. Put it at the back of your garden. Or use it as a very effective barrier hedge. *C. gilesii* is a large shrub with long leaves. It grows from the drier edge of the wheatbelt to well inland and can cope with harsh conditions.

Further reading: A revision of *Calothamnus quadrifidus* (Myrtaceae) A.S. George and N. Gibson, *Nuytsia* 20: 57–77 (2010).





Native cherry and sandalwood family

Phil Watson

Worldwide the sandalwood family, *Santalaceae*, is represented by over 400 species of which 50 species are Australian. Tasmania boasts seven diverse species from the genera of the native cherries *Exocarpus* sp. and currant bushes *Leptomeria* sp. and the potentially extinct austral toadflax, *Thesium australe*.

Characteristically most family members are root parasites. This feature enables their searching roots to extract nutrients from neighbouring indigenous plants such as gums and wattles.

The distinctive *Exocarpus* genus is the best known of the ten Australian *Santalaceae* genera boasting a range of endemic trees and shrubs species including the appealing native cherry, *E. cupressiformis*, and broom ballart, *E. sparteus*, which display attractive pendulous branches adorned with green to bronze shades of conifer-like foliage. All species bear small, succulent, cherry-like fruits which have proved nutritionally beneficial for Aborigines, explorers and colonists alike. Somewhat disappointingly, however, are the low success rates when propagating them from seeds or cuttings or growing them on in desired landscape settings.

Amongst the other Australian genera the sandalwoods and quandongs, *Santalum* sp. from Australia, Polynesia, India and Indonesia, have an exclusive status due to their historic association with the fragrant sandalwood industry which has been valued for centuries in the making incense sticks, sacred ornaments and funeral pyres.



Exocarpus cupressiformis fruit.
Photo: Jill Dark



Tree and fruit of Quandong, *Santalum acuminatum*. Photos: Jill Dark

Significantly, the sweetish quandong's reputation as a staple aboriginal food has lead extensive research as part of its role in developing Australia's bush tucker industry.

This article will further explore the major roles played by the sandalwood and the native cherry in early colonial history. Curiously many of the families' little known species are valued for unexpected cultural attributes. To exemplify the point, a species growing along the arid coastal dunes of South Africa, the blue-grey leathery leaved, cape sumach *Osyris compressa* has been used for centuries to tan cattle skins. Successive layers of compressed leaves or bark transform the hides to either light brown or dark brown leather respectively.

Following this brief insight, this article seeks to also consider the natural, cultural and historical interrelationships and values of this versatile sandalwood family.

Native Cherry's and currantbush's historic connections

French kitchen garden help in first recording of native cherry

Native cherry, *Exocarpus cupressiformis*, was first collected on 9 May 1792 by Labillardiere in the company of a young, enthusiastic Riche along the shores of Southport Lagoon (recorded as 'great lake') in southern Tasmanian. Fascinatingly, the first collection of native cherry occurred on the shore excursion during which the ship's botanist and gardener Delahaye doggedly cleared and cultivated the soil in preparation for the famous first French kitchen garden.

This excursion proved botanically significant with the first collections of not only native cherry but also erect currantbush, *Leptomeria drupacea* (recorded by Labillardiere as a *Thesium* sp), a common buzzy, *Acaena* sp., flag iris *Diplarrena moraea* and cutting grass *Gahnia grandis*.





An excited Labillardiere recorded the finding in his diary with the words *an evergreen tree, which has its nut situated, like that of the acajou (cashew), upon a fleshy receptacle much larger than itself. I therefore name this new genus "Exocarpus"*.

At the time he was the naturalist on board the scientifically well equipped 500 tonne *Recherche*, which along with the frigate *Esperance* was commanded by Admiral Bruni d'Entrecasteaux during the 1792-3 exploration of Port du Nord (Pigsties Bay) in Recherche Bay. Although the expedition's primary aim was to search for the French's national hero La Perouse and his missing ships *Astolabe* and *Boussole*, they had also been commissioned to engage in extensive geographical and botanical exploration. The three-year search proved futile as both ships were wrecked on the Vanikoro reefs, which were narrowly missed on d'Entrecasteaux's return voyage. Amusingly the Admiral was somewhat resentful of the persistent naturalists' requests for extra cabin space to press and store specimens as well as persistent delays due to their botanising. Labillardiere seemed very much aware of this situation when he noted in 1800; *it would have been very proper regulation, if a boat had been kept expressly for the use of those gentlemen who were appointed to make researches into natural history*.

Native cherry and currantbush become well known colonial fruits

During the early colonial period, the Englishmen considered Australia as a topsy turvy place where "dogs" bounded on hind legs; "water moles" deposited eggs and brandished duck bills whilst plants sported stones on the outside. W.C. Wentworth in 1819 jovially noted that *"Nature... seems determined to have a bit of play, and to amuse herself as she pleases. Accordingly, she makes cherries with the stone outside"*. By 1830 native cherry's strange inside out edible fruits had gain a reputation as one of the colony's best liked bush tuckers. The fruit was eaten raw or cooked, but was only picked when deep red and ready to fall. The early farmers were cautious of the plant, as it was known that the foliage was toxic to stock.

Dawson commented in 1830 that *"the fruit is similar in colour to a Mayduke-cherry, but of a sweet and somewhat better quality, and slightly astringent to the palate....This as far as I know is the only natural production in Australia worthy of the name of fruit"*.

Victorian botanist Baron Von Mueller in 1877 described the fruit as *"... the red edible part...constitutes merely an enlarged and succulent fruit stalklet (pedicel) and...cherry stone, forms the real fruit containing the seed"*.

Although native cherry has gained historical recognition for its fruit, its fellow family member, the common currant bush *Leptomeria drupacea* contributed enormously to improving the ailing scurvy-stricken crews and convicts from the First Fleet. Its small green fruits assessed as being of the same sourness as lemon, contributed a rare source of Vitamin C to their spartan diets. The ever observant colonial botanist Baron Von Mueller was equally impressed by the similarly tart, spiny currantbush *L. aphylla* of the Victorian and South Australian mallee when he declared them to be *"succulent, pleasantly acidulous and harmless"*.

Aboriginal Use

Ballart was the Moori Victorian aboriginal name for native cherry. The Aboriginal people enjoyed these juicy, sweet fruits as a late springtime treat, rather than as a staple food. As the trees grow sparsely in the woodlands and the ripe fruits are small in number on the trees during the fruiting season, collection of large amounts was relatively difficult.

As a **medicinal** plant it had a number of reported uses. The sap of the tree was used as a snake bite treatment, while the twigs provided a bitter tonic and astringent. This astringent proved valuable as a solution for stopping infection on sores and cuts.

The leaves were also used to create a smoke for repelling insects during the warmer summer months.

Of interest, is the use by north eastern Australian Aboriginals, of the closely related species *Exocarpus latifolius*, broad-leaved native cherry. This plant had yellow fruit, which was again eaten when very ripe. However, its bark was soaked to provide a tonic for the sterilisation of tribal women, no longer allowed to give birth due to tribal traditions.

Exocarpus sp. contributes to a diversity of birds

Native cherry, like many of its genus, has significant habitat and landscape potential with its attractive pendulous branches along with their dense protective foliage and bird attracting fruits. Larger specimens are frequently seen as sub canopy trees in drier, rocky sites of eucalyptus woodlands.

Their elegant form and drooping yellow green foliage, distinguishes them from the surrounding sclerophyllous vegetation, forming insect attracting three-dimensional frameworks ideal for spider webs and bird habitat.

The dwarf cherry, *E. strictus*, commonly forms dense shrubbery within a range of coastal, wet forests and subalpine communities. These protective thickets support a variety of small marsupials such as



bandicoots, dunnarts and potoroos as well as a rich diversity of native birds.

In delightful ground hugging alpine heaths the mountain ballart (*E. humifusus*) and alpine ballart (*E. nanus*) are amongst a number of red fruiting heaths including *Podocarpus lawrencei* and *Cyathodes petiolaris*. Tim Low in *Bush tucker* suggests that the red colouration is a response by plants to the lack of fruit-feeding birds. He notes that by evolving



Exocarpus cupressiformis Above as a grove on Cherry Tree Hill, Ilford NSW – named for the abundance of the species but now partly cleared for a pine plantation. Right: an individual specimen at Ben Bullen. Photos: Merle Thompson



E. strictus
Above left: Developing fruits
Above: Shrubs in situ Photos: Jill Dark
Left: Ripe fruit Photo: Merle Thompson

fruits of consistent colour and size the plants optimise their potential for being located and seeds dispersed. Their insignificant scented white flowers would also suggest they are seeking the pollination services of similar suite of tiny insect pollinators.

The swollen fleshy red stalk (pedicel) on which the real seed bearing fruit (nut-like) grows is exactly the same design for the cashew nut tree, with the nut located on the outside of its fleshy fruit.

When in fruit, fruit-eating birds ingest the seed whilst devouring the juicy fruit. These seeds, with their tough outer shell weakened by the bird's digestive juices, are dropped away from the mother plant to germinate surrounded by the nutrients present in the bird's dropping.

Of course the Latin name *Exocarpus* makes sense, translated to mean "nut or seed on the outside of a fleshy fruit".

Horticultural Use

As a result of the difficulty in propagating the plant from seed or cuttings its wonderful horticultural potential has yet to be achieved. Most nursery persons can successfully produce young seedlings and rooted cuttings. However, many will die very early in their growing stages. This is a result of the plants parasitic nature, which means they are reliant on fungal associations to enable them to grow through the seedling stage to healthy adults. Skilful nursery people supply this fungal association, found in association with decaying native vegetation, in their potting mixtures used to grow on the developing seedlings.

The effort of sourcing a healthy seedling will be repaid by the pride of having an elegant, somewhat rare feature plant, prominently located in your native garden.

Their coniferous appearance led to earlier use as an attractive native Christmas tree, which today is hopefully a tradition of the past, with the easy availability of "Radiata Pine" saplings.

Sandalwood is a commercial bonanza

In the case of sandalwood, the discovery and exploitation of the Polynesian islands was in part a response to the greedy obsession to procure supplies of this valuable commodity. The early exploitation of sandalwood in Hawaii, Fiji and the New Hebrides proved to be full of intrigue being ostensibly marred by violence and atrocities.





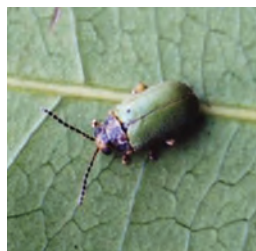
Menippus darcyi, a little green beetle at Grays Point

Margaret Bradhurst

I am normally a 'plant' person with a keen interest in photographing native orchids; however, I was given the challenge to photograph a small green beetle, which was feeding on the leaves of *Celtis paniculata* in a small patch of threatened littoral rainforest at Grays Point Reserve in Southern Sydney.

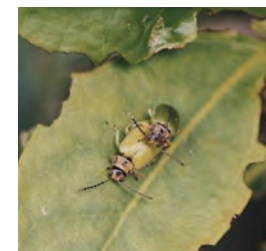
The beetle in question is *Menippus darcyi*, a small light green chrysomelid leaf-beetle about 5 mm in length which feeds solely on the leaves of *Celtis paniculata*.

The history of *Menippus* is quite confusing. When the beetle was first discovered at Grays Point in 1998, it was named *Menippus fugitivus*. Then, because it was the only known population on mainland Australia, it was listed as 'endangered' under the Threatened Species Conservation Act NSW (1995). Later, further investigation showed that there were in fact three species of *Menippus* under the name 'fugitivus'. As a result of reclassification the Grays Point beetle has now become *Menippus darcyi*. *Menippus fugitivus* is now found only on Lord Howe Island where it feeds on the endemic *Celtis* species there.



Menippus darcyi is a common species in Queensland, but has few records in New South Wales, with a big gap between the southernmost population at Grays Point and the next, which is on the north coast near Taree. Grays Point Reserve borders Port Hacking in Sutherland Shire and is managed by the Grays Point Bushcare Group under the control of Sutherland Shire Council. The small 0.8 ha reserve has between 10–15 *Celtis paniculata* trees and it is thought that they support a population of about 500 beetles, which are active between August and April. The Reserve is part of Sutherland Shire Littoral Rainforest, which is listed as an endangered ecological community under the Threatened Species Conservation Act.

All species of *Menippus* in Australia feed on *Celtis*. The adult female lays eggs in spring and they hatch into small larvae. They cause extensive damage to the small population of *Celtis*, removing new shoots and scalloping the edges of many leaves. The beetle camouflages itself well amongst the green foliage and quickly moves out of sight if disturbed. Even though *Celtis paniculata* can be found in a few other remnant pockets of littoral rainforest in Sutherland Shire, it is only the Grays Point population which attracts the *Menippus darcyi* beetle.



Bark of *Celtis paniculata*

It is obvious that life is very fragile for *Menippus darcyi*. The little green beetle is totally dependent on *Celtis paniculata* as a food source and there are only 10–15 trees in Grays Point Reserve. If anything should happen to those trees, *Menippus darcyi* would not survive. A number of factors could affect the survival of *Celtis paniculata*. These include destruction by fire, a possible extension to a very small car park and the fact that the beetles themselves are causing extensive damage to the leaves and shoots of the trees. The small number of trees in the reserve could not support a larger population of beetles.



Bark of *Celtis paniculata*

It is hoped that the future of both the beetles and the reserve continue to be protected under the Threatened Species Conservation Act.





Celtis paniculata (Native Celtis or Native Hackberry) is a member of the Ulmaceae family and grows from Kiama in New South Wales to the Endeavour River in tropical Queensland. It is a rare plant in the remnant Sutherland Shire Littoral Rainforest community. A small to medium sized evergreen tree, it has smooth brown patterned bark showing occasional vertical or horizontal ridges. Leaves are 5-10 cm long, dull green on both surfaces with venation more noticeable below. Oil dots are visible with a hand lens. The tiny greenish, male or female flowers can be seen January to March. Fruit is a black drupe to 10 mm diameter which ripens August to March.



Leaves and fruit of *Celtis paniculata*

The only other member of the Ulmaceae family found in the Sydney area, *Trema tomentosa* var. *viridis* (previously *Trema aspera*), also grows at Grays Point Reserve. It is known as Native Peach or Poison Peach and its characteristics are similar to *Celtis* in that the leaves are strongly three-veined from the base. In this case they are quite rough and sandpapery. Flowers are male and female and the fruit a small black drupe.



Trema tomentosa var. *viridis*

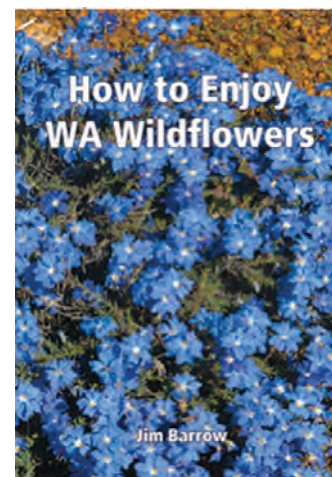
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Book review: *How to Enjoy WA Wildflowers* by Jim Barrow

John Aitken, President APS NSW



Subscribers to *Australian Plants* will be well aware of Jim Barrow and his passion for Western Australian plants. He has written a number of articles for the journal and has produced two issues of *Australian Plants* devoted to WA wildflowers and where to see them. When my wife and I visited WA 18 months ago, we carefully studied both issues and took them with us as a guide to finding the best locations to view the wildflowers. We followed Jim's suggestions and were not disappointed. We found them to be an invaluable source of information and following Jim's suggested routes made our trip much easier and more enjoyable.

Such was the positive response to Jim's two issues that he decided to write an expanded compilation of them, which resulted in his wonderful book *How to Enjoy WA Wildflowers*.

The book is divided into three very readable, informative and enjoyable parts. Part 1 provides an important and fascinating insight into the factors which affect WA wildflowers and their distribution. It is an excellent introduction from which to gain a better appreciation of the nature, diversity and beauty of WA wildflowers.

Part 2 contains excellent suggestions for touring routes of where to best see the different wildflowers growing in their natural glory. These trips, beginning with King's Park, Perth, range from Shark Bay to the north, Hyden (Wave Rock) and the south coast, areas east of Perth and to Albany and the south west.

Part 3 includes a number of one-day trips from Perth.

The book contains a large list species of the countless wildflowers likely to be seen and is supported by many excellent photographs,

This is an enjoyable book, which I highly recommend to wildflower enthusiasts who plan to savour the unique wildflower delights of WA.



