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Contents

The ANPSA Biennial Conference	John Aitken	79
The ANPSA Australian Plants Awards, 2013	Margaret Lee	80
<i>Ajuga australis</i> (Austral Bugle): a highly variable native species	Daniel Clarke	83
Plant collectors from Van Diemen's Land	Dick Burns	88
Nangawooka Flora Reserve	Max Jahn	100
<i>Banksia marginata</i> forms in Tasmania	Jonathan Esling and David Marrison	105
Why we still belong – 40 years on and still keen	Peter & Ann Radke	112
Cycads – the 'Dinosaur Plants'	Jim Barrow	113
Barking mad – the art of bark	Doug Rickard	120
Book review: <i>Pathfinders in Tasmanian Botany</i>	Alex George	Insert 3

Front and back covers: The seeds of *Macrozamia riedlei*, which grows in the south west of Western Australia. It is a small, usually trunkless plant, growing between 0.5–3 m high. Photo: Jim Barrow

Australian Plants articles

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The ANPSA Biennial Conference, August 2013

John Aitken, Co-editor, *Australian Plants*

The biennial conference of the Australian Native Plants Society (Australia) (ANPSA) was held on the Sunshine Coast, Queensland from 10–16 August 2013. ANPSA is the umbrella group for all the state-based Australian native plant societies and the conference is an important forum for members to share their enthusiasm for plants and to discuss Australia-wide issues. The Conference was attended by over 185 members from member societies in the ACT, New South Wales, Queensland, South Australia, Tasmania and Victoria. In addition, a representative from the Top End Native Plants Society, Northern Territory, was welcomed as an observer.

The Conference was superbly organised and consisted of a well-balanced program of talks, excursions and workshops. One of the many highlights of the Conference was the ANPSA Australian Plants awards, which were conferred on Angus Stewart from NSW, Professional category and Hazel Dempster from WA, Amateur category. Both Angus and Hazel have made outstanding contributions to our knowledge and understanding of Australian native plants. The citations to both Angus's and Hazel's achievements are on pages 80–82 of this issue of *Australian Plants*.

Lawrie Smith, from SGAP Queensland, was inducted as the new President of ANPSA for the next two years. During the Conference, the former President, Margaret Lee, presented Lawrie with his ANPSA President's badge. All member societies wish Lawrie every success in his tenure.

Margaret, who became President of ANPSA at the last Biennial Conference in Adelaide in 2011, has made a significant contribution to the organisation. We all owe Margaret a great deal of thanks for her tireless efforts during this time.



The organising committee from SGAP Queensland is to be congratulated for its wonderful efforts to make the conference such an outstanding success and to the Queensland members for making us so welcome.

The next biennial conference will be held Canberra, in November 2015 and will be hosted by the Australian Native Plants Society, Canberra Region.

The ANPSA Australian Plants Awards 2013

The Australian Plants Awards were presented on Monday 12 August 2013 in conjunction with the ANPSA Conference (Australian Native Plants Society (Australia)) hosted by the Society for Growing Australian Plants, Queensland at Alexandra Park, Sunshine Coast.

The recipients are **Angus Stewart** for the professional category and **Hazel Dempster** for the amateur category.

The awards are made to persons whom the ANPSA Committee considers to have made an outstanding contribution to the knowledge of Australian plants. Angus Stewart from NSW was awarded for his contribution in the course of a notable professional career in a natural science field and Hazel Dempster from Western Australia was awarded for her contribution through primarily amateur or voluntary work or interest in Australian plants.



Angus Stewart and Hazel Dempster with their awards.

Angus Stewart, Professional category

Angus Stewart has made an outstanding contribution to the knowledge of Australian plants through his professional career as a plant breeder and as a media presenter, writer and author.

Angus has a Bachelor of Science (Honours) degree in Agriculture from the University of Sydney and is Managing Director of New World Plants, where he breeds Australian plant cultivars including many Bush Gem kangaroo paws as well as various other genera. He has contributed to the development of popular and reliable garden plants for the eastern states.

He has contributed significantly to public knowledge of Australian plants in television and print media. Angus has been a presenter on ABC Television's *Gardening Australia* program since 2005 and has been a broadcaster with ABC radio 702 since 1992. He regularly writes articles about Australian plants for *Gardening Australia* magazine and for many other publications. Since 1995 he has published six books on gardening and propagation starting with *Gardening on the Wild Side: the New Australian Bush Garden* in 1995 and more recently *500 Plants – Great Australian Favourites for your Garden* in 2012. He has encouraged Australian gardeners to experiment with a range of propagation techniques through his book *Let's Propagate: A Plant Propagation Manual for Australia*.

Angus has been a member of the Australian Plants Society NSW for over 25 years and during this time has presented talks to their groups and conferences and to many other gardening and community groups. He willingly makes himself available to support APS groups in local activities.

Angus' contributions to community education have been recognised with several awards, including Outstanding Contribution to Horticulture award (2005) and the Allan Seale Award for services to Horticultural media (2008) from the NSW Nursery and Garden Industry Association, and joint winner of Horticultural Media Association of Australia Book Laurel for Best General Gardening Book (2011) for *Creating an Australian Garden*.

The generous contribution Angus has made to communicating knowledge about Australian plants to the wider community makes him a very worthy recipient of an Australian Plants Award.



Hazel and Angus receiving their awards from Margerat Lee, President of ANPSA



Hazel Dempster, Amateur category

Hazel Dempster has made an outstanding contribution to the knowledge of Australian plants in a voluntary capacity as a member of the Wildflower Society of WA for over 40 years. She is an Honorary Life Member of the Society.

She is an expert in West Australian native plants and an educator on native plant propagation. Her vast knowledge, based on experience of horticulture and nursery practice, is generously shared. She is frequently sought as a guest speaker or to give practical demonstrations on Australian plants for Wildflower Society meetings and for other community groups and public events.

Hazel has produced a wide variety of publications, papers, fact sheets and articles as well as contributing to works by others. These include an 8 page Fact Sheet for the Environmental Weed Action Network, articles for *West Australian Gardener*, *Ecoplan News*, *Wildwatch Australia* and the WA Wildflower Society and other publications. She has also contributed to submissions for local government planning and sustainability strategies.

Hazel is instrumental in the ongoing success of the Northern Suburbs' Branch nursery, providing advice to volunteers on propagation and successfully propagating many species herself. Her knowledge and commitment has contributed to the success of the nursery in encouraging members and the general public to grow local native species in their home gardens.

Since 1996 she has been actively involved in the Environmental Weeds Action Network and was President from 1999 to 2002. Hazel has been closely involved with a successful application for federal funding for the National Cooperative Research Centre for Weed Management Systems. She has served for a long time on management committees, participates in the State conference each year and has been a delegate to many national ASGAP and ANPSA conferences. She is also a long-time supporter of the Australian Flora Foundation.

Each week, Hazel attends the State Herbarium to help mount and identify plant species. She had an active role in the progress and development of the new breed of Leschenaultias recently released by Kings Park and is a voluntary associate consultant with her daughter Sue in her firm Dempster Local Plant Strategies.

Hazel's lifetime of consistent and continuing dedication to the knowledge and promotion of Australian plants makes her a worthy recipient of an Australian Plants Award.

Ajuga australis (Austral Bugle); a highly variable native species

Article and photos, Dan Clarke, Botanical Consultant

An inherent part of human nature is the necessity to classify and categorise. We feel the need to 'pigeon hole' items and make some logical sense of all the entities, which we observe and use. Classification can sometimes be a difficult process, especially when one delves into taxonomy; the science of biological classification. I had a chance to be a 'taxonomist' during my fourth year Honours project, the last stage of my Bachelor of Science degree, studying the native plant species *Ajuga australis*, commonly known as the Austral Bugle.

Ajuga australis belongs to the Lamiaceae family which includes other native genera such as *Prostanthera* and *Westringia*, along with the culinary genera *Mentha* (Mint), *Rosmarinus* (Rosemary) and *Lavandula* (Lavender). It is the only species of *Ajuga* recognised in Australia.

Ajuga australis is a herbaceous perennial and usually exhibits a basal (at ground level) rosette of leaves, which can be quite numerous. The flowers are cauline, i.e. produced on aerial stems which arise from the centre of the rosette and can reach up to 50 cm in length (See photograph below).



Ajuga australis
from near Bredbo,
Southern Tablelands



A. australis can be found mainly on the east coast of Australia, with collections obtained from as far north as Townsville and as far south as Tasmania. The geographic range extends west to the Flinders Ranges in South Australia. What is striking about this large geographic range is the variety of habitats, environmental conditions and soil types which *A. australis* inhabits. It may, therefore, be no surprise to some that a bewildering and wide array of morphological variation (taxonomic jargon for the physical characteristics of species) can be found within *A. australis*. When plant species exhibit this much variation, they are termed 'species complexes'. When time and motivation are available, taxonomists eagerly study such species to determine whether any 'splitting' is required. In other words, taxonomists search for scientific evidence to support the recognition of additional species from within the species complex. The morphological variation presented in *Ajuga australis* makes it the perfect species for a taxonomic investigation.

Several species within *A. australis* sensu lato (in the broad sense) have been previously described, reflecting its morphologically variable nature. *A. sinuata* was described by botanist Robert Brown in 1810 in addition to *A. australis*, from specimens collected on the central coast of New South Wales. *A. grandiflora* was later described in 1933 from specimens collected near Broken Hill. There have been more recent attempts to recognise new species within *A. australis*. However, these names have been 'lumped' back into *A. australis* on the basis that a thorough taxonomic investigation across the geographic range is warranted.



Given the extensive geographic range, my project was limited to New South Wales. My first task was to observe the collected specimens preserved in the National Herbarium of NSW, located at Sydney's Royal Botanic Gardens. It did not take long for confusion to set in, as I observed one specimen after another, noting the differences in the general habit of the plants, as well as variation in the shape and size of cauline leaves and flowers.

Left: An Herbarium sheet of *A. australis*,
Photo: F. Langshaw plantnet.rbgsyd.nsw.gov.au

The photographed herbarium specimens are all sexually mature individuals and reflect best the extremes of morphological variation. Larger plants are from the west of NSW, near Broken Hill. Others are from cool temperate areas such as Mt Tomah and Barrington Tops National Park.

Later in the year, I awoke my adventuresome spirit and took to the road in order to collect my own specimens of *A. australis*. I also needed to document environmental and habitat data. Specimen collections were also used for DNA analysis, which is an additional useful taxonomic tool.

The first trip, which was in the company of my wife, Katherine, took us to the far west of NSW. We passed through Wellington where I made my first collection at Mount Arthur Reserve.

We pressed on further west as I was keen to collect plants from Mutawintji National Park (north-east of Broken Hill), as some truly robust specimens had been collected there. Alas, after trekking 4 km into Mutawintji Gorge at the end of a long day on the road, we failed to see any plants of *A. australis*. Somewhat downhearted, we headed south to Mungo National Park (north-east of Mildura) where we found some specimens at the Walls of China. On the way home, we stopped in at numerous locations, surveying the spots where previous collections had been made, but were frustratingly out of luck. I was told by those familiar with *A. australis*, that this was likely due to prolonged drought



Ajuga australis, Mount Arthur
Reserve, Wellington, NSW



conditions. Therefore, plants were reduced to rootstocks or only present in the seed bank.

A second trip was organised with my fellow university colleague, Kirstin Proft, who was battling with her own species complex, *Prostanthera lasianthos* (Victorian Christmas Bush). Fortunately, our two plants occur in several of the same locations. Our travels took us to some very scenic country in the Northern Tablelands of NSW. We were able to make collections at places such as Point Lookout in New England National Park and Polblue Swamp in Barrington Tops National Park. At Polblue Swamp, *A. australis* is extremely difficult to find, as plants are comparatively small in size. As a result, I walked over it several times before I recognised it for what it was.

I was able to make further collections on other trips in Kosciuszko National Park near Jindabyne and Geehi; in the west of Sydney in areas of Cumberland Plain Woodland; and managed to pin, as far as I can ascertain, some new 'dots on the map', with the most notable collection obtained in some grassy woodlands at the top of Conrod Straight, Mount Panorama through the help of some local intelligence.

After making numerous collections and careful observations, the taxonomist attempts to analyse aspects or characteristics of the studied specimens. In my study, I constructed a character set comprised mainly of measurements of size and shape of leaf and floral parts. Other character states included prostrate flowering stems as opposed



to the more typically found vertical stems. The density of hairs on the leaves was also recorded and was found to range between almost glabrous (hairless) to densely hairy.

After some complex statistical analyses, I concluded that six 'forms' of *A. australis* could be discriminated morphologically. Some

A. australis, Polblue Swamp, Barrington Tops National Park



A. australis transplanted in my home garden from Mt Panorama, Bathurst with a plant from Coolah, NSW, on right.

of these forms tend to occupy specific habitats and appear to correspond to previously described species, whereas other forms have never been recognised before. The DNA data obtained were not very useful in the discrimination of these forms, yet it did demonstrate that all the forms of *A. australis* sensu lato are closely related in terms of evolutionary relationships.

Regarding cultivation, *A. australis* can be purchased from some nurseries though it is not a commonly sold plant. I found that *A. australis* transplanted easily from the field into pots containing the same site soil. I have transplanted some of these into my home garden patch, which are all currently mirroring the habit and characteristics observed in the field. It has been interesting to monitor the continued prostrate flowering habit of one form, whereas I eagerly await my first observed flowering of other collections, even though I collected them some eighteen months ago. Germination rates using seed of *A. australis* (contained in a mericarp measuring 2–3.5 mm long) were very low, although I did not experiment with any pre-treatment techniques. I corresponded with staff at the Australian Botanic Garden, Mount Annan, who told me their experiments with seed were not very successful as most collected seed was not viable. However, *A. australis* will propagate vegetatively, forming dense mats of plants connected by rhizomes.

As many species of exotic *Ajuga* are successfully cultivated (mainly *A. reptans*), I hope this article gives our native representative a needed boost into the horticultural spotlight.



Plant collectors in Van Diemen's Land

Articles and photos, Dick Burns OAM

Dick is a Life Member of Australian Plants Society Tasmania and a recipient of the ANPSA Australian Plants Award (amateur category). In 2013, Dick was awarded the Medal of the Order of Australia for service to botany, as an author and conservationist.

In 2009/10, the Australian Plants Society Tasmania supported the production of a series of interpretive panels in the Tasmanian Section of the Tasmanian Arboretum at Eugenana. Each panel gives visitors an introduction to the person honoured within the name of an adjacent plant. This led to the writing of Pathfinders in Tasmanian Botany by Dick, published by the Tasmanian Arboretum in 2012. See note on page 99 and Book Review on insert page 3.

The species epithets *lawrencei*, *gunnii*, *milliganii* and *archeri* or variations thereof regularly crop up in Tasmanian plant names. These recognise the work of Robert William Lawrence, Ronald Campbell Gunn, Joseph Milligan and William Archer. All were collectors of wild plant material of Van Diemen's Land, for British botanists over decades from 1830. Each also had a genus named for him – *Lawrencia* in Malvaceae, *Gunnia* in Orchidaceae, *Milligania* in Liliaceae and *Archeria* in Epacridaceae. *Gunnia australis* is no longer recognised as being a separate genus, being absorbed into *Sarcochilus*; Gunn is still honoured in the common name, Gunn's Tree Orchid. *Lawrencella* is a Western Australian daisy genus honouring Robert Lawrence.

Plants had been collected in Van Diemen's Land prior to this period (the name Tasmania was adopted in 1855 following the end of transportation of convicts). In 1773, Tobias Furneaux brought his ship *Adventure* into the bay in south Bruny Island now named for the ship. (He became separated from Captain James Cook's ship, *Resolution*, as they sailed from Antarctica on Cook's second voyage.) Furneaux gathered seeds of a few local plants, notably from one of the tall trees in the area. Furneaux noted they were 'of the Ever-green kind of a different sort to any I ever saw . . . [he wrote that there were two different forms] . . . the leaves of one is long and Narrow, the seed (of which I have got a few) was in the shape of a Button . . .' (quoted in Kenny p. 86). Plants grown from this seed were on sale in England in 1774. A specimen collected from Adventure Bay by David Nelson, the plantsman on Cook's next voyage, was subsequently used to describe the genus *Eucalyptus* and the type species *E. obliqua*.

Jacques-Julien Houtou de Labillardière and his team of scientists travelling with the French expedition led by Bruny d'Entrecasteaux



Prostanthera lasianthos var. *lasianthos*

collected specimens during their two stops at Recherche Bay in 1792–93, with Labillardière later describing many type species, including the first of its genus, *Prostanthera lasianthos*.

William Paterson was the commander of the first settlement established near the mouth of the Tamar River in November 1804, (later moving upstream to become Launceston). He collected some material during his four-year tenure in charge of the settlement. *Patersonia* in Iridaceae honours him. Robert Brown, who named *Patersonia*, came to New South Wales as botanist with the Matthew Flinders expedition that started from England in 1801. After leaving the expedition in Sydney, Brown spent time in the Tamar Valley in January 1804, before Paterson arrived. From February to August, he stayed in the newly settled Hobart Town, collecting many specimens from the surrounding area. These were later described by Brown, appearing in his book on the systemic classification of our flora, the *Prodromus Florae Novae Hollandiae et Insulae Van-Diemen* – An Introduction to the Flora of New Holland and Van Diemen's Land – published in 1810. Robert Brown is recognised in the genus *Brunonia* as well as in some species epithets.



The Hookers

William Jackson Hooker and Joseph Dalton Hooker, father and son, were the first officially appointed directors of the Royal Botanic Gardens at Kew, London. Under their directorships, the major conservatories were built, the overall layout was established and Kew developed its reputation as a world centre for botanical research.

Before William Jackson became Director of Kew, he spent some time as Regis Professor of Botany at the University of Glasgow. He had been collecting and describing plants of Great Britain for many years and some time in 1823 decided to seek plant material from Van Diemen's Land for his own herbarium. Hooker sent a letter, dated 12 July 1823, to residents he thought might be willing to assist. On 1 September 1827, a Launceston merchant, Thomas Scott, replied and sent some seeds and sprigs of plants, along with some mosses from Macquarie Harbour. Scott had 'seen your letter to my late friend the Revd John Youl, he died in March last . . .' (quoted in Burns & Skemp p. 4).

Elsewhere in his letter, Scott made clear his lack of botanical skill. However his significant contribution to Tasmanian botany was his introduction to Hooker of the first of the resident collectors.

Both William Jackson Hooker and his son Joseph Dalton willingly assisted their developing team of Vandemonian collectors. They responded to requests with guidance in preparation of pressed specimens, reference books, etc. Species that recognise the Hookers include, for WJ, *Olearia hookeri* and *Scaevola hookeri* and for JD, *Acrothamnus hookeri* and *Ozothamnus hookeri*.



Acrothamnus hookeri, syn.
Leucopogon hookeri

Robert William Lawrence (1807–1833)

In May 1830, Thomas Scott wrote to William Hooker introducing 'a young friend of mine Mr Robt. Lawrence who is an enthusiastic botanist . . .' (Burns & Skemp p. 8). Scott had only managed to send the one batch of seeds to Scotland.

Robert Lawrence was the son of a wealthy English merchant who decided to migrate with his family to Van Diemen's Land in 1822. Lawrence senior was granted land around the Tamar Valley and became an influential landowner. His first son, Robert, remained in England to complete his education, joining the family in 1825. Robert's father built a home for him on the eastern slopes of the Tamar River; its name, Vermont, remains as a major road in the area.



The Launceston family home for the Lawrences.

Robert was a man of scientific bent, keeping a detailed diary that gives a picture of his responsibilities on the family estates, his interest in animal dissection and in horticulture. His 1829 entries indicate great enthusiasm and shows developing skill in botanic Latin.

During 1830, Robert took part in the Aboriginal campaign, now known as the Black Line, the attempt by Lieutenant-Governor Arthur to round up all Tasmanian Aborigines. The attempt failed, but Robert used much of his time in the field in collecting and observing plants.

Lawrence's first collections sent to William Hooker were of seeds but he later sent herbarium specimens. He kept diaries of his trips, apparently undertaken with servants (probably convicts). Extracts from his diaries are given in Burns & Skemp and in Short (2003).

It is unclear when Lawrence met Ronald Campbell Gunn. They became friends and it was Lawrence who stimulated Gunn in the pleasures of collecting plant specimens.

Robert Lawrence was not to share this joy with his friend for long. He died unexpectedly in bed on his 26th birthday, 18 October 1833, it is thought due to an epileptic fit. His wife Anne had died only a fortnight before, some days after giving birth to a daughter, Anne Emily.

Species named for Lawrence include *Podocarpus lawrencei*, *Pterygopappus lawrencei*, *Spyridium lawrencei* and *Correa lawrenceana*. There is no known portrait of Robert Lawrence.



Spyridium lawrencei
flower

Ronald Campbell Gunn (1808–1881)

Ronald Campbell Gunn is the major figure in this group. As an indication of the extent and scope of his collections, the 2012 Census of Tasmanian Vascular Plants lists 39 taxa with Gunn as part of their name. His varied jobs and appointments over the years took him to all major population centres, from where he roamed and collected for some thirty years. Gunn's work drew the attention of botanists to the special position of the flora of Tasmania; for instance the process of sorting Gunn specimens was a major influence in JD Hooker's acceptance of the process of evolution.



Bronze of Ronald Campbell Gunn in City Park Launceston. He is admiring his best-known discovery, *Nothofagus gunnii*.

Recently a full-size bronze statue of this great man was erected in City Park Launceston, quite near the Lawrence family home.

Gunn was born into a Scottish family stationed at The Cape of Good Hope, South Africa, then educated in Scotland. When aged 17, he and his father moved to Antigua in the West Indies, where Ronald obtained a civilian post with the army. The young Gunn married Eliza Ireland the next year, 1826. In 1830 they and their son and daughter moved to Hobart. Gunn's work as Superintendent of Convicts then Police Magistrate took him to Launceston

It was at this stage that Gunn met Robert W Lawrence. He dispatched his first collection to Hooker in 1832, collected from around the north of the island. Four more children were born to the Gunns but Eliza died in 1836 while in Britain. In the same year, Gunn was appointed Police Magistrate for the Van Diemen's Land Company (VDLC) settlement at Stanley, where new plant communities stimulated his collecting. Dr Joseph Milligan, surgeon for the Company, who had been sending specimens to Gunn since 1834, was now able to join Gunn on collecting expeditions.

Gunn moved back to Hobart in 1838, soon becoming private secretary to Lieutenant-Governor Sir John Franklin. In 1839, Gunn married

Margaret Jamieson, with whom he had another nine children. Not all of Gunn's children survived into adult life.

In 1840 the two ships Erebus and Terror under the command of Captain James Clark Ross came to Hobart for a three-month refit after exploring Antarctica. On board was the young Joseph Dalton Hooker, travelling as assistant surgeon and botanist. Gunn and Hooker enjoyed their shared botanising with Hooker collecting for his own extensive herbarium.

In 1841 Ronald resigned from government positions, transferring to Launceston to be manager of the Lawrence estates. Ronald Campbell Gunn's last major collecting trip was in 1847, to Lake St Clair and its dominating mountain Mt Olympus, where he collected *Nothofagus gunnii*, Deciduous Beech. Gunn eventually became a Member of the Tasmanian House of Assembly. He died in Launceston and is buried there.

Most of Gunn's collected material was sent to British botanists whose herbaria ended up at Kew Gardens, but he had kept his own herbarium of specimens. Much of this collection went to the National Herbarium of NSW; a representative selection has since been returned to the Tasmanian Herbarium.

Place names also honour Ronald Campbell Gunn, notably Gunns Plains south of Ulverstone and Mount Campbell adjacent to Cradle Mountain.



Nothofagus gunnii, Deciduous Beech

Joseph Milligan (1807–1884)



Englishman Joseph Milligan spent some thirty years in Van Diemen's Land/Tasmania. His work as a surgeon took him to some historically notable places including the Aboriginal settlement at Wybalenna, Flinders Island (1844–46) and the convict penal station in Macquarie Harbour (1846–47).

Joseph received his formal training at the Royal College of Surgeons of Edinburgh, graduating in 1829. The Van Diemen's Land Company appointed him as surgeon for their recent settlement at Surrey Hills south of Burnie.

Dr Milligan was probably stimulated into plant collecting by James Backhouse, an English Quaker who travelled through New South Wales and Van Diemen's Land between 1832 and 1838, enquiring into the welfare of convicts. He was a plant collector, sending material to William Hooker: *Correa backhouseana* is named for him. Backhouse visited the young surgeon in January 1833 then called on Ronald Gunn in Launceston. In September 1834, Gunn forwarded the first of Milligan's collections to Hooker.

Joseph left VDLC in 1842 and in the same year joined Sir John and Lady Franklin on their overland expedition as medical officer and naturalist. Sir John was investigating the possibility of constructing a road link to Macquarie Harbour on the West Coast. Few specimens were collected on this trip, possibly because of the quantity of vice-regal necessities; the chair constructed to carry Lady Jane can still be seen in Hobart. Over the years however, Milligan's collections became second only to those of Gunn.

In March 1843, he married Eliza Lawrence, half-sister of Robert W Lawrence. The Milligan marriage mirrored the tragedy of Robert and Anne Lawrence: Eliza died following the birth of a son. At the time Joseph was employed as superintendent and medical officer for the displaced Aborigines at Wybalenna. He asked to be relieved of his duties but over the years, after the remnant of the Aborigines was moved closer to Hobart, worked for them when he could: Milligan prepared a partial Aboriginal dictionary, the major reference for their languages.

While stationed at the re-opened penal station of Sarah Island, Macquarie Harbour as Medical Superintendent of Convict Discipline, Milligan had many opportunities to collect from the rich West Coast flora. Among



his collections at this stage were the type specimens for the genus *Milligania* (*Milligania longifolia*) and for *Dracophyllum milliganii*.

By 1848, Milligan appears to have settled in Hobart. That year he was appointed Secretary of the newly-formed Royal Society of Van Diemen's Land (now the Royal Society of Tasmania) and continued in that role until 1860. The replacement secretary was William Archer. During his time in Hobart, Milligan continued collecting, with major collections from the east coast in 1848 then from the east and north between 1849 and 1854. He also had geological skills; Joseph's studies of the Tasmanian coal deposits were well regarded.

He became chairman of the short-lived Douglas River Coal Mining Company in 1855.

Following his retirement, Dr Joseph Milligan and his son returned to England. He died in London in 1884.

There are 13 Tasmanian plants named to honour Joseph Milligan, all endemic to the State.



Dracophyllum milliganii, an epacrid of Tasmanian South West montane communities.

William Archer (1820–1874)

William Archer was a Tasmanian-born collector. He was named for his grandfather, William Archer, a miller of Hertford, England. One of his sons Thomas, our William's father, migrated to Van Diemen's Land. In 1817, Governor Macquarie granted Thomas land on the banks of the Macquarie River, Norfolk Plains, close to the site of the town of Longford. The Woolmers estate grew out of this grant and by the time Thomas died in 1850, he also owned the properties Fairfield and Cheshunt. One of his brothers set up the nearby estate Brickenden. The Archer family became identified for their innovations in farming and for their involvement in service to the community.

William Archer was Thomas' second surviving son. Born in Launceston, his early education was carried out locally in Campbell Town. William later studied architecture in London and engineering in Newcastle England with Robert Stephenson, the creator of Stephenson's Rocket. Soon after returning to Tasmania in 1842, he took over management of the family's extensive holdings. William lived at Woolmers till 1852, when he moved to Cheshunt, near Deloraine.

Archer was a remarkable man with wide-ranging skills. As an architect, he designed several important buildings in Hobart. Over the years,



Cheshunt, built with William Archer as architect. Photographed with the current owners' permission

he managed the family estates, filled various political roles and was secretary for the Royal Society of Tasmania for a time. And during the 1840s and '50s, he collected plant specimens for Kew Gardens and himself, mostly from the bush around his homes. My references give no indication of Archer's introduction to collecting, but he and Gunn did botanise together at times. This is despite marked political differences. In the 1840s many residents were agitating for the cessation of transportation; Archer was an advocate for ceasing the practice, Gunn's preference was for transportation to continue.

In 1857, Archer took his herbarium to Joseph Hooker, along with a beautiful series of drawings of Tasmanian orchids, sixty of which appeared in Hooker's large work *Flora Tasmaniae* (1855–59). Hooker dedicated the book to his Tasmanian collectors, William Archer and Ronald Campbell Gunn.

William Archer died at the family house of Fairfield and is buried in Longford. There are five species of *Archeria* in Tasmania. Other species honouring William Archer include *Diselma archeri*, *Olearia archeri* and *Eucalyptus archeri*. All species are endemic.

Europe remained the centre for taxonomy of Tasmanian plants until the arrival of Ferdinand Mueller in Victoria and his appointment as Government Botanist in 1853.



The Archer panel at the Tasmanian Arboretum in front of *Diselma archeri*

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Pathfinders In Tasmanian Botany, by Dick Burns

All profits on the sale of this book go to supporting of the Tasmanian Arboretum at Eugenana, North West Tasmania.

For copies, please contact Dick Burns at:

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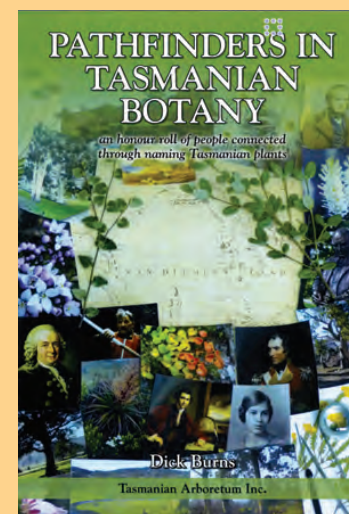
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A review of Dick's book can be found on insert page 3 of this issue of Australian Plants.



Nangawooka Flora Reserve, 'Place of Springs'

Article and photos Max Jahn. Information Don Overall.

The Nangawooka Flora Reserve is located 78 km south of Adelaide, on the Adelaide to Victor Harbor Road. It is a 1.22 hectare (5 acre) bush garden in a gently sloping depression at the foot of undulating hills, 7 km from the Southern Ocean. The Reserve is constantly subjected to cooling sea breezes and is protected from occasional hot north winds.



Verticordia chrysantha



Chamelaucium uncinata

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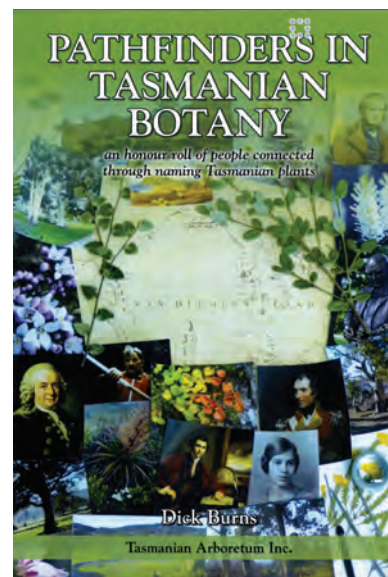
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Pathfinders in Tasmanian Botany: an honour roll of people connected through naming Tasmanian plants - Dick Burns



Tasmanian Arboretum Inc.,
Devonport, 2012, pp. [viii], 260.

ISBN978 064658 038 8,
paperback, \$40.

A review by Alex George, botanist and author (*The Banksia Book*, *William Dampier in New Holland*, sections of the *Flora of Australia* project, etc.).

This book is a wonderful compilation mixing botany, history, people, places and publications, all illustrated with a broad selection of portraits, photographs, drawings and other images. It presents articles on 11 botanists and 10 collectors associated with Tasmanian plants.

Those also particularly relevant to W.A. are R. Brown, A. Cunningham, W. Dampier, J.-J.H. de Labillardière, F. Mueller, C. Riche and J.E. Smith. It also profiles three scientists who were influential in the natural sciences (Linnaeus, Banks and Darwin), three artists (including Ferdinand Bauer) and three 'supporters' (including Baron von Hake, after whom *Hakea* is named). There is a chapter on other people acknowledged in Tasmanian plant names, with short biographical notes. It has eight appendices, notably on the history of Tasmania as relevant to the topic, on the early cultivation of Australian plants in Europe and how organisms are classified. The index includes the titles of books discussed in the text but unfortunately does not include the plants, people and places shown in the plates (but the main people may be found through the listing in the contents). [Note from the author: *Pathfinders* has two indexes, first for people and publications, then for plants.]

The text is oriented towards the non-specialist and is eminently readable. There is a slant towards The Tasmanian Arboretum (at Eugena, south of Devonport) in that mention is made of many plants being grown there. Overall, though, it is relevant for much of Australia.

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Nangawooka was one of the first native gardens to be included in the Open Gardens Australia program in South Australia and has been in the permanently open section since 1993.

The Reserve was formerly a cow paddock and consists of compacted sandy loam overlying clay with a neutral pH of 7. Numerous large eucalypts (*E. fasciculosa*, *E. leucoxylon* and *E. camaldulensis*) have been left and now give the Reserve a mature appearance.

Reserve development

The Reserve was founded in 1982 by the Zonta Club in conjunction with Don Overall of the South Coast Field Naturalists and inspired by Alison Ashby's enthusiasm for native plants. The property formerly belonged to the Woods and Forests Department.

The local Council provided fencing, watering and a graded track through to the top gate. 1982 being a drought year, planting was postponed until April 1983. The Zonta Club and the South Coast Field Naturalists together planted several hundred plants procured the plants from the SGAP regional Autumn Plant Sales in Adelaide. Paths were laid out and Geoff and Judith Richardson worked with Don edging the paths using pine tree limbs. The official opening was held on 10 October 1984 by the Minister for the Environment, the Hon. Don Hopgood. The Mayor of Victor Harbor, Eric Ashby, chaired the occasion.

In 1984 the Zonta Club withdrew from active help in the Reserve. In 1985 the Field Naturalists also discontinued their physical support.



Above: *Kunzea parvifolia*
Left: *Banksia caleyi*



In 1985 Ian Bond helped Don Overall form the Fleurieu Group of the Society for Growing Australian Plants. The new group took over the care, maintenance and development of Nangawooka.

Nangawooka was signed over to the now City of Victor Harbor in 2000. In 2008 the Victor Harbor City Council formed a Friends of Nangawooka Flora Reserve. Don Overall continues to be the Coordinator and works with the City Council's Head Gardener. Council helps the Friends with maintenance, such as tree lopping, weed spraying and pruning material removal.

Reserve flora and fauna

The Reserve's climate is a mild Mediterranean one, with warm dry summers and cool wet winters and an average rainfall of 530 mm. The maritime influence reduces the extremes of weather, resulting in few frosts.

Over 1250 species covering 250 genera have been procured from the Australian Plants Society South Australia (formerly SGAP SA) plant sales over the years. Since the 2010 drought, many new plants have been planted by the Friends, including species from the local areas. The new plants will increase the presentation of the Reserve with its mature trees.

85 bird species have been seen at Nangawooka. An existing bird hide is being enlarged. Large dead trees have been left for wildlife and nesting boxes are scattered around the Reserve. Superb Blue Wrens are likely to run around visitors walking along the many paths. An extension to the scented garden is being planned.



Lasiopetalum schulzenii



Graptophyllum excelsum



Different stages of the flowers of *Banksia praemorsa*



Different forms of *Melaleuca huegelii* flowers

Nangawooka contributes to our further appreciation of our wonderful country. The Friends are aware of their responsibility to manage the Reserve well, for botanists, gardeners, bird watchers, photographers, school classes, nature lovers from all over the world, and people who just want to relax with nature.

Visitor facilities

People may wander around the many pathways in the Reserve, view the wonder of the native flowers, watch the birds and rest on the many park seats in the many picnic spots. The memorial seats are scattered around the Reserve. As most plants have name labels, visitors can be self-guided. The disabled toilet facility was financed by the Victor Harbor Rotary Club.

A gazebo named the 'Alison Ashby M.B.E. Centenary of Federation Interpretive Gazebo' was opened by Eric, the nephew of Alison Ashby, in 2001 in Alison's memory. Alison Ashby was given an honorary life membership of the Society for Growing Australian Plants, for





championing interest in and knowledge about Australian native plants. The 24 seats and information boards in the Reserve were financed by Zonta from a portion of the commission from the sale of Miss Ashby's wildflower cards over 13 years. The Lions Club paved the gazebo.

More information

Further information about the Reserve can be found in:

- *Directory of Australian Botanic Gardens and Arboreta*, 1988, National Botanic Gardens, Canberra.
- *The Garden Lovers' Guide to Australia*, 1998, Holly Kerr Forsyth.

Groups are able to use the pleasant setting for ceremonies, such as weddings and reunions by contacting Don Overall on (08) 85521784.



Above: *Melaleuca trichophylla*
Left: *Grevillea* 'Superb'

Banksia marginata forms in Tasmania

Jonathan Esling and David Marrison

Jonathan is a horticulturalist with a passion for Australian flora. He works for Plants of Tasmania Nursery, a specialist Tasmanian plant nursery. David is a senior horticulturalist at the Royal Tasmanian Botanical Gardens. He has a long and deep interest in banksias and Australian flora generally.

Tasmania has been a bit short changed when it comes to species diversity in the *Banksia* genus, as with *Grevillea*, which is represented only by *Grevillea australis* in the island state. While Tasmania had at least two other species in the past (*Banksia integrifolia* and *Banksia kingii*) we now have just two species, *Banksia serrata* and *Banksia marginata*. *Banksia serrata* is listed as rare in the state and has a fairly limited distribution, being confined to the Rocky Cape National Park on the north coast and Flinders Island in Bass Strait. In contrast, *B. marginata* has a widespread distribution. The paucity of species diversity in the *Banksia* genus is compensated at least in part by the huge variability in form.

In Tasmania, *Banksia marginata* occupies an amazingly wide diversity of habitats, being located in coastal heaths through to subalpine areas, and correspondingly varies greatly in growth habit, leaf size and shape. These variations occur between habitats but also within individual stands. Plants range from totally prostrate forms, as found in the wind blown north coast at Petal Point and exposed sea cliffs at Cape Pillar on the southeast coast, to small trees of 12 m or more in sheltered positions. Leaves are usually arranged alternately, attached by a short 1–3 mm petiole. Leaf shape seems to vary from oblong to oblanceolate, lanceolate or linear. Margins can be entire or serrate, while tips are either blunt or finish with a sharp point or a hooked tip. Flower colour is a fairly consistent yellowy golden lemon, although green and pink flowers have been observed. Flower size ranges from just a few centimetres up to 20 cm height, depending on exposure and other environmental conditions. Some forms are lignotuberous while other forms can reshoot from epicormic buds. Suckering has been observed on plants where root disturbance or other forms of trauma have occurred.

Banksia marginata is distributed throughout the state from an altitude of just above 0 m in the coastal zone through to 1200 m in the Mt Field National Park. This adaptable species occurs in wet sclerophyll, dry sclerophyll, subalpine woodland, buttongrass moorland, coastal and heathland communities. Given its widespread distribution, plants also grow in a variety of soil types including mudstone, dolerite, basalt, sandstone, and granite amongst others.



Many of the native nurseries in Tasmania were quick to take advantage of variation in *Banksia marginata* and brought several forms into cultivation. These include 'Ridgeway Spread', 'Coastal Spread', 'Coles Bay Compact', 'Superbush' and 'Petal Point Dwarf'. The following descriptions focus on these forms, although there are several others in cultivation at the Royal Tasmanian Botanic Gardens, which include selections from South Arm and Southport. 'Mini Marg' is a dwarf form from Tasmania's northeast coast, which seems to feature more in interstate nurseries than in Tasmanian ones.

Examples of *Banksia marginata* forms commonly cultivated

'Coastal Spread' is a slow growing, low spreading form 1.5 m high and 2 m wide with crowded foliage along the stems. Flowers yellow/lemon 50–80 mm high. Leaves are oblanceolate and generally do not exceed 15 mm length and 4 mm width. It originates from Tasmania's east coast.



'Coastal Spread',
Royal Tasmanian
Botanical Gardens.

'Coles Bay Compact' is a low spreading form 2 m high and wide, which originates from Coles Bay on Tasmania's east coast. Its leaves are 20–30 mm long and 5–10 mm wide, tipped with a series of sharp points. It produces yellow flowers in autumn, which are 60–90 mm high..

'Petal Point Dwarf' is a compact bush to 1 m high and wide, which originates from Petal Point on Tasmania's north coast. It produces yellow/lemon flowers, 50–90 mm high. The leaves are oblanceolate with entire margins, 10 mm wide and 20–35 mm long.

'Ridgeway Spread' is a low spreading form often takes on a sculptural habit, with a height of 2.5 m and width of up to 3 m. Its flowers are yellow/lemon and are 50–80 mm high. The leaves are linear 5–10 mm wide and 10–80 mm long with entire margins. The original plant came from Ridgeway, a suburb on the foothills of Mt Wellington, 300 m above sea level.



'Coles Bay Compact', Royal Tasmanian Botanical Gardens.



'Petal Point Dwarf', Royal Tasmanian Botanical Gardens.



'Ridgeway Spread', Island Bonsai.

'Superbush' is a form that takes on a more formal habit with tight upright growth and long linear foliage. It ranges between 2–3.5 m high, is around 1.5 m wide and has 50–90 mm yellow/lemon flowers. Its leaves are linear 20–60 mm long and 3–5 mm wide. This form has proved to be more difficult than some other forms to propagate. The original specimen was found south of Hobart.

Variation in foliage of the above mentioned forms with three additional miscellaneous seed grown examples is shown in the photograph overleaf.



'Superbush'



From left. 'Ridgeway Spread', miscellaneous seed grown, 'Superbush', miscellaneous seed grown, 'Petal Point Dwarf', 'Coles Bay Compact', miscellaneous seed grown, 'Coastal Spread'.

Examples of additional observed *Banksia marginata* forms

Cape Pillar on Tasmania's southeast coast is home to some stunning forms including totally prostrate, miniature and pink flowering forms. Propagation trials are currently underway to see if seed collected from these forms remains true to type.



Above: Semi-prostrate form

Left: Prostrate form, both at Cape Pillar



Pink flowering form, Cape Pillar

The subalpine/alpine areas of Lake Rhona and the Denison Range in South West Tasmania have some very low growing, bushy forms that would be suitable for cultivation in frost prone areas.

The Southern Forests area south of Hobart has forms with linear leaves, making them resemble *Banksia spinulosa* from a distance. Several of these forms had great horticultural potential but were lost during logging operations before cutting material could be collected.

Several subalpine forms observed in the Western Lakes-Central Plateau area also have horticultural potential, growing up to 1.5 m with flowers up to 20 cm nicely displayed on the tops of branches. Unfortunately these forms have so far proven to be difficult to propagate. Lagoon of Islands has some large and very bushy forms with small leaves not unlike the 'Coastal Spread' form.

There are many other locations in Tasmania that contain interesting forms. The Bay of Fires/Gardens area in the north east is home to a number of miniature and low growing forms which are not yet in cultivation. Cape Bruny Light House has several very low growing forms. Snug Tiers above Pelterata Falls has some lovely bushy forms.

Subalpine Mt Wellington in Hobart and Crescent Bay and Cape Raoul on the Tasman Peninsula also have worthy forms awaiting cultivation.

For additional information, email Jonathan Esling at jonathanesling@yahoo.com

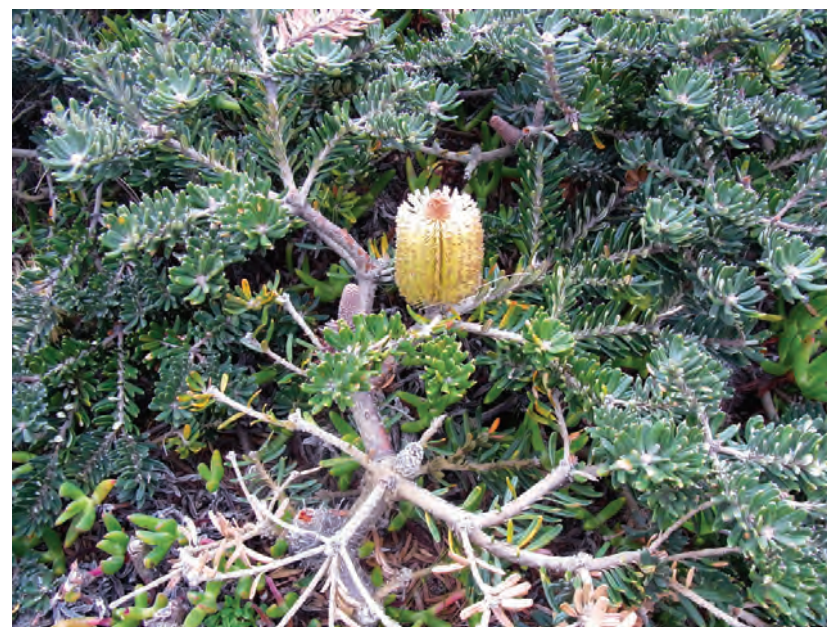
Photograph Credits: Jonathan Esling 'Examples of forms commonly cultivated'; David Marrison 'Examples of additional observed forms'.



Bushy, low growing form, Lake Rhona, Denison Range.



A lovely golden flowered form, South West Cape.



Low growing form, Cape Raoul

Why we belong – 40 years on and still keen

Peter and Ann Radke, SGAP Qld

The following was part of a wonderful talk given by Peter and Ann Radke at the 2013 ANPSA Biennial Conference. For many at the Conference, it encapsulated the reasons why we belong to one of the following ANPSA affiliated groups; the Australian Plants Society of NSW, SA, Tasmania or Victoria, the Society for Growing Australian Plants Qld, the Australian Native Plants Society, Canberra Region or the Wildflower Society of WA.



Peter and Ann Radke

'We have been members of SGAP Queensland for about 40 years, since we were young and newly married. It is interesting to reflect on what attracted us to the society back then and why, 40 years later, we are still very keen members.

And it's quite simple, really. It's because SGAP is, and always has been, much, much more than just another garden club.

Because native plants originate from the Australian bush, they are inextricably tied to the Australian landscape. Consequently, SGAP has always been about not only propagating and growing Australian plants in gardens, but also about excursions into the bush, collecting propagating material from the wild and understanding the plants in their natural habitats and a passionate love affair with the natural environment..

Thus SGAP has always tended to attract a different type of membership from typical garden clubs, with many members also interested in bushwalking, conservation, wildlife and the natural environment.

And so it is with us.

Our passion for native plants is inextricably linked to our passion for the Australian landscape, its geology, its ancient landforms, its diverse habitats and consequently its vast and amazing array of flora.'



Cycads – the 'Dinosaur 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.

I once heard a tour operator refer to Cycads as 'Dinosaur plants'. That is a nice catchy term, very handy for gaining the attention of tourists. But it does not give the Cycads their proper dues. They preceded the Dinosaurs by at least 20 million years. Fossil Cycads are known from the Lower Permian of China, 270–280 million years ago. It was not until towards the end of the Permian, 251 million years ago, that a group known as Archosaurs appeared. This group went on to evolve into Dinosaurs during the era known as middle life or Mesozoic. (Note how zoologists have taken over the terminology - Mesozoic.) This era is known to them and to the public generally as the age of the Dinosaurs, but palaeobotanists refer to it as the age of the Cycads! Consequently, Cycad fossils are found in all continents including Antarctica. Museum drawings and dioramas which depict re-creations of Dinosaur life typically show Cycads as the dominant plants.

As you know, most Dinosaurs died out when an asteroid hit Earth somewhere near the Yucatan peninsula, ending the Mesozoic. One group survived. Perhaps it was because they lived in Gondwana, as far as possible from the impact site; perhaps it was because, like mammals, they were small and active; or perhaps it was because they wore modified scales. Today we call them birds and the modified scales are called feathers. Birds have invaded every continent and most environments.

The Cycads did less well. Only some 200 species in 11 genera persist in Central and South America, Southern Africa, South-East Asia and Australia. Accustomed as we in Western Australia are to being the centre of all things botanical, it comes as a surprise to find that the centre of Cycad distribution in Australia is in South Eastern Australia (South of topic of Capricorn). In that area there are 32 species of *Macrozamia* at the latest count and probably more to come. The greatest diversity within the genus occurs here, with several apparently recent evolutionary radiations. Most are understorey plants of eucalypt forests and woodlands. A single species of *Lepidozamia* also occurs here, and two *Cycas* species creep into the far north of the region.



There is also a single isolated species of *Macrozamia* in central Australia, living on steep slopes in sheltered canyons. This occurrence is a relic of times when more hospitable climates prevailed in the region.

Here, in the southwest, it is now accepted that there are three species present.

*Macrozamia*s look like palms, but palms they are not. Palms are very much 'Johnny-come-latelies' and in a completely different group. So call them 'Zamia' – not 'Zamia palms'.

So what is special about these old, primitive plants? Old they may be but primitive? – I don't think so. They 'invented' three characteristics that we think of as belonging to modern plants: nitrogen fixation in cooperation with a micro-organism; insect pollination; and large seeds suitable for animal dispersal.

Nitrogen fixation

Once, when I was collecting soil samples, I found myself looking at 'witch's fingers' emerging from the soil; long skinny claws and, appropriately for witches, blue-green. These were of course coralloid roots emerging from beneath a *Zamia* plant. Coralloid roots form early in the life of a seedling *Zamia*. They emerge from the region at the base of the leaves (or top of the roots if you prefer) and grow upwards towards the surface. This is where cyanobacteria live. They move into the coralloid roots and are nurtured by the plant. The bargain is that the plant supplies products of photosynthesis to the bacteria and the bacteria supply fixed nitrogen to the plant. A similar bargain applies to plants such as legumes who host a bacteria called *Rhizobium* in their root nodules and to *Casuarinas* who host an actinomycete called *Frankia*. Cyanobacteria form associations with other organisms including corals and a fern called *Azolla*. They also enter glands found at the base of each leaf stalk. The white arrows show



The white arrows show coralloid roots developing in a seedling *M. riedlei* just below the leaf base and at the top of the swollen root.

coralloid roots developing in a seedling *M. riedlei* just below the leaf base and at the top of the swollen root. of a giant rhubarb that grows in South America and New Zealand (*Gunnera*) and strike a similar bargain.

Here is a puzzle. Why do coralloid roots, which are always well covered by soil and never see the light, retain their blue-green colour? This colour is due to two pigments: ordinary chlorophyll 'a', such as occurs in most plants, and a blue pigment that fluoresces at a particular wavelength.

That is, when exposed to strong light, it absorbs the light energy, and releases it by emitting light of a very narrow range of wavelengths. It is easy to see why the blue pigment would be useful in harvesting light and making photosynthesis more efficient. We can speculate that the chlorophyll is needed to control oxygen levels in the coralloid roots, just as legumes need a form of haemoglobin in their root nodules to also control oxygen levels. But why the blue pigment is retained is a puzzle. Perhaps the plant simply needs a source of inoculum and the best available source is free-living cyanobacteria in the soil.

The ability of the Cycads to fix nitrogen must have been a very important in the development of early ecosystems on Earth. They must have acted as 'pioneer' plants, moving into areas on which the soil was little more than loose rock fragments and therefore prone to erosion. Their roots would have stabilised this material and the nitrogen they brought into the ecosystem must have permitted other plants to follow.

Pollination

Cycads are sexy. Male and female cones are born on separate plants and pollen may therefore have some distance to travel. It was once taken for granted that, since they are cone bearing plants, pollen will be carried by wind. However, Cycad pollen is heavy. It falls from the cone rather than blowing in the wind. For all Cycads so far investigated pollen is transported by insects. And often by very sophisticated methods.

In many cases, the insects involved are beetles – often weevils. (Weevils are smallish beetles with a long 'nose'. Some people say you should never talk about them and never look at one – Speak no weevil, see no weevil!) For some Cycads, thrips are important.

In Australia, the transport of pollen by insects has been studied for some Eastern species of *Macrozamia*. The general principle is that the male cones emit a chemical that is attractive to the relevant species of insect. Then, at a particular time of day, the temperature of the male cones rises by as much as 6° and the production of the chemical



Right: A male cone of *Macrozamia riedlei*. the pollen can be seen spilling from the cone scales and dusting the old cone below. At the time of taking the picture, the cone was quite warm to the touch.

Below: One of the many weevils feeding on the pollen. Its feet have pollen adhering to them.



increases. This repulses the insects who then go instead to the female cones which have remained cool and emit a lower concentration of the chemical. (In other words, the males get hot and bothered and the females remain cold!) For a species that uses weevils to transport pollen, the heating event occurs at about sunset; for species that use thrips, the heating event occurs at about midday. Male cones may be sacrificial in providing the reward to the pollinators while the female cones are safeguarded. It is not unusual, of course, for higher plants to use scents to attract insects for pollination, but it is very unusual to use them in this 'pull-push' fashion.

The fruits

The fruits of the *Zamia* seem to send a familiar message. They are fairly large and are covered with a brightly coloured outer coating. This is a pattern common for many higher plants and the message seems to be 'Eat me'. This is a simplification. The real message is 'Eat my outer fleshy layer. That is your reward for spreading my seed. But don't eat my seed. That is my means of propagation. And to persuade you of that, I have made it poisonous or nasty tasting'. Loquats are a good example. There is some sweet flesh (but not much!), and a lot of poisonous seed. The original peach and apricot seed also contained some rather nasty chemicals. Certainly, even in the Perth metropolitan area, something eats the outer flesh of *Zamia* fruits. You can easily see nibble marks on the fleshy part and they seem to occur overnight so I suspect rats are involved.



Part of a ripe female cone of *M. riedlei*. the orange flesh coating the seed has been 'nibbled'.

Actually quite a few animals eat the orange flesh. Here is a report by Alan Notley reproduced from the August 2010 Newsletter of the Wildflower Society of WA.

'In the process of building our house a *Macrozamia riedlei* was left in the edge of bush adjoining a paved area only 6 meters from our kitchen



door. Over a period of 26 years this has increased in size slowly but had not fruited until this year (2010).

We have watched two very large cones develop, with their weight resting on the ground and remaining intact until the fruit was apparently ripe. One morning I observed that one cone had been knocked to pieces and the flesh had been eaten from several of the seeds. Who was the culprit?

A short time later the culprits returned – two Western Grey Kangaroos. These Kangaroos move in periodically from the nearby National Park. In summer they sneak in at early morning and drink from our birdbath but they are generally very shy and nervous.

They were so excited about this apparent treat of ripe *Macrozamia* fruit that they abandoned all fear to come in and feed in almost a frenzy for two or three days. Most of the time they held the ripe fruit to the ground with one front paw and nuzzled it to feed, but on some occasions they picked up the fruit, squirrel fashion with both paws and held it to eat the flesh. On the second day of this feast the Australian Ringneck parrots decided to join in and the seeds were rapidly stripped of all the red flesh and scattered around the base of the parent plant. They have been left in situ to germinate.

Over the years I have noticed in the bush, *Macrozamia* seeds scattered in a similar fashion but was not aware that it was apparently a delicacy for the kangaroos’.

Even magpies partake. In the same issue of the Newsletter, Gary Tate writes as follows.

‘I was riding north from Ocean Reef Rd towards Picnic Cove in Edgewater on the shared path when I came across three magpies on the path. They were eating the orange flesh of the *Zamia* (Djiridji - Nyungar) seed pods (Bayu). This I thought to be unusual behaviour. One magpie was persistent and allowed me to capture these images. In the following 12 months I have not witnessed this again’.

But the seed is very nasty. If you wish to dissuade an animal from eating your seed, you want the effect to be unpleasant and to occur soon after the seed has been eaten so the animal makes the association between the unpleasant effect and eating the seed. Several of the early European visitors to our shores learned this lesson the hard way. Men from Cook’s, Vlaming’s, and Flinder’s crews tried eating the nuts and most were very sick. But not Robert Brown. In addition to being a remarkable botanist he must have had a constitution of cast iron. He recorded that he ate ‘about 16 nuts of the *Zamia*, part raw and part



Australian magpie eating the flesh from a *Zamia* seed.
Photo Gary Tate.

roasted. I felt no bad effects. Others who did not eat more experienced severe sickness and retching. In some the sickness came on about an hour or two. In others it did not intervene for several hours.’

The large store of starch in Cycad seeds is nevertheless an important source of food for many people, but the seeds must be carefully processed to remove toxins, before they are edible. Aborigine people are reported to have washed the seed in running water and also to have buried them.

It is possible that long-term exposure to low levels of Cycad toxin can have cumulative effects. For more than 50 years, it has been noticed that the Chamorro people who live on the West Pacific Island of Guam have a very high incidence of a fatal, paralyzing, neuro-degenerative disease. It has been suggested that this is caused by eating Cycad seeds, or by exposure to the copious pollen arising from Cycad plants, or even by eating flying foxes that have fed on Cycad seeds.

In summary, next time you see a group of *Zamia* plants, do not think of them as Dinosaur plants. Think of them as remarkably adapted survivors.



Barking mad – the art of bark

Doug Rickard

Doug spent his working life in industrial instrumentation but away from work, his main pastime has always been art. Now semi-retired, he spends a lot of his spare time photographing Australian native plants.



You may think that I am barking mad, and you may well be right, for I'm hooked on bark. For those who focus only on the flowers, bark is the stuff that cloaks the trunks of our native trees. Look closely and you will see that bark too comes in a wonderful and often surprising range of

colours and patterns. Some of them are works of art that would grace any gallery anywhere in the world.

When I talk about bark as works of art most people immediately think of either the rather dusty framed bark picture that hangs in Aunt Betty's dining room or the scribbles on Scribbly Gums (*Eucalyptus haemastoma x racemosa*). The larvae of the small and elusive Scribbly Gum Moth (*Ogmograptis* sp.) that are responsible for these scribbles must be very artistic little creatures as they draw an almost endless range of faces, animals (like the rabbit above), fish and other objects all over the pale trunks of the Scribbly Gums.

But take look at other trees for many of them also have stunning works of art on their barks.

A Sydney tree with bark that never fails to amaze me with its ever-changing patches of colour, dimples and creases is the Smooth-barked Apple (*Angophora costata*). In the picture on the right the annual shedding of the bark of this Angophora had just



started but the main interest is the group of pink epicormic shoots that are sprouting from a crack in the peeling old bark.

The picture above left shows a patch of peeling bark on another *Angophora costata*.

On the banks of the Hacking River in the Royal National Park, Sydney, an interesting looking bark on a Water Gum (*Tristaniopsis laurina*), shown above right, was spotted. The colours probably were more intense as the tree was in a shaded spot and the bark was still damp after recent rain. It is a picture that many avant garde artists would be proud of.

Who said that the barks of trees were always brown, grey or just occasionally cream? Some are, and for those who prefer a more subdued and sculptured look, the answer may be the photo on the right of a knot of bark on the trunk of a Prickly-leaved Paperbark (*Melaleuca styphelioides*) growing at Audley in the Royal National Park.





Artistic bark is almost everywhere – it is a matter of looking.

The picture on the right is of the ragged bark of a Brown Stringybark (*Eucalyptus baxteri*) on Kangaroo Island, South Australia. Up in the Snowy Mountains in NSW the bark of the Snow Gums (*Eucalyptus pauciflora*) never fails to impress (below).



For a picture that could become a talking point with your guests, try something like a large version of this picture of the burl on the trunk of a River Red Gum (*Eucalyptus camaldulensis*) at Wilpena Pound in SA. River Red Gums were made famous by the paintings of Sir Hans Heysen at the turn of the last century.



For minimalist art, how about a picture of the bark of the Salt Gum (*Eucalyptus salicola*) from the arid parts of southern WA (left)? For something more dramatic on your wall, try the picture of red gum oozing from the trunk of a Grey Ironbark (*Eucalyptus paniculata*) (above right).

So when next in the bush with your camera, don't just focus on the flowers. Try taking a few pictures of interesting looking bark. Remember, the big plus when photographing bark is that it takes a howling gale or even a tornado to make tree trunks wave about in the wind.

But to get a picture of the granddaddy of all barks, take a trip up to PNG and track down the only Eucalypt that is native to the northern hemisphere, the Rainbow Eucalyptus (*Eucalyptus deglupta*). The colours on the bark of this almost alien looking tree are all natural – no mad artist has got to work on it with his paintbrush (above). In fact this and all other pictures in this article show the barks in their natural colours and none of them have been adjusted in Photoshop.

Pictures by Doug Rickard and Margaret Bradhurst except that of the *Eucalyptus deglupta*, which is reproduced courtesy of World Press.

