

Australian Plants



Registered by Australia Post
Publication No. PP226253/00017

March, 2006
Vol. 23, No. 186

\$3.95

This issue sees a focus on Western Australian flora, with a large part devoted to the genus *Adenanthos* of the Proteaceae family, a group more known for leaf than for floral variation. Before now, the only non-botanical texts to treat the genus as a whole (and then only as part of a larger body of work) were Wrigley & Fagg's *Banksias, Waratahs & Grevilleas*, now sadly out of print, and Eliot & Jones' *Encyclopaedia of Australian Plants suitable for*

Cultivation Vol.2. To remedy this we sought Dr E. Charles Nelson, who had published a monograph on *Adenanthos* in 1978, and he kindly wrote the article which takes up a large part of the issue you're holding now. The miracle of email allowed easy correspondence with Dr Nelson, who now resides in Norfolk in England.

On a more serious note we are fully aware of the lateness of recent issues. One of the biggest factors in delay of publication is lack of articles. Currently we have to hunt out about 8 out of every 10 articles in the magazine. Though an enjoyable task it is a very time consuming one, and should real life intrude on the volunteer work of production of the magazine things can fall behind very quickly. All help is appreciated; if you or your local branch would like to write an article, series of articles, guest-edit an issue, or even alert us to interesting horticultural or botanical items relating to Australian plants then please get in touch with us.

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Back cover: ***Adenanthos detmoldii*, Scott River** - photo: E. Charles Nelson (p. 202)

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Seeing Wildflowers in Fitzgerald River National Park

Margaret Moir

Overview

About 180 km north-east of Albany and a little farther west of Esperance lies one of the most diverse botanical regions in the world, the heart of the Fitzgerald World Biosphere Reserve, Fitzgerald River National Park. The park surrounds the inlets of the Gairdner, Fitzgerald and Hamersley Rivers, between Bremer Bay and Hopetoun on the South Coast of Western Australia, and south of Jerramungup and Ravensthorpe. More than 1800 species of flowering plants, as well as a myriad of lichens, mosses and fungi, have been recorded in the Park. This represents nearly 20 per cent of the total number of plant species in Western Australia, in an area that covers only a tiny fraction of the State.

Landforms

The plant associations found in the park are closely related to the soils and landforms, with many of the more fascinating plants restricted to the landforms unique to the area.

The coastal hills, collectively known as the Barrens, are the most distinctive landforms in the park and many plants found nowhere else in the world are restricted to them. The Barrens are composed of quartzites; the tilted and folded rock beds, like those seen at East Mount Barren, were once layers of sand deposited on the sea floor. They were subsequently compressed, heated and uplifted by movements of the Earth's crust.

The park is also known for its spongelite cliffs, which are exposed along the Hamersley and Fitzgerald River valleys. The soft rock was formed more than 36 million years ago, when the sea level was higher than today and flooded the coast up to 65 kilometres inland, leaving the Barren Ranges as islands. Sponges proliferated in the warm shallow seas, and their silica skeletons in the silty sediments gave rise to the name of the rock type.

During subsequent periods of warmer and wetter climates, following the fall in sea level, the cliffs were carved, as run-off easily eroded the soft sediments.

Elsewhere, the marine plain soils have been chemically and physically eroded by wind and water to form a complex mosaic of nutrient-poor sands and gravels that support the diverse and low-growing heathlands.

Granite exposures in the north of the park mark the southern edge of the ancient Yilgarn Block - a core of continental crust that underlies much of Western Australia.

Margaret Moir is the leader of the Eucalyptus Study Group.



Above and Left:

Pimelea physodes - the Qualup Bell.

Below: *Eucalyptus sepulcralis*

Photos: M Mo





- Top Left: *Beaufortia anisandra*
 Top Right: *Eucalyptus preissiana*
 Left: *Adenanthos ellipticus*
 Above: *Eucalyptus pleurocarpa*
 Below Left: *Banksia coccinea*
 Below: *Regelia velutina*

Photos: M Moir



Distinctive Plants

Distinctive plants confined to the park and its immediate surrounds include the silver-leafed Barrens Regelia (*Regelia velutina*), and Barrens Clawflower (*Calothamnus validus*), which has flowers resembling claws, Barrens Beaufortia (*Beaufortia anisandra*) and Barrens Adenanthos (*Adenanthos ellipticus*). Dense Clawflower (*Calothamnus pinifolius*), a miniature pine look-alike, is restricted to the quartzite soils, as is the graceful Weeping Gum (*Eucalyptus sepulcralis*). It was given the name *sepulcralis*, which means 'of the tomb', as this weeping small tree, seen along Hamersley Drive, was thought to be ideal for cemeteries.

Other Plants

The sheer diversity of plants is made all the more striking by the array of impressive flowers, unusual forms and bizarre leaf shapes, sizes and colours; attributes particularly prevalent in the most numerous families - the Proteaceae (Banksias, Hakeas, Adenanthos, Isopogon, Dryandra etc), the Myrtaceae (Eucalypts, Bottlebrushes and their relatives) and the Fabaceae (pea-flowered plants).

Sixty-two plant species are found only in Fitzgerald River National Park, with a further 48 species more or less confined to the park. Showy Banksia (*Banksia speciosa*), with its pale yellow flowers and saw-toothed leaves, and Scarlet Banksia (*Banksia coccinea*) carry their flowers above the foliage. Woolly Banksia (*Banksia baueri*) has football-sized flowers, while those of Creeping Banksia (*Banksia repens*) emerge from the ground.

Bell-fruited Mallee (*Eucalyptus preissiana*) has large golden flowers, while the more common Blue mallee or Tallerack (*Eucalyptus pleurocarpa*) is notable for both its multi-stemmed habit and its large bluish-green leaves, which have a waxy white bloom.

The Featherflowers (*Verticordia* species) provide brilliant splashes of white, pink, yellow and mauve.

Many of the pea-flowered plants like disturbed soils and are often more conspicuous following fire or along road verges, where the aptly-named Ouch Bush (*Daviesia pachyphylla*), with its spiny thick leaves and arching branches is obvious.

When flowering, the Qualup bell (*Pimelea physodes*), in the Family Thymelaeaceae, is also prominent. It has large pink and yellow petal-like bracts that enclose the real flowers.

Whilst the peak flowering time is August to November, a minor peak occurs again in autumn, and intermittent flowers throughout the year provide a constant floral display and food supply for honeyeaters and honey possums.

Adenanthos Labill.

A Plantsman's Retrospect And Prospect _____ E. Charles Nelson, Norfolk, UK

Introduction

Thirty years ago I completed my doctoral thesis on a genus that five years earlier I had never heard of – *Adenanthos* Labill. belonging to the Proteaceae. Indeed, as a lad brought up in northern hemisphere I had not even heard of the Proteaceae in 1970; my “love” then was *Erica* L., the hardy European heathers. In 1971, I arrived at the Australian National University, Canberra, on a research scholarship to work on the ecology of the flora of southern Australia, particularly the perplexing problem of those species which, so botanists said, occurred in both the southwest of Western Australia and in the south-eastern states but were absent from that vast stretch of country that is largely occupied by the Nullarbor Plain. It soon became obvious that the problem was not necessarily one of disjunct (or discontinuous) distribution patterns, or of ecology, but one of taxonomy: the plants on opposite sides of the Nullarbor usually were entirely different species even if they bore the same name, and this was certainly the case in *Adenanthos*!

Time passes. Nowadays, back in the northern hemisphere, I don't have much opportunity to see *Adenanthos* “in the flesh”. The last time I saw a living plant was during August 2004 in northern California where, to my delight, two botanic gardens had splendid shrubs of *A. × cunninghamii*. For reasons that I explain elsewhere, this particular plant has a remarkable history in cultivation, and it was one of the delights of my time at ANU to bring the plant to light again – and probably to reintroduce it to Australian gardens (although that is a claim I am unable to substantiate fully). It is perhaps my favourite *Adenanthos*!

In the following article, I revisit *Adenanthos* in the wild, mainly during 1972 and 1973: I last saw one in the wild in 1984 when I was in Western Australia to attend the International Conference on Indian Ocean Studies in Perth, and to visit some of my friends there, particularly Pam Sanderson in Albany, to whom I dedicate this retrospect and prospect. Pam and I went to the Scott River area in the far southwest of WA to find the natural hybrid that now bears her name: *A. × pamela*. Quite by chance, on the same visit, when driving to the Fitzgerald River National Park, I happened upon another hybrid, then unrecorded, in a road-side lay-by: *A. apiculatus × cuneatus* (1: 326, under *A. apiculatus*). I have not been back to Western Australia since then, and very much doubt that I will make another visit; a lifetime is not inexhaustible.

* After completing his doctoral research on *Adenanthos* at ANU, Dr Charles Nelson returned to Ireland. From 1976 to 1995 he was horticultural taxonomist in the National Botanic Gardens, Glasnevin, Dublin. Now living in eastern England, Dr Nelson works as a freelance botanist and editor.



Above Left: *Adenanthos x cunninghamii*

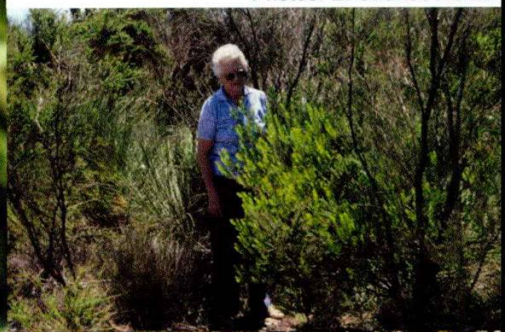
Above: *A. x cunninghamii*
showing spring foliage. See pg 228.

Left: *A. x pamela* See pg 203.

Below: *A. x pamela* and Pam Sanderson

Bottom: 1 October 1973; the author photographing
the first plant to be discovered plant of
Adenanthos x cunninghamii

Photos: E. Charles Nelson



A word about gender!

Adenanthos is a compound name derived from two Greek words, *ἀδὴν* (*aden*) and *ανθος* (*anthos*), meaning (respectively) gland and flower. *Anthos* is a neuter noun, but Jacques de Labillardière, who named the genus, chose to treat his compound name as feminine. Thus the species epithets which he published originally had a feminine (-a) termination: *A. sericea*, *A. obovata* and *A. cuneata*. Most authors respected this and followed him using the feminine gender.

However, the *International code of botanical nomenclature* 2000 (2) lays down (Article 62.1) that "A generic name retains the gender assigned by botanical tradition, irrespective of classical usage or the author's original usage. A generic name without a botanical tradition retains the gender assigned by its author." This is a substantive change since I wrote my revision in the 1970s (3). While *anthos* is neuter, authors (but *not* Labillardière) have treated it as masculine and so it has been decided that "botanical tradition" indicates that all genera with generic names ending in -*anthos* or -*anthus* are to be regarded as masculine. Thus *Flora of Australia* (1) and the Australian Plant Names Index (APNI) treat *Adenanthos* as masculine and the adjectival terminations have been amended from -a (feminine) to -us (masculine); note one exception, the masculine of *barbiger* is *barbiger* (not "barbigerus").

***Adenanthos* in cultivation: a retrospect** — In the early 1970s, while there was great interest in growing indigenous plants in Australia, very few *Adenanthos* species were in cultivation. Without having exact figures, I suspect that no more than a half dozen, perhaps fewer, species would then have been regarded as garden-worthy. In Canberra Botanic Gardens (now the Australian National Botanic Gardens), close to the ANU campus, I did "discover" the plant which subsequently I named *A. ileticos* (after John Wrigley). There were a few grown in Kings Park and Botanic Garden, Perth, but I doubt if you could have found any *Adenanthos* in nurseries even in Western Australia at that time. Nor had any deliberate selections been made: there were no named cultivars.

Probably the best collection – but that is glorifying it rather a lot! – was in a greenhouse on the ANU campus where I had my research plants: 21 species (and two subspecies) variously raised from cuttings and seed. These were passed on the Canberra Botanic Gardens when I left Canberra in 1975 – in fact, the excellent staff of the Botanic Gardens had been instrumental in propagating a very substantial proportion of the research plants from cuttings that I sent back by mail from Western Australia in 1973. Without this help my research would have been much less thorough.

Looking back even further, there is very sparse evidence that *Adenanthos* was cultivated during the nineteenth century when "New Holland" plants were fashionable in European gardens. There are no nineteenth-century illustrations derived from plants cultivated in, for example, English gardens. The history of cultivation of indigenous species in Australian gardens is an almost undocumented subject, but it is fairly safe to suggest that, with the remarkable exception of *A. × cunninghamii* which must have been raised from seed in Sydney Botanic Gardens about 1827 (1: 353–355), no more than a

handful of *Adenanthos* species were deliberately cultivated in Australia before the second half of the twentieth century.

Today, while no *Adenanthos* is available, as an ornamental shrub, from European nurseries as far as I can discover via the Internet, there are three listed as commercially available in the western USA (4): *A. cuneatus*, *A. × cunninghamii* and *A. sericeus*. In Australia, I am reliably informed, a few other species are in the trade. *A. sericeus*, "coastal woollybush", has also taken a recent remarkable turn, and is marketed in eastern states at least as a native substitute for the "traditional" Christmas conifer. In the Albany region, around King George Sound, where *A. sericeus* is indigenous and abundant, the "woolly bush" was used as a Christmas tree in the early 1970s (3: 377) and certainly earlier, so this is an extension of use into eastern states. A further extension of this is the cultivation of a few *Adenanthos* as sources of cut-foliage for floral decoration (5, 6); one Israeli nursery offers two cultivars (7) both protected by plant breeders' rights.

It is necessary to point out that there is a lot of misnaming in the nursery trade; under the species descriptions below I comment on the individual cases that I have detected. *Adenanthos × cunninghamii*, which is the most frequent in the trade, is sometimes labelled *A. drummondii*, *A. sericeus* or even *A. cuneatus*.

English (common) names — In the past few years has been a proliferation of new English names for *Adenanthos* (8); those names tagged § are listed on FloraBase CALM website. Some are sensible but others, especially "koala plant" (9) used by a Dutch garden-centre chain, are not.

Garden-worthiness of *Adenanthos* species and hybrids — This is my own, subjective view of which species do, or would, make good garden plants, ornamental additions to the "ordinary" garden. As technical descriptions are available in several current publications, particularly *Flora of Australia* (1: both in print and on the internet), and Elliott and Jones's *Encyclopaedia of Australian plants suitable for cultivation* (10) (both based on my published revision: 3), full descriptions are not included here. Elliott and Jones (10) suggested horticultural uses for the species, some of which are rather fanciful.

The most floriferous and colourful species are the three that compose the section *Eurylaema*, all characterised by relatively large individual flowers (in fact, a single-flowered inflorescence), and undivided adult leaves. The long curving style terminates in a oval, flattened pollen-presenter, and there are only three fertile stamens.

Adenanthos detmoldii ("Scott River jugflower" §, "yellow jugflower")

Flowers bright yellow with orange lip that turns brown after pollination, very hairy on outside; bud with pointed, upturned apex; leaves slender, less than 0.5 cm broad, to 8 cm long, conspicuously covered with scattered resinous glands; lanky shrub without a lignotuber, shoots erect, sparsely branched, to 2–3 m tall. Photos on back cover and page 209.

While this has the largest flowers, and is the only species with canary-yellow blooms, it has a rather untidy habit; whether careful, selective pruning would improve this in cultivation is uncertain and, in any case, would probably result in a loss of flowers.

Adenanthos barbiger ("hairy glandflower" §, "hairy jugflower")

Flowers bright red, covered outside with conspicuous long hairs; bud with pointed, upturned apex; leaves usually narrow and more than 3 cm long, with single apical gland; shrub with a lignotuber, shoots usually erect, rarely branching, to 1 m tall. Photo on page 209.

This can be spectacular when in flower; in the wild, vigorously growing plants, especially a few years after a fire, will have numerous flowers arranged along the upright shoots. There is considerable variation; plants in the Perth region seem to have shorter leaves than plants from the far southwest.

Adenanthos obovatus ("basket flower" §, "jugflower", "stick-in-jug")

Flowers scarlet (paler than *A. barbiger*) to orange-scarlet, with short hairs outside; bud with blunt apex that is not upturned; leaves obovate to oval, usually less than 2 cm long, to 1.5 cm across, with single apical gland; shrub with a lignotuber, shoots erect, rarely branched, to 1 m tall.

Vigorous plants with young shoots covered in flowers are spectacular, especially because the leaves are shorter than the flowers and don't tend to conceal them. Studies by R. D. and S. J. Wooller (11) showed that plants of this species were highly consistent both in the number of flowers produced each year and in their flowering periods. This suggests that careful selection, followed by vegetative propagation, of the most floriferous plants could provide consistently garden-worthy cultivars. Photos front cover and pg. 209

Adenanthos barbiger* × *obovatus

It is possible (probable?) that hybrids between *A. barbiger* and *A. obovatus* exist in the wild in places where they grow in close proximity. I collected specimens that were intermediate between the two, but they could not clearly be distinguished from the possible parents. DNA studies could resolve this issue.

A putative hybrid is listed for sale by two Australian nurseries (12, 13), but I can find no description of it.

Adenanthos* × *pamela

Flowers orange or pallid red, somewhat hairy outside, bud with blunt apex that is not upturned; leaves to 3 cm long, 0.5–1 cm broad, obovate, with numerous scattered glands; shrub with lignotuber, shoots erect, sparsely branched, to 1.5 m tall. Photos on page 200.

Greg Keighery (14) was the first to report this hybrid from the Scott River area in 1979. I saw several plants in the same area in 1984 (15). Scattered shrubs occur in disturbed areas such as road verges, in places where both *A. detmoldii* and *A. obovatus* also grow, these being the most likely parent species. It was introduced into cultivation in the late 1970s, having been propagated by cuttings, but I can find no evidence that it is still commercially available.

Cuttings taken from different individuals in the wild will result in clones with distinctive characteristics; again careful selection could yield garden-worthy cultivars.

I named this handsome hybrid after Pam Sanderson (15), a good friend and keen amateur botanist of Albany.

All the other species of *Adenanthos* have four fertile stamens, conical (not flattened) pollen-presenters, and, with a few exceptions, bloom sparsely or possess flowers that tend to be concealed by the foliage. Within this group of species there are three that have much smaller flowers; these also have leaves which are deeply divided with linear lobes (like prongs of a fork). They are not, in my opinion, especially garden-worthy, but would make interesting small shrubs for a collector of Proteaceae.

Adenanthos apiculatus

Flowers cream or green and cream, less than 1.5 cm long, with sharply recurved (kinked) base to the arching style; leaves surrounding the flowers at tips of shoots to 2 cm long, with 3 or 5 filament-like lobes; prostrate, spreading shrub without a lignotuber, to 2 m in diameter. Photo on page 210.

This usually mat-like undershrub is common in the King George Sound / Stirling Range area. Vigorous plants cover substantial areas and so the species has potential as a ground-cover shrub. However, the flowers are pallid and small, and often quite hidden by the long leaves clustered around them.

Within *Adenanthos* the epithet *apiculatus* (in older sources *apiculata*) has a long history of misapplication; it was frequently used for the species correctly called *A. cygnorum* ("common woolly bush") and references in pre-1980 literature (for example 16) often refer to that plant.

***Adenanthos dobagii* ("Fitzgerald woollybush" §)**

Flowers cream or pale pink, about 1 cm long; leaves to 2 cm long, usually divided into 5 filament-like lobes; bushy shrub without a lignotuber, to 0.5 m tall. Photo on page 210.

A rare species, indigenous to the Fitzgerald River National Park and not in cultivation, as far as I know. It is unlikely to have any horticultural potential as the small flowers are concealed at the tips of the shoots by the longer leaves. (The name, by the way, came from the initial letters of "Department of Biogeography and Geomorphology" wherein I studied at ANU.)

Adenanthos drummondii

Flowers small, around 1 cm long, red at apex and pale yellow at base; there is a tuft of hairs in the throat; leaves small, not more than 1 cm long, usually divided into 5 filament-like lobes; bushy shrub to 1 m tall, with a lignotuber. Photo on page 210.

Distinctive due to the tuft of hairs in the throat of the flower, and also the sharply recurved (kinked) base to the curving style; the individual flowers are perhaps the smallest in the genus.

A. drummondii occurs only to the north of Perth and is not commercially available as far I am aware. Plants marketed under this name in California and Australia (17) seem, if the images are correct, to be *A. × cunninghamii* (see below).

The remaining species of *Adenanthos* have flowers intermediate in size. They can be subdivided into two sets – those with laminar leaves and those with leaves deeply divided into usually filamentous segments. However there is one species that does not fall into those two general categories.

Adenanthos acanthophyllus (“prickly woollybush” §)

Leaves usually three-lobed, each lobe with three triangular, spine-tipped, marginal lobes; flowers dark red to pallid pink; upright, bushy shrub with lignotuber, to 6 m tall. Photo on page 210.

The “holly-like” foliage is unique in the genus, but not in the Western Australian Proteaceae; it resembles that of *Isopogon baxteri*, for example.

In the wild, *A. acanthophyllus* is confined to a limited area at the southern end of Shark Bay, where shrubs are locally abundant on the deep red siliceous sandplain. Not commercially available and probably of little horticultural value except within its natural range as a thick hedging plant.

The species with flat, laminar leaves include several with horticultural potential; *A. cuneatus* (“sweat bush”) is one that is already familiar and in the trade both in Australia and overseas. It is one of the several *Adenanthos* that produce coloured young foliage, a character that links *Adenanthos* with several African genera, and one that make these of considerable horticultural potential including as a source of unusual cut-foliage.

Adenanthos cuneatus (“bridle bush”, “coastal jugflower” §, “flame bush”, “sweat bush”)

Flowers dull crimson; stalked leaves fan-shaped, about 2 cm long, 1.5 cm across, usually with 5 rounded lobes along the outer edge, silvery grey when mature; young foliage often brightly tinged with red or copper; erect or spreading or prostrate shrub with a lignotuber, to 2 m tall. Photo on page 211.

This has great merit as a ground-cover shrub, as suggested by Wittwer (18), and as cut-foliage plant, and I am sure that selections could be made focusing on habit and the intensity of the colour of the young foliage. As far as the flowers are concerned, like the majority of *Adenanthos* species they are never spectacular but they do attract honeyeaters. This shrub can grow close to the ocean so is tolerant of coastal conditions.

This is available commercially in Australia and elsewhere but it is not known how many different clones are being propagated. Only two clones have been named to date —

‘Coral Carpet’®: spreading to 1.5 m across, to 0.2 m high; new foliage pinkish purple. A selection from Lullfitz Nursery, Wanneroo, WA, introduced in 2005; this cultivar is protected by plant breeders’ rights. A chance, self-sown seedling from ‘Coral Drift’. (19)

‘Coral Drift’: more upright than ‘Coral Carpet’, 0.5–0.7 m tall, 1–1.5 m broad; foliage grey, young leaves also pinkish purple (20). Stated to be the clone that was “commonly grown” (19) in the 1990s, and it is currently available (13).

For some unaccountable reason, but probably a clerical error, AQIS (Australian Quarantine and Inspection Service) has the common name "Templetonia" (8) for *A. cuneatus*. The same name is also used by RIRDC (6).

The names "bridle bush" and "sweat bush" refer to the preference horses have for eating this shrub, but the young foliage will cause them to sweat. "Flame bush" is an allusion to the bright red new growth.

Natural hybrids involving *A. cuneatus* include *A. × cunninghamii*, and there are unnamed ones between it and *A. apiculatus*, *A. dobsonii* and *A. forrestii* (1, 3).

Adenanthos stictus

Like *A. cuneatus* but with much larger leaves especially when young; silvery grey when young, becoming less hairy and grey-green as they mature; an erect shrub, without a lignotuber, to 5 m tall. Photo on page 211.

This is not in cultivation, as far as is known. It is a much more robust shrub than *A. cuneatus*. Vigorous young shoots produce large, silvery, almost ginkgo-like leaves. Unlike *A. cuneatus* this species has to regenerate by seed.

Adenanthos stictus occurs only to the north of Perth; its habitats are separated from those of *A. cuneatus* by at least 1,500 km.

Adenanthos ellipticus ("oval-leaf *Adenanthos*" §)

Leaves almost hairless without silvery sheen, to 3 cm long, usually elliptic to obovate, rarely with 3 lobes at tip; flowers cream and orange-red; diffuse shrub with ascending branches, without a lignotuber. Photo on page 197.

Clearly allied with *A. cuneatus* and *A. stictus* but lacking the silvery-grey foliage, and with much paler flowers. Confined to quartzite hills in the Fitzgerald River National Park, and not obviously of interest to gardeners. The species is ranked as vulnerable; almost all mature plants on East Mount Barren were killed by fire in 1989 but good regeneration from seed did occur (21).

Adenanthos ileticos ("club-leaf *Adenanthos*" §)

Leaves triangular, small, to 1 cm long, 0.5 cm across, with three, small, rounded lobes at apex; flowers pale red-pink and cream; shrub to 2 m or more tall, with a lignotuber. Photo on page 211.

First collected (and propagated) in 1968 by John Wrigley for Canberra Botanic Garden, and cultivated there in the early 1970s where I first saw it. In the wild, it is confined to the area between Esperance and Norseman, and may be related to both *A. cuneatus* and *A. forrestii*. As a garden plant *A. ileticos* is not spectacular, and it is only infrequently available from nurseries.

I must respond to a comment by Barry Kemp (22): "Not so kind was the author of the name *Adenanthos ileticos*, the species name derived from the Greek *ileticos*, meaning 'wriggle', so if you know Greek and are good at cryptic crosswords, you may deduce that it was named after John Wrigley, the well-known authority on Australian native plants!" Well, it was indeed kind,

and John gave his consent. It was intended not as a crossword clue but as a bit of fun, and "wrigley!" just seemed an awful mouthful. By the way, I've no idea whose brain-wave came up with the name "club-leaf *Adenanthos*" – as in pack-of-cards' club – but Wrigley's jugflower surely would have done just as well.

There are four other species with usually undivided leaves, although sometimes plants produce leaves with a few apical lobes.

Adenanthos dobsonii

Leaves small, oval to spoon-shaped, about 1 cm long, 0.4 cm across, grey with silvery sheen; flowers red or red and cream; low-growing, bushy shrub with a lignotuber, to about 0.5 m tall. Photo on page 212.

Indigenous to the sandplain east of Esperance, ranging towards Israelite Bay, this is in cultivation, and is sometimes available commercially. It resembles *A. glabrescens* (see below).

In October 1973, I found a single plant near Israelite Bay that was clearly a hybrid between this and *A. cuneatus*.

Adenanthos glabrescens

Leaves like *A. dobsonii* but green without the persistent silvery indumentum, to 2.5 cm long, about 0.6 cm across; flowers pink-scarlet and cream; erect shrubs about 0.5 m tall. Photo on page 212.

This occurs in areas to the west of Esperance and two subspecies are recognised, one with a lignotuber and smooth, narrow foliage (to 0.3 cm broad) (subsp. *glabrescens*) and one without a lignotuber (subsp. *exasperatus*). *A. glabrescens* is in cultivation but it is not certain which subspecies.

Adenanthos linearis

Adult leaves linear, 0.2 cm wide, to 3 cm long, seedling leaves trifid; flowers cream with pink or crimson apex; diffuse, prostrate shrub, to 0.25 m tall, without a lignotuber. Photo on page 212.

Not a spectacular plant in any respect, and so of limited horticultural interest although it is listed as available (propagated to order) by one Australian nursery (12).

Adenanthos venosus

Stalkless leaves oval or obovate with a pointed tip, hairless except at base when mature; flowers with glandular hairs on outside, claret with cream band in centre; spreading shrub, with a lignotuber, to 1.5 m tall. Photo page 212.

Easily distinguished by the presence of glandular hairs on the flowers, this species also has a distinctive flower colour. The young foliage can be red- or copper-coloured, but because the mature leaves are dull green there is not the vivid foliage contrast produced by *A. cuneatus*. While this species is in cultivation it is not known to be commercially available.

The remaining species all have deeply segmented leaves, either densely sclerified and thus rigid and hard to the touch, or not so and having quite a soft feel. The leaf segments (laciniae), which can be very numerous, are either round in cross-section and linear or flattened in cross-section. The two species with rigid foliage include one which blooms very profusely.

Adenanthos gracilipes

Leaves usually divided first into 3 segments radiating at angles of 120° from each other; the segments may be further divided into 2, not sharply pointed; each whole leaf has a three-dimensional aspect and so the shrub seems to be composed of "netting wire"; flowers cream and reddish-pink; shrub with lignotuber, to 1.5 m tall. Photos on page 213.

A. gracilipes is not in cultivation, as far as I am aware. It would form an unusual but probably not a particularly ornamental subject.

***Adenanthos pungens* ("spiky Adenanthos" §)**

Leaves hard and very sharply pointed, usually divided into three, but sometimes undivided; flowers pale to rich pink, often produced in great profusion; shrub without lignotuber.

There are two subspecies recognised; subsp. *pungens* is an upright shrub; subsp. *effusus* ("sprawling spiky Adenanthos") has prostrate branches and can form a mat several metres across. Photos on page 213.

This is a rare, endangered species, rather susceptible to *Phytophthora cinnamomi*. Of the two subspecies the most remarkable is the spreading *A. pungens* subsp. *effusus*, which in bloom forms a spectacular, dense, pink carpet. Flower colour does vary substantially. A very desirable garden subject; if vegetative propagation can be achieved successfully, selected clones, chosen for flower colour, could be named and released.

Several species have leaf segments that are flattened (not round) in cross-section — this is also a characteristic of *A. × cunninghamii*. In the first two following the segments are spoon-shaped, in other words distinctly broadest towards the tips.

Adenanthos forrestii

Leaves silvery, small, about 1 cm long, with 2 or 3 spoon-shaped segments (sometimes not divided) about 0.5 cm long with an indented apex; flowers cream and pale red, or plain cream with a hairy ovary; upright shrub with lignotuber, bark of shoots smooth, to 1 m tall. Photo on page 214.

Confined to the deep siliceous sand dunes that occur on the coast of the Nullarbor Plain between Twilight Cove and Point Culver, and near Mount Malcolm. It is in cultivation but not especially notable or ornamental.

I saw a plant (in 1972 and 1973) which was most probably a hybrid between this and *A. cuneatus* near Twilight Cove. In 1974 Alex George also collected a probable hybrid in the same area.

Pictures on following pages

Text continued on page 228



Above: *Adenanthos barbiger*
(habit): South of Nannup. See pg. 203

Right: *Adenanthos barbiger*

Below: *Adenanthos obovatus*
(habit): West of Denmark
See pg. 203

Bottom: *Adenanthos detmoldii*
(habit): Fitzgerald River National Park
See pg. 202

Photos: E. Charles Nelson





Above left: *Adenanthos apiculatus*

Above: *Adenanthos apiculatus*
(habit): Blackboy Hill

See pg. 204

Photos: E. Charles Nelson



Above: *Adenanthos drummondii*
(habit): Dundergagan. See pg. 204

Right: *Adenanthos drummondii*

Below: *Adenanthos dobagii*
(habit): Fitzgerald River National Park
See pg. 204

Bottom right:

Adenanthos acanthophyllus
See pg. 205

Photos: E. Charles Nelson





Top left and right:

Adenanthos cuneatus See pg. 205

Right: *Adenanthos ileticos*

(habit): south of Norseman. See pg. 206

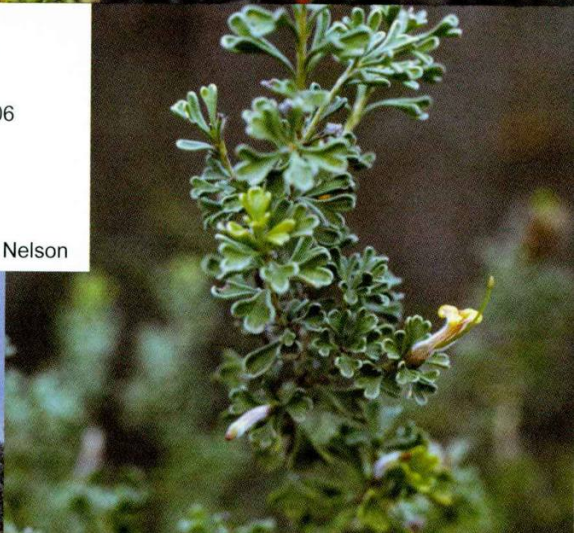
Below left and bottom:

Adenanthos stictus

(habit, foliage & flowers): Watheroo.

See pg. 206

Photos: E. Charles Nelson





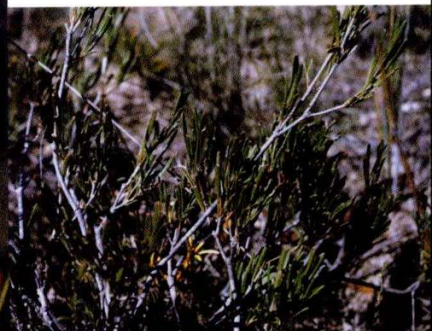
Above left and above:
Adenanthus glabrescens subsp.
Glabrescens south of Lake King.



Left and below:
Adenanthus linearis

Bottom left: *Adenanthus dobsonii*
Bottom right: *Adenanthus venosus*
 See pg. 207

Photos: E. Charles Nelson





Top right and above:

Adenanthos pungens subsp. *effusus*
(foliage & flowers): Tambellup

Top Left: *Adenanthos gracilipes*

2 photos: foliage - east of Lake King and flowers
Forrestania

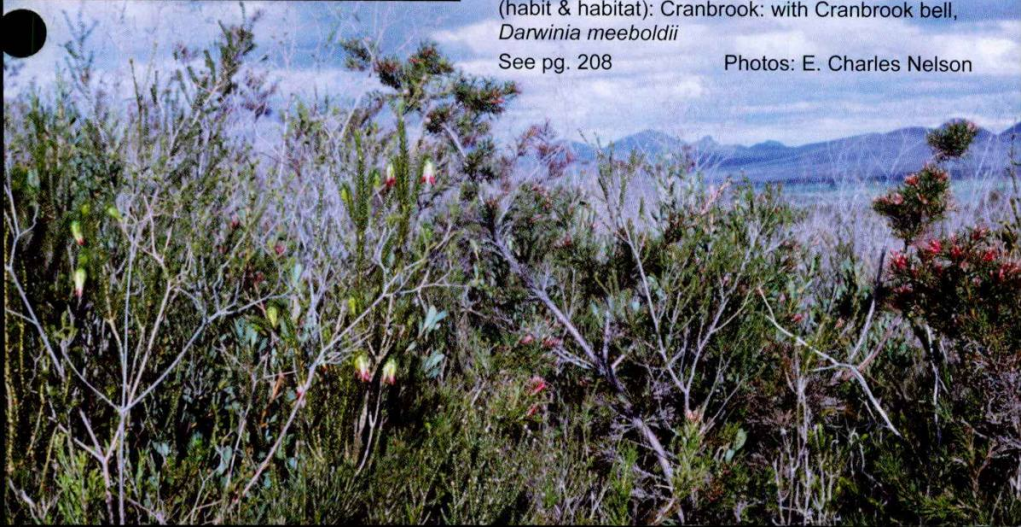
Left: *A. pungens* subsp. *pungens*

Below:

Adenanthos pungens subsp. *pungens*
(habit & habitat): Cranbrook: with Cranbrook bell,
Darwinia meeboldii

See pg. 208

Photos: E. Charles Nelson





Adenanthos species

Australian Plants research project by D. John Barrie

- | | |
|---|---|
| 1 | <i>Adenanthos argyreus</i> |
| 2 | <i>Adenanthos</i> sp. cf <i>A. cunninghamii</i> |
| 3 | <i>Adenanthos sericeus</i> |
| 4 | <i>Adenanthos cuneatus</i> |

See page 215

Scanning: Julie Barrie

Adenanthos species

Culture & Propagation notes

D. John Barrie

Daisy Patch Nursery – Coonalpyn, South Australia

Introduction

The genus *Adenanthos* has received little reference in Australian Plants in the past. Among the reasons for this could be that their culture needs are often not easily managed in Eastern Australian climates and soils. Availability is no doubt also a factor. In my 30 odd years as an Australian Plants Society member I have sourced the following 20 species: *A. argyreus*, *A. barbiger*, *A. x 'cunninghamii'*, *A. cuneatus*, *A. cygnorum*, *A. detmoldii*, *A. dobsonii*, *A. ellipticus*, *A. forrestii*, *A. glabrescens* subsp. *glabrescens*, *A. ileticos*, *A. linearis*, *A. macropodianus*, *A. meisneri*, *A. obovatus*, *A. pungens* (prostrate form), *A. sericeus* (short leaf), *A. sericeus nana*, *A. terminalis*, *A. venosus*. (Refer to scanned images, *A. dobsonii* not illustrated)

They originate predominantly from the southwest of Western Australia with two species in the east, *A. terminalis* in South Eastern SA and Western Vic and *A. macropodianus* is endemic to Kangaroo Island.

Of the *Adenanthos* species that I have encountered the most popular in cultivation is the Albany or Coastal Woollybush (*Adenanthos sericeus* subsp. *sericeus*). It is a shrub from 1 metre but can occasionally grow to a small tree of 5 metres with a somewhat upright habit. The plants respond well to light pruning and so can be maintained in most gardens. The soft finely divided leaves are pale green to grey green in colour. Flowers are red or orange but not particularly conspicuous as they are rather small and nestle within the leaves. It is of coastal origin from the districts of Esperance, Albany and further west. A second subspecies *Adenanthos sericeus* subsp. *sphalma* grows 0.5–2 metres high, has shorter leaves and is from the Esperance district. In my garden with 400 mm of annual winter dominant rainfall, *A. sericeus* does OK with little extra water in shallow neutral sand over alkaline sandy loam with limestone and sodic marl below. It withstands strong competition from adjacent mallee and native pines with ease.

Adenanthos sericeus has been regularly propagated by me for several years. Other *Adenanthos* species are less accessible, less popular and less conducive to producing suitable propagation material so I will describe my methods for *A. sericeus*. The other species respond similarly when suitable material is available at an appropriate time for my basic system.

Propagation

My propagation system is quite effective for small numbers of plants. It consists of large polystyrene boxes with holes punched in the bottom for drainage. These are two thirds filled with propagating media. I find that volume maintains an even moisture level much more easily than smaller pots or shallower depth.

This article is accompanied by a number of scanned specimens that are intended to be used as illustrations for basic identification. Scanning, Julie Barrie

My mix varies with season and species but I avoid too much sand as it is heavy to handle in boxes of this size. The bottom 70 mm or so consists only of Perlite above which I mix coco-peat 15% to perlite 85% also to 70 mm. The perlite coco-peat mix is well fluffed up to maintain plenty of air space and aid the ease of setting the cuttings. The surface is then covered with coarse river sand <5 mm but not passing through flywire that I use as a sieve. This sand is hydrophobic so minimises surface evaporation and thus reduces salt buildup from our Murray River water. The set cuttings need little water since the volume of media dries out slowly. It is then a matter of managing humidity and temperature above the media. I water with moderate size droplets from overhead three times a day during hot weather, (October to April) works well for me. By controlling air circulation and thus the evaporation rate in the tunnel house I have found it unnecessary to use fungicides. Moderate air circulation must be maintained. The tunnel is open ended with adjustable shade cloth covers both ends and during the warmer weather I cover the whole tunnel in 50% shade cloth to moderate the temperature. A controlled atmosphere at 24 C with a propagation mix at 27 C is considered ideal, but I get results with no power bill and little capital outlay.

On a 35°C day the air temperature can exceed 50°C. Temperatures in the low to mid 40's occur most summers. On those days I may additionally briefly hand-water once or twice to maintain humidity and I lose very few cuttings from water stress.

That said, the cuttings I prefer are moderately firm new growth, stems still with a greenish look. I often use heel cuttings as tips are usually too soft for my method. I prefer powder based hormones of 3000 ppm of IBA for *Adenanthos*. Cuttings will usually strike within 5 weeks, however if they fail to strike by 10 weeks I discard and try again. There is no value in having boxes full of recalcitrant cuttings. Only if I have a new species or just a few cuttings to work with I may persevere longer in hope. Boxes of cuttings are placed on a clean weed mat floor with no bottom heat.

The 'attitude' of the cuttings usually indicates when roots have formed, there will be signs of new growth, they will be a better colour and the leaves stand out somewhat more firmly. I gently slide an old putty knife between the rows and lift the media to loosen it. Cuttings will lift easily unless you have left them too long! Even easier if they have no roots! I prefer to pot on when the first roots appear rather than have roots damaged or distorted in trying to dib-out. Plants rooting in autumn are often very slow to grow on during winter. Spring produces a quicker result. When growing other species, my material is often from small or low plants. Hygiene is then important as material is invariably contaminated with soil residues containing fungal spores. A brisk whisk in a 2% sodium hypochlorite solution can help to decontaminate material but then rinse in clean water. I rarely find this necessary if the plant is healthy and material is sourced from above the splash zone. Over the years my strike rate has varied from almost nil to better than 90%. This typifies the variables that dictate success in a less than controlled system. This method is cheap and can be fun when the lottery of success favours you.



Adenanthos species

Australian Plants research project by D. John Barrie

- 5 *Adenanthos obovatus*
- 6 *Adenanthos ellipticus*
- 7 *Adenanthos* sp.
- 8 *Adenanthos forrestii*

See page 215

Scanning: Julie Barrie

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Adenanthus species

Australian Plants research project by D. John Barrie

- | | |
|----|---|
| 9 | <i>Adenanthus</i> sp. cf <i>A. cunninghamii</i> (bronze tipped) |
| 10 | <i>Adenanthus detmoldii</i> |
| 11 | <i>Adenanthus sericeus</i> (short leaved form) |
| 12 | <i>Adenanthus ileticos</i> |

See page 215

Scanning: Julie Barrie



Adenanthos species

Australian Plants research project by D. John Barrie

- | | |
|----|---------------------------------|
| 13 | <i>Adenanthos cygnorum</i> |
| 14 | <i>Adenanthos meisneri</i> |
| 15 | <i>Adenanthos argyreus</i> |
| 16 | <i>Adenanthos macropodianus</i> |

See page 215

Scanning: Julie Barrie

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Adenanthos species

Australian Plants research project by D. John Barrie

- 17 *Adenanthos sericeus* 'Nana'
- 18 *Adenanthos forrestii*
- 19 *Adenanthos cuneatus*
- 20 *Adenanthos pungens* (prostrate form)

***Adenanthos terminalis*, a brief report on its success in revegetation works in the southeast of South Australia**

With the privatising of the National Railway system infrastructure changes were made. Among these was the provision of extended passing loops at various locations to enable trains of up to 1.5 km long to pull off the main track to be passed by others.

One of these sites was a small railway siding at Coombe in the upper South East of SA. The topography was shallow alkaline sand flats with one dune to about 7 m high at the western extremity. On this dune was an association of *Eucalyptus incrassata* with heath understorey including *Banksia ornata*, *Xanthorrhoea caespitosa*, and *Adenanthos terminalis*.

I had failed in my attempts to propagate *A. terminalis* from wild collected cuttings so took a lateral look at the options. A bushfire had burnt a small patch adjacent to the railway to the east of the revegetation site. This resulted in a fresh flush of regrowth from which I sourced a few cuttings. These subsequently struck readily using the methods that had previously failed (See propagation notes above). The few plants produced were not going to make much impact on the area to be revegetated. To back up that effort I had scalped a layer of sand from around plants that were being destroyed by the widening of the cutting through the dune. Some of this sand was placed in a foam fruit box with a newspaper lining to block the holes. The box was then sat on a raised bench at the margins of my nursery watering system so as to get only a little moisture. This resulted in six *Adenanthos* seedlings emerging amongst a plethora of other species. Four were successfully potted on. Another quantity of scalped sand was spread over a sand bed about 200 mm deep and left to nature. No *Adenanthos* resulted from this exercise, in fact very little germinated at all. The little extra moisture on the bench seemed beneficial.

On completing the railway cutting earthworks, the specified 45 degree batter in rather loose sand had drift potential. I scattered the remaining scalped sand down the embankment then proceeded to pock mark the slope with footprints to hopefully key in some of the seeds. *Banksia ornata* responded particularly well to its seed being pressed into the sand and left to nature. The planting of tube-stock supplemented the direct seeding. *Kunzea pomifera* was planted from tube-stock and from runners rescued from the excavation. Although slow to spread they have taken very well.

I revisited the site each year to monitor results. The *Adenanthos* were the surprise. Direct strewn seed had germinated in each subsequent year and although some drift has occurred baring a few centimetres of roots they are growing remarkably fast, the largest approaching one metre high. That exercise has resulted in economical establishment of *Adenanthos terminalis* on a steep South Western facing sand embankment.

The *Adenanthos* tube-stock were planted to the east on less favourable sand flats, though not as vigorous at least some plants are surviving. Tube-stock was watered in at the time of planting. Good weed control and planting by mid July enabled >80% of the tube-stock to survive through the spring and summer with no additional water.



Adenanthos species

Australian Plants research project by D. John Barrie

- 21 *Adenanthos linearis*
- 22 *Adenanthos detmoldii* (simple leaf)
- 23 *Adenanthos terminalis*
- 24 *Adenanthos meisneri*

See page 215

Scanning: Julie Barrie



25



Adenanthos species
 Australian Plants research project
 by D. John Barrie
 25 *Adenanthos barbiger*
 See page 215

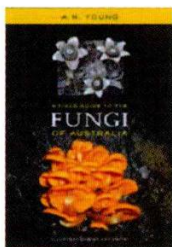
Scanning: Julie Barrie

Left: *Adenanthos cuneatus*
 See page 215

Photo: C. Liber

A Field Guide to the Fungi of Australia

Book review by Pam O'Sullivan



A Field Guide to the Fungi of Australia by A.M. Young, illustrated by Kay Smith. Publisher: University of New South Wales Press Ltd., Sydney, New South Wales, Australia, 2005, 240pp, paperback RRP Price AUD \$29.95 ISBN 0 86840 742 9.

'Fungi play an essential role in Australian bushland ecology... without them, life on earth as we know it would rapidly cease.' Thus, we desperately need to become more aware of fungi and the role they play. To do this it is essential to be able to start and look for and find fungi, identify and document our findings or help others do it for us.

Continued opposite

Native Plants of Adelaide

Book review by Casimir Liber

Phil Bagust & Lynda Tout-Smith – 132pp

This A5 sized book is a well- laid out colour reference guide to Adelaide indigenous flora. Its subtitle, *Returning the vanishing natural heritage of the Adelaide Plains to your garden* captures its aims quite well (and hopefully will help in its fulfilment!).



The book begins with a brief overview of the flora of the Adelaide Plains and remnants before moving into chapters based on occurrence – Common plants, Mallee Woodlands, Tall Woodlands, Riparian and Coastal, highlighting the importance of plant associations. The chapters have one individual plant to a page and make good use of space, generally with both a habit shot and close-up of flowers. Brief cultivation notes are also provided.

Some propagation notes and references for further reading are provided at the back of the book. Overall this is an excellent introduction to local flora for the inhabitants of Adelaide.

A Field Guide to the Fungi of Australia is a great little book, which will help contribute to increasing our knowledge about fungi. This is a well-formatted book, which makes it user friendly. The very talented Kay Smith, who has a great eye for detail, beautifully illustrates it with 23 delightful watercolours and over 260 line drawings. There are 36 colour photos and comprehensive descriptions of more than 170 species by Tony Young. This may only seem like a tiny fraction of Australia's rich and diverse fungal flora, which is estimated at about '20,000–25,000 species of macrofungi' with only about 25% of these documented!! However, the book covers a wide range of representative species, many of which are those ones most commonly encountered and all with up-to-date names.

If you already know Tony Young's previous field guides to fungi and thought they were good then you will find this 2005 guide significantly different and even better in lots of ways. It includes an easy to use pictorial key. This key not only divides fungi into groups such as 'jelly' fungi and 'coral' fungi for example, it also groups gilled fungi by different habitats like grasslands and forests, and in addition by the specific substrate on which they grow such as soil or wood. Tony's descriptions of the individual species are clearer and more comprehensive than in his previous books - nearly a full page for each species. It is also pleasing and useful to have an increased amount of information relating to 'habitat and notes'. Clear, beautifully detailed line drawings accompanying each description now illustrate the whole fungus or a group of the fungi and at times some of the substrate on which they grow. All of which contributes to making this a very useful and easy to use field guide. Though, for the more scientifically minded the illustrations in Tony's earlier books not only showed a section through the fungus but also covered micro-characters such as spores, basidia and the like. Descriptions of spores are still there, and mostly with some additional information, the trade-off has been more detailed descriptions of the macro-characteristics!

The earlier part of the book is well worth reading to find out more about the current state of knowledge and lack of funding for work on fungi! There is general information on ecological aspects of fungi and how they reproduce, the difference between mushrooms and toadstools, fairy rings, luminescence, their special (mycorrhizal) relationships with plants, fungi as food for animals and their place on our menus and most importantly a discussion about toxicity. A boldly circled T indicates known toxicity on species descriptions. Unfortunately, there is still much to be learnt in this area about our native fungi so as Tony says 'The absence of any symbol must NOT be interpreted as an indication that a species is edible.'

For those of you with an interest in the natural environment and fungi in particular I highly recommend *A Field Guide to the Fungi of Australia*. It is good value at \$29.95 for a 240-page book that is beautifully illustrated, scientifically up-to-date and an easy to use field guide. If you are unable to get a copy for yourself encourage your library to obtain a copy for you to access and to help increase the awareness and knowledge of these very important, fascinating and frequently very beautiful organisms. And yes, after reviewing this book, I had found it so useful and so beautifully illustrated that I had to go out and purchase a copy for myself!!

George Lullfitz

Rosemary Verbeeten

George began his working life in 1962 as assistant seed collector at Kings Park. He left Kings Park to work at Yilgarnia Nursery where he formed a longstanding working relationship with Charles Gardiner (the WA Government Botanist). While working there he literally learned off by heart, the names of the complete known flora of WA. He accompanied Charles Gardiner on many field trips.

With two other partners George started 'The Wildflower Nursery' in Wanneroo, a northern suburb of Perth. In 1979, George left the partnership and set up his own nursery, Lullfitz Nursery, also in Wanneroo. This still operates today.



The Australian Plants Award in the Professional Category was presented to George Lullfitz at the ASGAP Conference 2005 in Perth. The photo shows George being presented with the award by Rosemary Verbeeten.

On this occasion two awards were awarded in this category. The other recipient was John Knight from NSW who is currently the superintendent of the Eurobodalla Regional Botanic Garden.

Photo: M Wagner

Through his work as a professional nurseryman George has concentrated his energies and expertise on selecting, learning to propagate and promoting new species and interesting varieties and forms of Western Australian flora. He has been involved in the selection, hybridisation and the introduction into cultivation outstanding forms of *Chamelaucium*, *Lechenaultia*, *Anigozanthos*, *Scholtzia* and *Boronia heterophylla*. He also has introduced low growing and prostrate forms of many species. He has been involved in research and development of a floriculture programme involving a wide range of Western Australia flowers suitable for export markets. Upon request, for specific projects, usually in adverse situations, he has achieved growing for the first time, of adapted, endemic species, local to that specific area; which were needed for the landscape development of for example, of new towns in the desert, or for the rehabilitation of arid area mines.

George has had two books published. In 1978 he had published, *Grow the West's Best Native Plants*. He followed this up in 2002 with *A New Image for West Australian Plants*. George was also the main photographer for these two publications. He is a regular contributor to articles about the native flora in newspapers in WA. He is a regular guest speaker to many organisations. George was instrumental in the formation of the Northern suburbs branch of the Wildflower Society.

George has been involved in the training of many horticultural apprentices. He was the Presenter of the ABC TV 'Greenfingers' program for many years. He has conducted and funded bus tours to educate local government personnel, landscape architects and contractors and education personnel regarding the use of native species in landscape development.

George has been at the forefront of the Western Australian Nursery Industry for over 25 years and we are most fortunate for this with the range of plants that we can grow in our gardens today.

Adenanthos eyrei ("Toolinna Adenanthos"^S)

Like the previous species but with larger leaves, more than 1.5 cm long; segments spoon-shaped but the apex not indented; flowers dark crimson with hairless ovary; bushy shrub to 1 m tall, bark on old stems very conspicuously warty, without a lignotuber.

The young foliage is crimson or coppery, like that of *A. cuneatus*, so this could make an attractive garden subject, and may be amenable to propagation from cuttings.

This was only discovered in 1973 at Toolinna on the Nullarbor coast growing on deep siliceous sand, with *A. forrestii* and *A. cuneatus*, and *Banksia epica*. This very isolated locality had not been visited by botanists before the 1970s. It was on the route taken by Edward John Eyre during his trek across southern Australia from Adelaide to King George Sound in 1841. The names *Adenanthos eyrei* and *Banksia epica* both commemorate that trek.

Adenanthos cacomorphus

Leaves 1–1.5 cm long, covered with dense silver-grey felt, divided in to 3 or 5 linear segments incised to at least half the length of the leaf; flowers bright pink, with white hairs outside; erect shrub with lignotuber, less than 1 m tall.

An uncommon species from the western periphery of the Fitzgerald River National Park, growing in areas also inhabited by *A. cuneatus* and *A. flavidiflorus*, so it may be of hybrid origin. However, this forms substantial populations – it does not occur as isolated individuals, like the other putative hybrids. The leaves of *A. cacomorphus* are more deeply segmented than those of *A. cuneatus*, and the segments are not round in cross-section like those of *A. flavidiflorus*. The name, meaning misshapen, refers to the grotesque pollen grains.

Adenanthos × cunninghamii ("Albany woollybush"^S, "prostrate woolly bush")

Leaves 2.5–3 cm long, with least 6 linear segments that are flattened in cross-section, young foliage red- or copper-tinged; flowers dull crimson; erect or sprawling shrub without lignotuber, to 2m tall. Photos on page 200.

A handsome shrub, especially when the colourful young growth is present, and easily propagated by cuttings. Now probably the most commonly seen *Adenanthos* in cultivation, although it is very infrequent in the wild. In the western USA it is often mislabelled – I have seen plants under the tags *A. sericeus* and *A. cuneatus*, and web-sites indicated it was also (incomprehensibly) sold as *A. drummondii*.

DNA studies by Esther Walker and Margaret Byrne (Murdoch University) have confirmed that plants of *A. × cunninghamii* are of hybrid origin, resulting from cross-pollination of *A. sericeus* and *A. cuneatus*. Fertile seeds are produced; wild-collected seeds yielded plants with foliage more closely resembling one or other of the parent species, suggesting that back-crossing can also occur (23).

This plant was first cultivated about 180 years ago in Sydney Botanic Gardens, presumably having been raised from seeds collected at King George Sound in April 1827 by Charles Fraser (3). Originally I concluded that this "species" was extinct, but by pure chance on 1 October 1973 I found a plant in Torndirrup National Park; searching the area produced two more. Since then more individuals have been located.

Adenanthos × *cunninghamii* is quite variable, and the name "prostrate woollybush" certainly is not a good one as some plants can be 2 m tall. If more than one clone is in cultivation, they should be given distinctive cultivar names.

The species with softer foliage are treated below according to the number of leaf divisions (laciniae), starting with those which, *in the wild*, have the fewest laciniae. My research data from the plants cultivated at ANU indicate that the number of leaf laciniae can increase under cultivation; this was demonstrated most dramatically by *A. sericeus*.

Leaves divided into 3 or 5, not silvery

Adenanthos terminalis ("yellow gland-flower")

Mature leaves hairless or with hairs persisting at the base; flowers about 1.5 cm long, cream or cream and green; ovary densely hirsute; upright shrub, side branches spreading, without a lignotuber, 1–2 m tall. Native in South Australia and Victoria.

Not an especially attractive plant, indeed rather dowdy and so not worth growing except in a botanical collection. The most widespread of the two eastern species, ranging from Eyre Peninsula and Kangaroo Island, South Australia, eastwards into the Big and Little Deserts, Victoria.

Adenanthos cygnorum ("common woollybush"[§])

Leaves to 2 cm long with both curled and straight hairs (hand-lens needed), but when mature often hairless except near base; flowers about 2.5 cm long, pink and green, or creamy green, ovary hairless; prostrate or erect shrub without a lignotuber.

Rather like *A. terminalis*, this western species ranges widely, from Kojonup north to the Murchison River and from Perth east to Wickpin. Two subspecies are recognised; the upright one, subsp. *cygnorum* ("common woollybush"[§]), can reach 4 m in height; the prostrate one, subsp. *chamaephyton* (syn. *A. teges*), will form a thick mat up to 4 m in diameter. There are other differences; the prostrate plant tends to have pointed flower-buds and somewhat smaller flowers. It is an undershrub in jarrah forest on laterite, and grows in a limited area around Mundaring and Chidlow, in the Darling Range east of Perth. It will sometimes produce ascending or erect shoots, but in cultivation in Canberra remained low-growing.

Observations of the mat-forming subsp. *chamaephyton* suggest that it resists burning and so it has been proposed that it could be used as a natural fire-break plant (16) but as far as I am aware this has never been fully tested.

Detailed studies of the common woollybush, using modern molecular techniques, could demonstrate that this species comprises more than two distinct taxa.

Adenanthos iabillardierei

Leaves about 1.5 cm long, with long hairs often persistent towards base and on stalk, usually with 5 segments; flowers cream with claret base and dark claret apex; erect shrubs, without a lignotuber, to 1.5 m tall.

Found only in the Barren Ranges, Fitzgerald River National Park, this is not a spectacular species, and old shrubs can look gawky with all the leaves clustered at the tips of shoots – not an uncommon characteristic in *Adenanthos*.

Leaves divided into 3 or 5, silvery

Adenanthos oreophilus

Leaves about 2 cm long, segments thick, c. 1 mm across, trefoil-shaped (not round) in cross-section, channelled on upper surface, often copper-coloured when young; flowers scarlet; erect shrub, to 2 m tall without a lignotuber.

This species can be mistaken for *A. sericeus* ("coastal woollybush") but in the cultivation experiments its leaf-form remained constant, and anatomically the leaf segments are very different from those of *A. sericeus*. The coppery tints of the young foliage can be very marked.

Adenanthos oreophilus has been collected at in the Fitzgerald River National Park and nearby at Mount Desmond near Ravensthorpe, and also 500km to the east at Mount Ragged and Hill 62.

***Adenanthos argyreus* ("little woollybush")**

Leaves to 1 cm long, with a distinct stalk, usually with 3 segments; flowers about 2 cm long, bright red-pink with white tomentum outside, style and ovary hairless; diffuse, usually erect shrub without lignotuber, to 1 m tall.

'Silver Carpet': low, spreading shrub, 0.5–1 m tall, to 1.5 m across; foliage grey; with small pink flowers in Spring and Summer. Tolerant of dry conditions and prefers well drained soils in full sun. (24)

This name was in a list of plants sold in October 2005 at an Australian Plant Society (SA Region) sale (25). Elsewhere a "prostrate form" is mentioned, but without a cultivar name (26).

'Silver Wave'; described, enigmatically, as a "spreading shrub or high groundcover with dense habit" (27).

It needs to be established whether these names both refer to the same clone.

A. argyreus is a very attractive silvery shrub with bright pink flowers, but these are rarely produced in great abundance. It occurs over a considerable area between Southern Cross and Lake King.

Adenanthos flavidiflorus

Leaves to 1.5 cm long, without a distinct stalk (or almost so), segments usually 5 (sometimes 7); flowers bright red-pink with dense white or yellow tomentum outside, style and ovary hairy; erect shrub, with a lignotuber, to 1 m tall.

Rather like *A. argyreus* but possessing a lignotuber, and with a hairy ovary and style. The name seems a misnomer, but plants can have yellow hairs on the outside of the flowers and this becomes more prominent when specimens are dried.

Most leaves with more than 5 laciniae

Among these there are two distinctive species, recognisable immediately because their flowers and sometimes the leaves have gland-tipped hairs; the only other species to possess such hairs is *A. venosus*.

***Adenanthos meisneri* ("prostrate woollybush")**

Leaves to 1.5 cm long, stalk hairy but segments become hairless, segments 9 or more; flowers red-purple to pale violet; erect shrub with a lignotuber, to 1 m tall, or prostrate.

A widespread species, ranging from the Swan River south towards Point D'Entrecasteaux. It is also variable in habit. George Lullfitz selected the cultivar 'Green Carpet' for its prostrate habit; it was introduced in 2000 and was granted PBR protection in 2002.

'Green Carpet'®: prostrate, not over 15 cm, spreading to form a mat about 1.5 m in diameter; leaves 1.5 cm long, with 9–16 segments (under sprinkler irrigation); flowers red-purple (28).

***Adenanthos velutinus* ("velvet woollybush" §)**

Leaves to 1.5 cm long with persistent, conspicuous, velvety indumentum, segments at least 9; flowers cream and grey-black; erect shrub, without a lignotuber, to 3 m tall.

Clearly related to *A. meisneri* but differs in the absence of a lignotuber, flower colour, and especially in the persistent velvety tomentum on the leaves. This rare species is confined to a single flora reserve near Cranbrook.

Adenanthos filifolius

Leaves almost hairless, with more than 12 segments; flowers cream and blue-black; erect shrub, without a lignotuber, to 1.5 m tall.

In flower colour this resembles *A. velutinus*, but the velvety tomentum and the gland-tipped hairs are entirely absent. This species is found on the higher slopes of the Stirling Range reaching 1,000 m altitude on Bluff Knoll, the highest altitude attained by an *Adenanthos* species.

***Adenanthos macropodianus* ("Kangaroo Island gland-flower")**

Leaves silvery, to 2 cm long, not concealing flowers, with 9 laciniae; flowers bright pink or rarely yellow; erect shrub, without a lignotuber, to 1–3 m tall. Native on Kangaroo Island, South Australia.

On Kangaroo Island this grows with *A. terminalis*. Not commercially available, but worth acquiring.

Adenanthos sericeus ("coastal woollybush", "Albany woollybush", "woolly bush"[§], "tall woollybush", "Australian smoke bush")

Leaves silky, 2.5–4.5 cm long, with 5–50 segments; flowers scarlet, usually concealed by leaves; erect shrub, to 5 m tall, without a lignotuber.

A variable species, divided into two subspecies, one occurring in the hinterland of King George Sound (subsp. *sericeus* ("coastal woollybush"[§], "Albany woollybush")) and the other at Cape Le Grand (subsp. *sphalmus*). They differ in the number of leaf segments, differences that remain when the plants were cultivated in the same environment. In the eastern subspecies, subsp. *sphalmus*, the wild plants have 6–15 segments and the leaves are rarely more than 3 cm long. The western subspecies, subsp. *sericeus*, has leaves exceeding 3 cm and possessing at least 20 segments. In cultivation the western subspecies will produce many more leaf segments than the eastern one, and the leaves will tend to stand out from the stems producing a very "fluffy" appearance.

In the older literature *A. sericeus* is treated as a widespread species, occurring on Kangaroo Island (this plant is now *A. macropodianus*), as well as along the west coast of WA. In fact it is restricted to the southern coast, and to two widely separated localities.

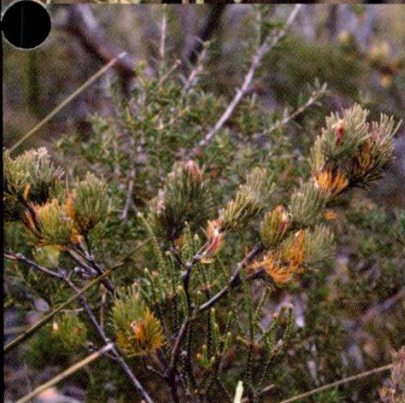
Now being marketed, as pot-grown plants, in Australia as an indigenous "Christmas tree". Otherwise, the woolly bush is not a spectacular plant yet there are several clones in cultivation including two ('Aviv', 'Tal') raised, selected and introduced by Nir Nursery (7) in Israel.

'Aviv'[®]: prostrate shrub to 0.4 m tall, with silvery grey-green, feather-like leaves, to 3 cm long, with 5–7 laciniae; flowers scarlet; "a crawling, more delicate variety ... which ... makes an excellent pot-plant and is a good ground-cover plant for gardens and rockeries, it can be planted all year round" (7). Granted plant breeders' rights protection by the Israel Plant Breeders' Rights Council (29) (expired February 2006), and by CPVO (rights expire in European Union in 2027). Named after Aviv Nir, Revital and Nitzan Nir's middle daughter (7).

'Silver Streak': "an upright shrub growing to 3 m tall – the soft grey green foliage is a feature – small red partially hidden *Grevillea*-like flowers in Spring and Summer" (27). The origins of this cultivar have not been discovered.

'Tal'[®]: shrub, to (2–)3 m tall, with soft, silvery grey-green foliage; leaves deeply lobed with feather-like texture, 3.5–4 cm long, with 5–7 laciniae; flowers scarlet (RHS 40A). A good cut-foliage plant. Granted plant breeders' rights protection by the Israel Plant Breeders' Rights Council (29), and by CPVO (rights expire in European Union in 2027). Named by Nitzan Nir after his wife, Revital ("Tal") (7).

There are indications that more than one other clone is in the trade; various sources also list *A. sericeus* 'compact' (27) (a name contrary to ICNCP 2004 (30)), "dwarf" (31) or "nana" (32), all presumably low-growing variants similar to 'Aviv'. Both 'Aviv' and 'Tal' are marketed under the name "Koala plant" (7, 9)!



Top Left:

Adenanthos forrestii

See pg. 208

Above: *Adenanthos eyrei*

Left and far left:

Adenanthos labillardierei

Below left: *A. cacomorphus*

Below: *A. terminalis*

Bottom left:

Adenanthos cygnorum

subsp. *cygnorum*

Bottom right: *A. cygnorum*

subsp. *chamaephyton*

See pp. 228–230

Photos: E. Charles Nelson



The prospects for *Adenanthos*

The horticultural potential of *Adenanthos* is slowly being realised, and it is remarkable that selection of new cultivars is now being undertaken not just in Australia but also overseas. Undoubtedly other clones will be named in the future, probably with the main emphasis on foliage characteristics.

In the wild, the future is less rosy as the populations of some species are seriously depleted. The collection of seeds and the conservation of these in seed banks may be the only hope for plants such as *A. pungens* subsp. *effusus* (33).

Future work on the genus using the most modern techniques for DNA analyses, which have revolutionised plant taxonomy in the last decade, will probably show that there are differences within and between populations which look morphologically very similar. Studies of the *A. barbiger-oboovatus* complex, and of *A. cygnorum* complex (34) may yield information that leads to the segregation of populations, perhaps into subspecies, if not species.

Finally, work on the entire family indicates that *Adenanthos* and *Isopogon* are related – “sisters” – to the southern African genera such as *Leucospermum* and *Leucodendron*, rather than to the Australian *Franklandia* as argued by Johnson & Briggs (35). “This is a novel and somewhat unexpected relationship”, noted Barker *et al* (36), although, truth to tell, it was a relationship which I had argued for myself in 1975 (3: 404–406), contrary to Johnson & Briggs. The resolution of generic relationships within the Proteaceae, and their consideration in the context of continental drift and the fragmentation of Gondwanaland, will be an interesting experience in the near future.

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Above:

Adenanthus argyreus

Left: Adenanthus argyreus

(habit & habitat): Lake Varley, Hyden

Below: A. oreophilus

(habit & habitat):

Dempster Inlet

Bottom:

Adenanthus oreophilus

See pg. 230

Top: Adenanthus flavidiflorus

South of Hyden

Above: Adenanthus flavidiflorus

(habit & habitat): Gairdner River

See pp. 228, 231

Below: Adenanthus oreophilus

(coloured spring foliage): Point Ann

See pg. 230

All photos this page: E. Charles Nelson





Above and above left:

Adenanthos meisneri

Left: *Adenanthos sericeus* subsp. *sphalmus*

Below left: *A. sericeus* subsp. *sericeus*
(habit & habitat): coast of Flinders Peninsula

Below: *Adenanthos velutinus*

Bottom left: *Adenanthos filifolius*

Bottom right: *Adenanthos macropodianus*

See pp. 231, 232

Photos: E. Charles Nelson



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PUBLISHED BY THE AUSTRALIAN PLANTS SOCIETY NSW LTD

Under the direction of the PUBLISHING COMMITTEE

Editorial Material: Editor, Australian Plants, PO Box 744, Blacktown NSW 2148

E-mail: edap@austplants-nsw.org.au Fax. (02) 9676 7603

PUBLISHING COMMITTEE: M Wagner (Convenor), J Caldwell, C Liber

All publication correspondence / feedback to: Publishing Committee, PO Box 744, Blacktown NSW 2148

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