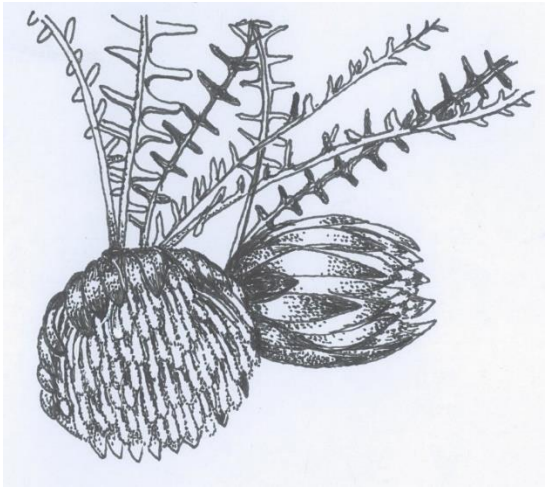


ISSN: 0728-151x February 2022

DRYANDRA STUDY GROUP NEWSLETTER No. 82

AUSTRALIAN NATIVE PLANTS SOCIETIES (AUSTRALIA)

Dryandra subpinnatifida var. *imberbis* Lyn Alcock

Contents

Margaret Pieroni
22 Ravenhill Heights
DENMARK WA 6333
Email: mpieroni@bigpond.com
Phone: (08) 9848 3331

Hello and welcome to newsletter no. 82. I hope you will enjoy this larger than usual issue.

It has taken me from the last newsletter until now to compile this newsletter. I feel that dryandras have been rather overlooked since their unfortunate inclusion into *Banksia* and there is quite a bit of taxonomic work to be done following some recent discoveries which we have brought to you via the newsletter. The Dryandra Lovers Facebook page is also producing some interesting material, as well.

Both Erica Shedley, botanist and Study Group member and Fred Hort, plant discoverer extraordinaire, have found what Kevin Collins and I believe to be new taxa – both appear to be varieties of *Dryandra nivea,* with the same formal, 'mounding' habit. Erica's one has flowers like *D.* sp. Morangup and leaves like *D. brownii.* Fred hasn't seen the flowers of his one but its leaves resemble those of *D. arctotidis* which start out looking like floral bracts with long, white hairs.

Closed borders because of the pandemic have meant that members from NSW and Victoria have not been able to make their usual annual visits to WA and we are all hoping that this year we will be able to get together and see some dryandras in the wild. After the good rains of last year, throughout the Wheatbelt, we are counting on finding *D. pteridifolia* subsp. *pteridifolia* in flower for the first time in 6 years – especially the bright pink-flowered one.

Many thanks to Stan and Phil for their excellent articles.

Best wishes

Margaret

Shy flowers, graceful birds, cute possums - a study of the pollination ecology of the Northern Sandplain dryandras.

If you are reading this, chances are you are familiar with Hi Vallee Farm – a 350 ha patch of kwongan near Badgingarra, about 250 km north of Perth. It is a private nature reserve with dramatic topography and exceptional floral displays. It is particularly rich in diversity of Proteaceae, boasting ten Banksias and eighteen *Dryandra* species, many of which are endemic to the Northern Sandplain.

On my first visit to Hi Vallee it was hard to love it. I was interested in the dryandras and came for a short reconnaissance of potential study sites. It was January 2021, not a single dryandra was flowering, not a bird in sight and stepping out of a car felt like being thrown into a convection oven. Even the toughest of the banksias and hakeas look parched and stressed. Despite this, my host, Mr. Don Williams, very kindly took me on a tour of the reserve to give me an idea of its topography and plant life, and to see roughly how many follicles different dryandra species were producing. The following day, the weather improved but I was pressed go back to Perth to finish up some lab work project before returning to Melbourne. Six months later, by incredible luck, travelling in a few days between one lockdown and another, I was back! This time, for contrast, it was the wettest July on record! But the wet, misty mornings and dramatic downpours followed by spectacular rainbows only piqued my curiosity and added to the charm of the place. After months of uninspiring city life in Melbourne, being out in proper bush felt exhilarating! Although July is not the peak wildflower season, I was thrilled to see many flowers I've hitherto known only from books and photos on the internet. I was very impressed by the quaint beauty of the groves of *Kingia australis*, its greenish flowers contrasting subtly with the orange cliffs of laterite. But the definite highlight for me was seeing the large, pale gold and deep red buds of the locally endemic *Dryandra catoglypta*. Tucked in among the species' broad, deeply lobed, blueish foliage, they looked almost incandescent when lit by the morning sun.

Endemic to Hi Vallee Farm, *Dryandra catoglypta* has large, brightly coloured inflorescences which contrast dramatically with the blue-tinted foliage but tend to be modestly tucked away

But I didn't come to Hi Vallee to admire the beauty of the flowers (although of course I did a lot of that too!) I arrived in a rented Hilux loaded with field gear and scientific equipment with the aim to stay for a month to study the pollination ecology of the local dryandras.

The dryandras are of course an intriguing group of plants with their varied growth forms and diversity of floral traits. The evolutionary theory predicts that flowers evolve under selection to maximise visitation and pollen transfer by the key pollinators. Broadly speaking, because there are many more plants than kinds of pollinators, this leads to convergent evolution of the so-called pollination syndromes – suites of traits that are particularly compatible with pollination by one type of pollinator such as bees or birds. Drawing on this paradigm, it has long been speculated that some of the species in southwest Australia specialise on pollination by small, ground-dwelling mammals - the most likely candidates being the low prostrate shrubs with small but robust and often strongly scented flowers, presented near the ground (geoflorous) or hidden deep within the foliage (cryptic). The original idea, proposed in the 1980s was based on the similarity of some of these species to South African proteas, which were known to attract rodents. Of course, the main mammal pollinator of such flowers in Western Australia has got to be the honey possum (*Tarsipes rostratus*) - the only

marsupial whose diet consists solely of nectar and pollen. However, it is not clear why geoflory and/or floral crypsis would be selected for by honey possums, given that they certainly are capable of climbing trees and tall shrubs to feed on very conspicuous inflorescences of other banksias such as *Banksia menziesii*, *B. attenuata* and *Dryandra sessilis*. Perhaps these plant traits have evolved under selective pressures not related to pollination but only in those generalist species that were also visited and pollinated by mammals? If so, perhaps there are other plant traits that consistently appear in species primarily pollinated by mammals (either to facilitate their foraging or to deter pollen and nectar thieves) - for example strong scent? It is easy to get lost in such speculations. What the scientific discipline demands is first to establish which dryandras are pollinated by honey possums (or other mammals) and to test whether any of them depend on mammals for pollination. Hi Vallee was a natural choice for the study site because of its unparalleled diversity of the dryandras and intact pollinator community. But how can one test whether or not a plant is pollinated by honey possums? Three methods are used commonly in similar studies, and the gold standard is to use all three simultaneously. They are: camera trapping to confirm that the animals visit the flowers, sampling pollen from the bodies of the animals to show they do pick up pollen and can in principle transfer and deposit it on the stigma of another plant, and selective pollinator exclusion which allows to test whether denying access to flowers (by means of cages, fences and/or fruit nets) of a particular pollinator reduces the number of fertile seeds the plants produce (compared to a control). Seemingly simple, all three of these methods are riddled with challenges and can be very labour intensive. Working in the rain and strong winds certainly didn't help with recording data (really need to get that waterproof paper next time!), while breaking laterite with a crowbar to bury the 50 cm deep buckets used for pitfall trapping of small mammals is just as hard as it sounds.

It was a very busy month of field work, but the cameras recorded lots of animals visiting dryandra flowers. I collected pollen samples from nine honey possums and set up the pollinator exclusion experiments on four dryandras with more or less cryptic flowers: *Dryandra catoglypta, D. speciosa* (syn. *Banksia splendida)* subsp. *macrocarpa*, *D. shuttleworthiana* and the unusual *D. subulata,* which grows a little further east in Alexander Morrison National Park. I was keen to also to include *D. stenoprion* in the study – a true geoflorous species with underground stems and inflorescences presented right at the ground level. However, this was only just beginning to flower at the time, while other geoflorous species such as *D. bipinnatifida* flower much later in the year (I will try to get to them next year). But I did also include *D. sessilis* var. *flabellifolia* for comparison. This species is an upright shrub with relatively small but numerous and very conspicuous flowers.

Honey possums are tiny marsupial endemic to southwest WA. They are known to visit the flowers of many species of Proteaceae and Myrtaceae. Uniquely among non-flying mammals, they are specialised on feeding on pollen and nectar.

While sampling pollen from the tiny but very fast honey possums was not easy, excluding pollinators from flowers was the most difficult aspect of my work. Particularly challenging was working with *D. sessilis* because of the needle-sharp spines on its leaves. I will need to wait until the end of summer for the results of this experiment (I need to collect mature fruit from the experimental plants to compare seed set between different pollination treatments).

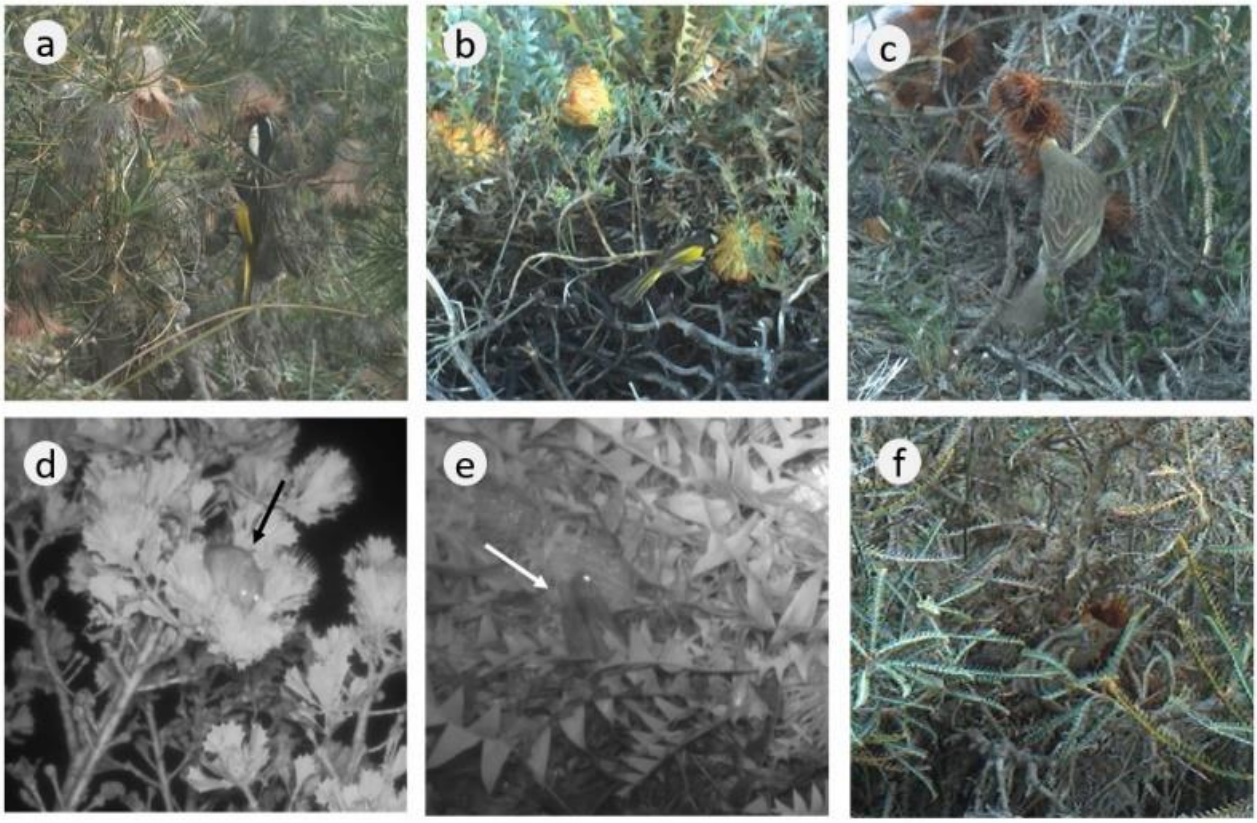
Nevertheless, I can already share some preliminary results from the camera trapping and pollen sampling.

Not unexpectedly, the honeyeaters (particularly White-cheeked, but also Tawny-crowned) were common visitors to all species I set the cameras on (which also included *Dryandra stricta, D. nobilis* var. *fragrans,D. kippistiana* var. *kippistiana* and *Banksia sphaerocarpa*). They fed very frequently on *D. catoglypta*, *D. shuttleworthiana* and were common on other dryandras but rarely visited either of the two small-flowered species *D. sessilis* and *D. kippistiana*. The 10 second video clips recorded by the cameras allowed me to glimpse the birds' foraging strategies. Because of their small size they are able to perch on the leaves but when available will use nearby branches and can easily feed hanging upside down. Their visits to flowers were mostly brief but at times they'd spend a minute or so foraging on nectar hopping gracefully between inflorescencences.

Large, bee-like wasps *Phalerimeris carinifrons* and Old Lady moths visited *D. sessilis* but were not observed on other dryandras. Feral honeybees, however, were commonly seen also on *D.catoglypta* and (less frequently) on *D. speciosa*. They foraged for both nectar and pollen and, in contrast to the birds, stayed for long time on the plants. I followed several honeybees for as long as seven minutes, moving between nearby inflorescences and collecting large amounts of pollen.

The cameras also recorded numerous visits by honey possums, particularly to *D. catoglypta* and *D. shuttleworthiana* but also to *D. speciosa* and *D. sessilis*. There were a few mice as well, visiting inflorescences of *D. catoglypta*, *D. shuttleworthiana* and *Banksia sphaerocarpa*.

Interestingly, *D. shuttleworthiana* appeared to also attract dunnarts. The cameras recorded 38 visits to four different plants of either White-tailed or Fat-tailed Dunnarts (or both, it was not possible to differentiate between these two species from photographs). Although there are reports in the literature of small dasyurids including dunnarts carrying pollen of Proteaceae and Myrtaceae, to my knowledge neither of these two species have hitherto been known to feed on nectar or pollen.



A selection of footage of floral visitors captured by the remote cameras: a, b) White-cheeked Honeyeaters on *D. speciosa* and *D. catoglypta* (resp.), c) Tawny-crowned Honeyeater on *D. shuttleworthiana*, d, e, f) Honey possums on *D. sessilis*, *D. catoglypta* and *D. shuttleworthiana* (resp.)

Dryandra species I'm studying: a) *Dryandra catoglypta,* b) *D. sessilis* var. *flabelliflolia,* c) *D.shuttleworthiana,* d) *D.subulata,* e) *D.speciosa,* f) *D. stenoprion* (which I missed flowering this year).

The flowers of *D. shuttleworthiana* have a prominent and unusual musty scent which may make them particularly attractive to mammals. I collected samples of the floral scent of this species and of *D. catoglypta*, which also has intriguing scent, and will attempt to identify the chemical compounds that may be particularly important in advertising floral resources to mammal pollinators.

When compared with a pollen 'library' (collected directly from plants flowering at the site) the pollen sampled from the honey possums' fur was beyond doubt of dryandra. I could identify *D. catoglypta*, *D. sessilis* and *D. speciosa* with good confidence based on the size and shape of the grains. Other species were more difficult to distinguish. Still, I've seen plenty of pollen grains in my samples that matched the size and shape of *D. shuttleworthiana* and *D. sessilis* and a few that could possibly be other species that were just beginning to flower at the time: *D. stenoprion*, *D. nobilis* or *D. stricta*. The five cameras I set up on *D. subulata*, recorded one mouse possibly visiting and feeding on the flowers and a few more passing them by, but no birds (even though the honeyeaters were present at the sites). I did not trap mammals at Alexander Morrison NP where this species occurs.

In conclusion, my preliminary results support the hypothesis that honey possums contribute to pollination of the four dryandras studied at Hi Vallee. I am not yet able to say how important they are as pollinators of these species. The results of the pollinator exclusion experiment will allow to test this hypothesis. However, it seems improbable that the degree of floral crypsis displayed by *D. catoglypta*, *D. speciosa* and *D. shuttleworthiana* affects rates of visitation by the honeyeaters.

Stan Wawrzyczek 20/9/21

Stan Wawrzyczek is a PhD student at La Trobe University, working in collaboration at Kings Park and Botanic Gardens and University of Western Australia. His research project 'The evolution of mammal pollination in the southwest biodiversity hotspot' is partially funded by the Holsworth Wildlife Research Endowment administered by the Ecological Society of Australia. The field work was conducted on traditional lands of the Yued Noongars. Collection of flora (including threatened species) and pitfall trapping of small mammals was approved by the Department of Biodiversity Conservation and Attractions and Animal Ethics Committee of La Trobe University. Stan would like to thank his hosts at Hi Vallee Farm, Don and Joy Williams for their boundless hospitality. Contact: s.wawrzyczek@latrobe.edu.au

Tim Darrington's 'caveau' greenhouse

Tim is our member who lives in France and has been very successfully growing dryandras and other Australian plants for several years. I have been very pleased to receive his reports and photos of his dryandra growing for a number of years. In his articles, he often mentions his "caveau" greenhouse and I recently asked him for an explanation of what it is. Tim replied with some photos.

Here is Tim's description from his recent email:

It is nothing exceptional, except a low greenhouse cut into the hillside. When the poly-carbonate roof is on (in winter), there is about 90 cm of headroom, so I have to crawl in! It's about 4.5 m long by about 2.3 m wide. It's called 'caveau' to distinguish it from other greenhouses in the garden and because of its resemblance to a family burial vault. (This is what the word means in French).

The 'caveau' greenhouse looking north.

The 'caveau' greenhouse looking east.

Grafting dryandras

Growing dryandras on their own roots in our garden on the South Coast of NSW is a huge challenge. Our high annual rainfall of 1,300 mm falls predominantly in the warmer months, in contrast to the Mediterranean winter-wet climate of dryandras in their homeland, WA. This makes growing most dryandra species here, impossible unless they are grafted. Our experience is that most succumb quickly after heavy summer rainfall. *D. nivea* is one of the few exceptions. We have ungrafted *D. nivea* plants growing and flowering beautifully, with one now seven years old. They have been placed in sloping beds to help with drainage.

Grafting Australian plants is very much in its infancy, with only a handful of grafted grevilleas and eremophilas found in nurseries. The aim of grafting is to attach a piece of the plant you wish to produce in grafted form (this is called the scion), onto the top of a compatible rootstock to produce a plant with characteristics of the scion (or top) as well as the root characteristics of the rootstock. The scion and rootstock fuse, effectively becoming a single, new plant. This is how all fruit trees and roses are propagated to ensure that the best forms can be planted almost anywhere. The best rootsock is resistant to root rot and will tolerate a wide variety of soil conditions.

I began grafting dryandras around 15 years ago while living in Canberra, after achieving some success grafting WA banksias. These grafting experiments with dryandras have continued while establishing our South Coast garden. No dryandra is considered tough enough in eastern Australian summer-wet conditions to trial as a rootstock. I therefore chose *Banksia integrifolia* as the stock for dryandras due to its proven compatibility with many dryandra species.

To date, I have now grafted 17 dryandra taxa, with 13 of these having grown to flowering:
D. carlinoides, D. cirsioides, D. comosa, D. conferta (Corrigin Blue), *D. cuneata, D. foliolata, D. fraseri* var. *fraseri, D. longifolia* subsp. a*rcheos, D. nobilis* subsp. *nobilis, D. obtusa, D. polycephala, D. praemorsa* var. *praemorsa* and *D. tenuifolia* var. *reptans.*

The oldest dryanda graft I have done that's still existing grows in Peter and Margaret Olde's garden, “Silky Oaks” in Oakdale on the outskirts of Sydney. It is *D. longifolia* subsp. *longifolia* and is now 15 years old. All the other grafts are growing in our own garden and range between five and ten years of age. All have been grafted using the traditional method of grafting a cutting of scion material onto a seedling of *Banksia integrifolia.*

I continue to experiment with nursery conditions and grafting techniques. Success rates of well under 50% are common and these rates need to be lifted to convince commercial grafters to graft banksias and dryandras. At present, no commercial grafts of dryandras or banksias are produced.

D. comosa grafted plant. Phil Trickett

D. longifolia subsp. *longifolia* at Silky Oaks

One technique that I have been trialling over the last year, is cotyledon grafting with banksias and dryandras and it is resulting in some great results, with 90% plus success rates. Here are some details of this method and results to date.
Cotyledon grafting:

Cotyledon grafts are proving to be the solution for banksia species that previously I have been unable to graft (such as *B. speciosa*). Initial trials of this technique with dryandras also look very promising, particularly with mounding species such as *D. drummondi*, *D. octotriginta* and *D. nervosa.* These species are difficult to graft using traditional methods because mature plants do not tend to have suitable grafting material on them.

The cotyledon grafting method involves grafting the scion at a very early stage of its development, when the true leaves have just started to emerge, onto a seedling rootstock of *Banksia integrifolia.* These grafts involve the entire scion seedling rather than just a cutting from a more mature seedling or plant as per the method I usually use. Here, I sacrifice the scion seedling by cutting it off at 1 – 1.5 cm below the cotyledon leaves. I use a top-wedge graft where two opposite cuts are made on the scion stem producing a wedge-shape. This scion is then inserted into a slit made in the stock plant, just below a leaf bud (this keeps the sap flowing to the leaf bud of the stock plant while the graft knits). A small snaplock bag is then placed over the scion for around 21 days in a protected, shady spot – a glasshouse is good.

Once the bag is removed, some protection from the wind and heat is required for the next month or so, until the graft fully establishes. Here is a photo of a young graft of *D. nervosa.* This was grafted in mid-August, 2021. It continues to put on excellent growth but the most positive aspect of this method is that next to no growing-on losses are occurring. If this success could be translated into a commercial operation, there is no reason why we couldn't start to see grafted dryandras appearing in our nurseries.

Phil Trickett 20/10/21

D. nervosa graft.

D. longifolia subsp. *longifolia* Margaret

D. fraseri var. *fraseri* grafted plant. Phil Trickett

Return to Bowelling

On 26th June, last year I made a return trip to the Bowelling area. Kevin Collins drove me up to a spot north of Bowelling where we met up with Lyn Alcock and Alex George for the day's exploring.

From our meeting place, we drove through the Jarrah forest to a spot where we left the vehicles to walk into the forest to look for *Dryandra* sp. Collie. We had detailed instructions from Grant Eikelboom as to its location and he had attached some pink ribbon to several trees on the way as well as to a small tree at the location of the plants.

Lyn had the co-ordinates for the plants but unfortunately she couldn't get a signal on her GPS. We followed Grant's instructions as to how far we had to walk and in what direction as best we could and when we decided we had gone too far, we circled back higher up on the slope and eventually I spotted a plant and then we found several more and then, the tree with the pink ribbon and many more plants.

Grant had sent photos of a plant in bud in March and again in June when he found flower heads (inflorescences) with the flowers close to opening. We were sure that we would find at least some flowers fully open but they weren't much further out.

We noted at the time that the inflorescences were quite large possibly the biggest “shaving brush” type in the series Aphragma. The leaves are wider than any of the others with lobes 65 mm long.

D. sp. Collie Margaret

D. sp. Collie Margaret

As this taxon is yet another with the underground branching habit, it is not possible to know exactly how many plants there are in the population. (As far as we knew it hadn't been found anywhere else but since our visit, Grant has found another small population on the outskirts of the town of Collie, itself).

By the time we got back to the cars, it was lunch time and we still had to visit the *D. subpinnatifida* var. *imberbis* populations closer to Bowelling.

First, we went to the small population with the 'perfect' plant featured in the last newsletter. The plant was crowded with inflorescences packed so tightly, at the base of the leaves that most of them were squashed out of shape and were very difficult to photograph.

On the way to the large population of *D. subpinnatifida* var. *imberbis*, we drove through the area of Jarrah forest that had been burnt, since our last visit. Grant had advised Kevin that there was a large tree across the track so he had taken his chain saw – just in case. It turned out that there were a few trees that Kevin, helped by Alex, had to saw through and remove from the track and we went off- track to circle round the large tree. By the time we got to the hillside clearing in the Wandoo woodland where the large population is, it was quite late and we were photographing the flowers, plants and burnt seed heads until sunset - having to drive the 200 or so km back to Mount Barker in the dark.

Grant had given instructions to the fire crew to not burn the plants in this large population except for a few around the perimeter. It is interesting to see that the hillside is covered with this dryandra and very few other genera.
The plants at this location are mostly all almost 'pure' but there are a few that are 'half and half'.
Importantly, there are no plants of *D. squarrosa*, with which it hybridizes, in the vicinity.

The almost 'pure' plants were more open - not a compact mound shape and their flowers were easier to photograph. Quite a few of the inflorescences had 'back-to-front' flowers where the styles curve inwards rather than outwards. I have noticed this curious phenomenon in other dryandras, notably *D. armata* and *D. purdieana*. The inflorescences in bud are particularly attractive. The emerald green limbs and ruby red bracts with their longs awns are really beautiful. The green limbs turn yellow and sprout white hairs as the flowers open as do those of several other dryandras.

The burnt plants are attractive, too, with the seed heads showing their opened follicles so that they looked like black plants with pale brown woody flowers.

I didn't manage to get back to see *D.* sp. Collie with open flowers but Lyn did and she found that some flowers were open and more were still in bud. She described the inflorescences as magnificent. The pale rust coloured one that we had photographed previously was like a “golden, glowing ball.” She did report, however that they had a foul scent, more like a dead animal (or *D. epimicta*), than the onion or garlic scent of several other related species. The flowers are probably as large or larger than any others in the series Aphragma and there are as many, or more flowers in the inflorescence. She found a plant with flowers of a different colouring. The perianth is pink, the styles that were slightly curved are cream and the limb yellow. To me, it looks like a 'missing link' between *D. pteridifolia* subsp. *pteridifolia* and (say) subsp. *vernalis*.
Surprisingly, the style (pistil), though curved is not longer, but the same length as the perianth.

Margaret Pieroni 4/10/2

Margaret photographing plants Lyn

Flowers on an almost 'pure' plant Kevin

'Back-to-front' flowers Margaret

A burnt plant Margaret

Dryandras in series 14 Aphragma (R. Br.) A.S. George (1996)

The series name is derived from the Greek *a* (without) and *phragma* (a screen or barrier). A reference to the fact that Robert Brown described species in this section as not having a separator in the seed follicles. This is possibly a misinterpretation, perhaps based on poor fruiting material, as these species do, in fact have separators.

The type species is *nervosa* R.Br.

Distinguishing characters are:
Leaves on a petiole, large, lamina pinnatifid, pinnatipartite or pinnatisect; margins flat or revolute. **Inflorescence** terminal or on short, lateral branchlet, usually subtended by long leaves. **Involucral bracts** shorter than flowers and densely hairy. **Receptacle** ± flat. **Perianth** straight with long limb. **Pistil** curved, shorter, or in two species, longer than perianth; pollen presenter elongated, narrow, ribbed. **Flowers** soon falling. **Follicles** rather large, obovate or orbicular, rather loosely attached, usually remaining closed until burnt. **Seeds** enclosed within papery separator with wing loosely attached, along the top of the seed, notched or entire.

The above text supplied by Alex George is reprinted from The Dryandras (*Cavanagh and Pieroni 2006*). While studying these taxa, Keith Alcock, then Study Group leader described the inflorescences as Type A: the 'shaving brush' type where the style is shorter than the perianth and Type B: Where the style elongates. The illustration of type B is of *D. quercifolia* which, of course is not in this group but serves to illustrate an example of the type. Type A is *D. nervosa.*

A History.

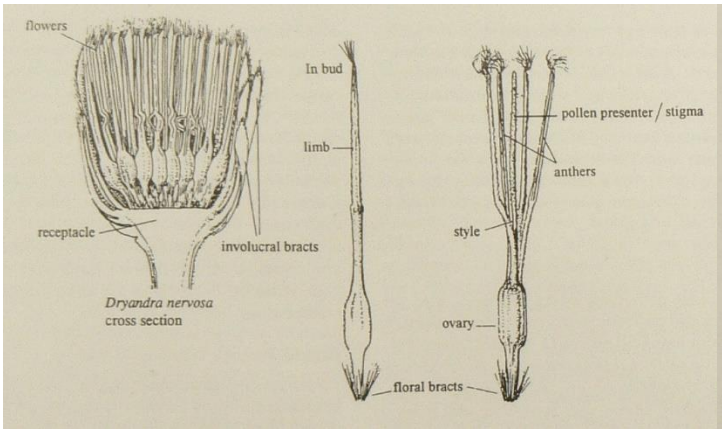
In 1974, Tony Cavanagh, the first Study Group leader published in Newsletter 2, the illustrated key to *Dryandra* from *How to know Western Australian Wildflowers.* (Blackall and Grieve 1954).

The key contained only 50 taxa, including just one in this group – *D. pteridifolia,* which was actually *D. nervosa.*

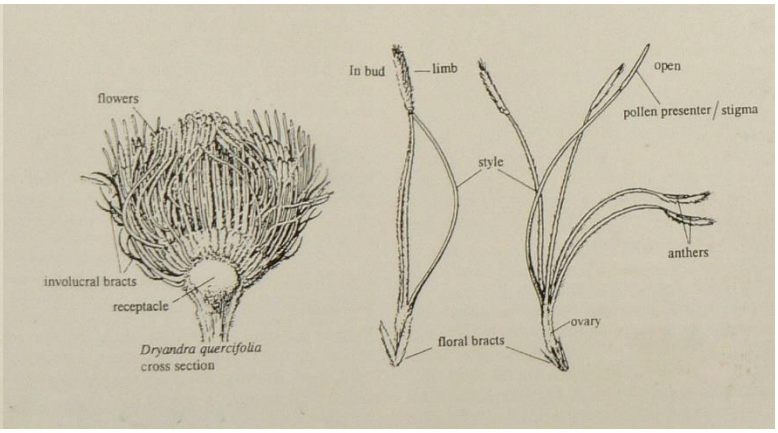
In *Flowers and Plants of Western Australia* (*Erickson, George, Marchant, Morcombe 1973*), my guide to the flora on my first visit to WA in 1973, *D. blechnifolia* is pictured as *D. pteridifolia.*

In 1979, Alf Salkin reported in the newsletter that National Herbarium of Victoria had some 30 species of *Dryandra* with just the one in series Aphragma – *D. pteridifolia.*

In 1984, Keith Alcock, the then leader published in newsletter no.12, descriptions and photocopied leaf prints of the 5 known but undescribed 'pteridifolia' forms. I have added the correct names in brackets. They were:
1. The upright, mounded form, (*D. nervosa*).
2. The spirally twisted, revolute leaf form, (*D. pteridifolia* subsp. *pteridifolia*).
3. The Stirling Range, prostrate form (*D. blechnifolia*).
4. The upright, Southern Cross – Hyden form, (*D. shanklandiorum*).
5. The prostrate, ground- covering form, (*D. porrecta*).



Type A



Type B

Since then, intensive collecting by Alex George, Keith, myself and others including Study Group members, led to the publication by Alex of *Dryandra* in *Flora of Australia* vol. 17B. It contained 11 taxa in Series 14 Aphragma.

D. pteridifolia subsp. *inretita* was described by Alex, later.

The number of dryandras then grew to 15 or 16 recognised today. The eastern and western forms of *D. porrecta* might be split into two taxa.

In *The Dryandras we* published all of the known taxa as well as sp. Boyup Brook and sp. Jingaring.

Sp. Collie was discovered more recently and *D.* aff. *fililoba* is conjecture on the part of Kevin Collins and myself. The plants discovered by Lyn Alcock in the Stirling Range National Park may well be another. To me it looks as though *D. nervosa* has evolved into a prostrate plant with underground stems.

Colour combinations in series 14 Aphragma.

The first colour is of the perianth and the second, the colour of the hairs on the limb.

A. Cream suffused with pale or deep pink/rust.
B. Cream suffused with pink/ cream
C. Golden yellow/rust.
D. Brown shades/white.
E. Dull, deep pink/ white.
F. Golden yellow/ copper.
G. Cream/ golden yellow.
H. Pale yellow/copper.
I. Cream suffused with pink/cream.
J. Pale yellow/cream.
K. Cream suffused with pink/yellow.
L. Cream/pale yellow.
M. Pale yellow/rust.
N. Pink/pale rust.
O. Pale yellow/golden yellow.
P. Pink/yellow.
Q. Pale yellow/ cream and rust (mixed)
R. Deep pink/copper
S. Orange-pink/rust
T. Orange-pink/pale rust
U. Cream/pale rust
V. Deep pink/pale yellow
W. Pale pink/copper

While browsing through Tony's collection of dryandra images I came across this gloriously coloured *D. shanklandiorum* taken by Lloyd Carman many years ago. Who knows whether this plant still exists somewhere, today?

The *D. pteridifolia* subsp. *pteridifolia* we hope to find in flower - this year. Photo Francis Nge

1. *D. aurantia*
Location: East of Mundaring Weir. **Prostrate** plant with underground stems. **Flowers** in autumn. **Inflorescence** has c. 80 flowers per head. **Limb** is 8 - 10 mm. **Perianth** is 34 – 37 mm. **Pistil** is 33 – 36 mm. **Pollen presenter** is 5 - 8 mm. **Colours** are C, T, U.

There are two separate populations of this species which grows in deep, white sand in low heath in the Wandoo Nature Reserve, north east of Perth. The northernmost population was discovered after the naming of the species, (aurantia meaning orange) It has flowers that are cream rather than orange-pink. The leaves are blue-grey and the flowers have an onion-like scent.

2. *D. blechnifolia*
Location: Stirling Range and towards Ongerup. **Prostrate** plant with underground stems. **Flowers** in spring. **Inflorescence** has c. 65 flowers per head. **Limb** is 11 – 13 mm. **Perianth** is 40 – 47 mm. **Pistil** is 39 – 45 mm. **Pollen presenter** is 8 – 11 mm. **Colours** are B, L.

This was known as *D. pteridifolia* in the past. It occurs in the Stirling Range National Park and to the east of there. The leaves are green.

3. *D. calophylla*
Location: Tenterden area south to Albany and east to Wellstead. **Prostrate** plant with underground stems. **Flowers** in late spring. **Inflorescence** has 30 – 45 flowers per head. **Limb** is 15 mm. **Perianth** is 40 – 41 mm. **Pistil** is 38 – 39 mm. **Pollen presenter** is 11 – 12 mm. **Colours** are C, D, E, J, M.

This species grows in sand in open woodland. It is distinguished by its small flowers in several colour combinations and the leaves with broad lobes, similar to *D. drummondii*. They are dark green above and white below.

4. *D. fililoba*
Location: Woodanilling to Lake Grace and north to Harrismith. **Shrub** to 1m. **Flowers** in winter. **Inflorescence** has 55 – 80 flowers per head. **Limb** is 15 – 18 mm. **Perianth** is c. 50 mm. **Pistil** is c. 50 mm. **Pollen presenter** is 14 mm. **Colours** are J, M.

This is one of the three (or four) that have a shrub form. It is distinguished by the many small leaves with thread-like lobes which surround the inflorescences.

5. *D.* aff. *fililoba*
Location: South and east of Woodanilling. **Shrub** to 800cm. **Flowers** in late summer and autumn. **Inflorescence** has c. 55 flowers per. head. **Limb** is 15 – 17 mm. **Perianth** is 45 mm. **Pistil** is 45 mm. **Pollen presenter** is 12 mm. **Colours** are I, J, M.

Kevin Collins has several plants of this, growing at the Banksia Farm at Mount Barker (WA). The plants in the southern part of the range of *D. fililoba*, that is around Woodanilling, appear to be the same or similar. It differs from typical *D. fililoba* in that the plants and the flower parts are smaller and it flowers much earlier. More field work is required for this one.

6. *D. lepidorhiza*
Location: West of Woodanilling and towards Katanning. **Prostrate** plant with underground stems. **Flowers** in late spring. **Inflorescence** has 25 – 30 flowers per head. **Limb** is 10 mm. **Perianth** is 32 – 34 mm. **Pistil** is 31 – 33 mm. **Pollen presenter** is 6 mm. **Colours** are E.

There are a few small populations and single isolated plants of this species occurring to the west of Woodanilling. The flower colour seems to be consistent. It is distinguished by the long flowering stems with crowded bracts (prophylls).

7. *D. nervosa*
Location: Stirling Range to Manypeaks, east to Ongerup and Boxwood hill with outliers at Lort River and Cape Arid. **Shrub** to 1 m. **Flowers** in autumn and winter. **Inflorescence** has 70 – 90 flowers per head. **Limb** is 13 – 15 mm. **Perianth** is 35 -40 mm. **Pistil** is 34 – 39 mm. **Pollen presenter** is 15 -20 mm. **Colours** are M, O.

This occurs in widespread locations - in the Stirling Ranges and east to Boxwood Hill and at the Lort River and Cape Arid National Park. (*D. pteridifolia* subsp. *pteridifolia* occurs between these locations)
The flowers are mostly hidden in the tangled leaves of this shrub. The leaves are green with attractive new growth of orange – pink or purplish pink. Flowers have an onion-like scent.

8, 9. *D. porrecta*
Location: Woodanilling to south of Mount Barker (western). South east of Nyabing to south of Lake King (eastern). **Prostrate** plant with underground stems. **Flowers** in spring. Inflorescence has 20 – 30 flowers per head. **Limb** is 9 -10 mm. **Perianth** is 37 – 40 mm. **Pistil** is 37 – 40 mm. **Pollen presenter** is 5 – 6 mm. **Colours** are K, L, O, P.

There are two forms of this species which may be recognised as separate taxa – the western and eastern. In both forms, the flowers are produced under the ground.

10. *D. pteridifolia* subsp. *pteridifola*
Location: From Gairdner River to Cape le Grand National Park and inland to Newdegate. **Prostrate** plant with underground stems. **Flowers** in autumn. **Inflorescence** has c.100 flowers per head. **Limb** is 9 mm. **Perianth** is 39 mm. **Pistil** is 53 mm. **Pollen presenter** is 4 – 5 mm. **Colours** are A, B, L, Q, R, V, W.

This is the first collected and named species in the group. It occurs near the coast in Cape le Grand National Park and north of and in the eastern Fitzgerald River National Park. The flowers have curved styles that elongate. They come in a range of colours. The leaves are bluish grey and spirally twisted.

11. *D. pteridifolia* subsp. *inretita*
Location: Between Lake Grace and Lake King. **Prostrate** plant with underground stems. **Flowers** in late winter. **Inflorescence** has 70 – 90 flowers per head. **Limb** is 12 mm. **Perianth** is c. 40mm. **Pistil** is c. 40 mm. **Pollen presenter** is 8mm. **Colours** are J.

Not all of the plants at the type location of this plant are completely prostrate. This might need further investigation as it is similar to *D. fililoba* with the numerous small leaves with filiform lobes which surround the inflorescences. The flowers smell like onions and honey.

I have seen a photo of this species showing that the pollen presenters on spent flowers have turned bright red.

12. *D. pteridifolia* subsp. *vernalis*
Location: Between Moore river and Eneabba and near Perth. **Flowers** in spring. **Inflorescence** has c. 100 flowers in the head. **Limb** is 12 mm. **Perianth** is c.40 mm. **Pistil** is c.40 mm. **Pollen presenter** is 8 mm. **Colours** are G, O.

This taxon occurs in heath between the Moore River and Eneabba and has been found just east of Perth. The style is slightly longer than the perianth but is not strongly curved. The leaves are dark green.

13. *D. shanklandiorum*
Location: Between Cadoux and Hyden. **Shrub** to 1.5 m. **Flowers** in late winter. **Inflorescence** has 100 – 130 flowers per head. **Limb** is 9 – 10 mm. **Perianth** is 48 -58 mm. **Pistil** is 58 – 74 mm. **Pollen presenter** is 4.5 – 5 mm. **Colours** are A, B, F, G, H, M, Q, R, W.

This is a fairly large, densely bushy shrub which grows in deep sand over laterite between Cadoux and north of Hyden. The flowers are similar to those of *D. pteridifolia* subsp. *pteridifolia* and come in various different colour forms. The leaves are green with long petioles and oblique lobes.

14. *D.* sp. Boyup Brook
Location: North of Boyup Brook. **Prostrate** plant with underground stems. **Flowers** in late autumn to early winter. **Inflorescence** has 40 – 45 flowers per head. **Limb** is 12mm. **Perianth** is 40 mm. **Pistil** is 36 mm. **Pollen presenter** is 8 mm. **Colours** are M, O.

This is known from only two small populations. There could be fewer than 10 plants in existence. The flowers are similar to those of *D. aurantia* while the leaves resemble those of *D. porrecta* (western form). It differs from the latter with its larger flowers of different colouring and earlier flowering time. Unlike *D. porrecta*, the flowers appear above ground.

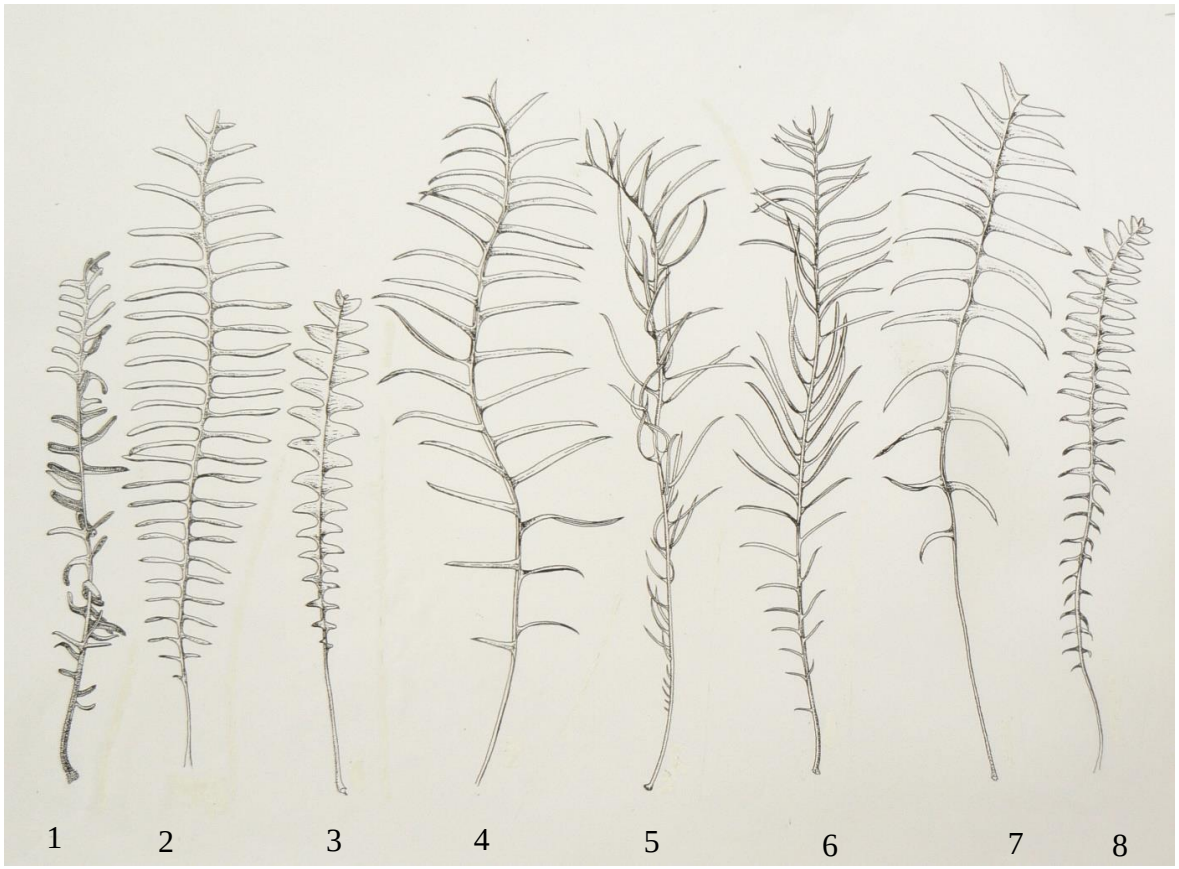
15. *D.* sp. Collie
Location: Collie and north of Bowelling. **Prostrate** plant with underground stems. **Flowers** in late spring. **Inflorescence** has c, 130 flowers per head. **Limb** is 11 mm. **Perianth** is 55 mm. **Pistil** is 55mm. **Pollen presenter** is 10 mm. **Colours** are C, G, S, T, U.

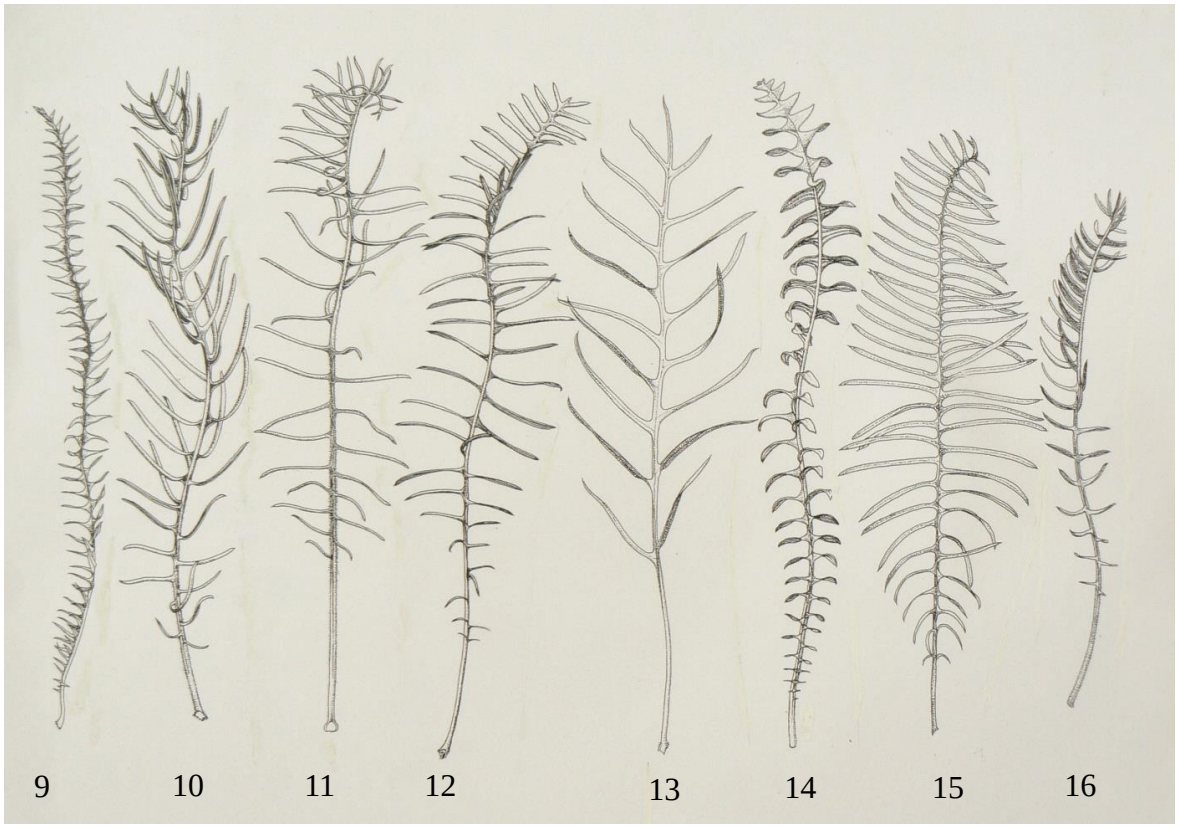
Recently discovered and so far, un-named, this taxon is distinguished by its large inflorescences with flowers that differ in their colouring within the population and the wide leaves that have lobes that are long in the middle and taper fairly abruptly towards both ends. The flowers have an offensive, dead-animal scent.

16. *D.* sp. Jingaring
Location: East of Brookton. **Prostrate** plant with underground stems. **Flowers** in autumn. **Inflorescence** has 60 – 70 flowers per head. **Limb** is 10mm. **Perianth** is 45 mm. **Pistil** is 45 mm. **Pollen presenter** is 8 mm. **Colours** are C, M, J, U.

As far as is known, this taxon is confined to a reserve near Brookton. The flowers are similar but larger than those of *D. aurantia* and the colours vary between plants. The leaves are green or (very occasionally), bluish grey.
(See newsletter no. 81 for more information).

Seedlings of *D.* sp Collie show the distinctive leaf shape at an early stage.





1 *D. aurantia* **2** *D. blechnifolia* **3** *D. calophylla* **4** *D. fililoba* **5** *D.* aff. *fililoba* **6** *D. lepidorhiza* **7** *D. nervosa*
8 *D. porrecta* (western) **9** *D. porrecta* (eastern) **10** *D. pteridifolia* subsp. *pteridifolia* **11** *D. pteridifolia* subsp. *inretita*
12 *D. pteridifolia* subsp. *vernalis* **13** *D. shanklandiorum* **14** *D.* sp. Boyup Brook **15** *D.* sp. Collie **16** *D.* sp. Jingaring