

DRYANDRA STUDY GROUP
NEWSLETTER NO. 53



Dryandra drummondii subsp. *macrorufa*

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Dryandra drummondii subsp. *macrorufa*. With leaves almost a metre long, this dryandra forms an impressive mounded plant. The flowers, with red styles, clustered at the base of the leaves are largely hidden. It flowers in January – later than subsp. *drummondii* which has much shorter leaves.

DRYANDRA STUDY GROUP

LEADER

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

NEWSLETTER EDITOR

Mr. Tony Cavanagh
16 Woodlands Drive
OCEAN GROVE
VIC. 3226
Email: tony.cav@bigpond.net.au
Phone: (03) 5255 1180

Welcome to everyone for our second newsletter of 2007.

Well in the last newsletter, the big news was the publication of *The Dryandras* and its launch. Now I have to report that a paper published in February this year has upset the applecart somewhat by proposing that far from being a separate genus, *Dryandra* is actually a part of *Banksia*, and most taxa of *Dryandra* have now been given *Banksia* names. At least it ensures that our book is unique in that it is highly unlikely that there will be another one on a genus that people are trying to get rid of! There are several articles in this Newsletter, by Alex George, Kevin Collins and myself all discussing the issue and pointing out some of the many shortcomings we see in the proposal. Needless to say, as a Group, we are not accepting it and will continue to call Dryandras *Dryandra*. We are not being ostrich-like in this, rather we believe that much more work needs to be done to verify the claims and we will wait until there is universal acceptance by the botanical world before we go down the path of transferring *Dryandra* into *Banksia*.

As I indicated in my article, I have great difficulty in understanding the new taxonomy and for that reason I believe that it would be valuable if there was a lot more dialogue between proponents of these changes and the people who are affected by their work, namely nurserymen, horticulturalists and interested amateur growers. I have a scientific background and am fully aware that when scientists write for professional audiences, they expect a certain level of basic knowledge on the part of the audience so it won't be easy. Yet while I have published articles and book chapters on "Germination of *Acacia*" and "Seed Dormancy", I have to say that I have little empathy with the new procedures. I find the language often dense and impenetrable with its own jargon terminology, and I suspect that I am not alone. These are a couple of sentences from one of the papers – "These eight species formed a clade with strong support in the cpDNA and ITS analyses (100% and 98% bootstrap frequencies, respectively). In the *waxy* analysis, the eight species formed two clades in a polytomy with six species of *Banksia*...". This may well be perfectly clear to another scientist working in the area but because I do not understand some of the terms (and can't find their meaning I readily-accessible dictionaries), the information may as well have been presented in Russian. I am very happy to provide space in this Newsletter should anyone wish to prepare an overview in layman's terms of the "new" taxonomy and is prepared to explain its importance and why results obtained from "a few leaves" (which is what I understand is all that is required for DNA analyses) are potentially sufficient to overturn "classical" results obtained from examination of hundreds or even thousands of specimens.

On a happier note, Margaret has reported on the endangered *D. subpinatifida* var *imberbis* with some magnificent photos taken at Kevin and Kathy Collins' Banksia Farm (thanks again to David Lightfoot for producing the colour pages). Kevin also updates us on his successes (and failures) and some results from striking Dryandras from root and stem cuttings. Even in his seemingly near ideal conditions, some Dryandras are proving very difficult to keep alive. Margaret and Elizabeth George spent a few days at that other wonderful *Dryandra* haven, Don and Joy Williams' property Hi-Vallee where they report on the Dryandras and also on the success of animal trapping projects in different habitats on the property. Don and Joy have set aside some 350 ha of remnant vegetation which will be managed in partnership with the Department of Environment and Conservation, a wonderfully generous gesture on their part. Congratulations from the Dryandra Study Group. Lastly, I include a few more book reviews of *The Dryandras*, all very favourable so we hope that it leads to more people buying the book and learning about our fascinating group of plants.

Happy DRYANDRA growing.

Tony

So *Dryandra* becomes *Banksia* – what’s all the fuss about?

In February this year, Austin Mast and Kevin Thiele published a foreshadowed paper entitled “The transfer of *Dryandra* R.Br. to *Banksia* L.f. (Proteaceae)”. Austin Mast is an American botanist/biologist based in Florida USA and Kevin Thiele was recently appointed as the Head of the Western Australian Herbarium. What they both have in common is a strong interest in what I might call the “new systematics” or the use of complex DNA analyses and cladistics to try to classify plants. Both have published several papers in this area relating to *Banksia* (indeed both their PhDs examined this genus) while Mast has extended his interest to the *Banksia/Dryandra* relationship and has found what he believes is compelling evidence that not only are they closely related but that his data shows that “*Dryandra* [is placed] among the descendents of the most recent common ancestor of the more widespread Australian genus *Banksia*” (Mast and Thiele, 2007)*. In other words, *Dryandra* is not a separate genus but forms one group at the rank of series within *Banksia*. Alex George discusses this in his article in the Newsletter and I have to agree that, given how diverse we know *Dryandra* species to be, it is indeed extraordinary that the Mast analysis concludes that **all** the dryandras are closer together (ie more similar to each other) than some *Banksia* species are to each other.

I used the term “cladistics” above and include a definition from the Internet site “The free dictionary by Farlex” to try to explain it. It also includes a shortened definition of “taxonomy”.

“**cladistics** (klədī's`tīks) or **phylogenetic systematics** (fī'lōjənēt'īk), an approach to the classification of living things in which organisms are defined and grouped by the possession of one or more shared characteristics (called characters) that are derived from a common ancestor and that were not present in any ancestral group (as envisioned by Charles Darwin's idea of "descent with modification"). Developed by Willi Hennig, a German entomologist, in the 1950s, it is a method of reconstructing evolutionary relationships that emphasizes the importance of descent and common ancestry rather than chronology.”

taxonomy, the study of the relationships of organisms, which includes collection, preservation, and study of specimens, and analysis of data provided by various groups of biological—.

It doesn't help a lot and herein lies one of the greatest difficulties of the new systematics – it involves techniques, procedures and practices which are largely inaccessible to and not easily understandable by the average person. Traditional descriptive morphological analysis at least had the advantage that almost any person could read and understand it, although these new techniques may well show that there are deficiencies with the old practices eg as I understand it, *Callistemon* no longer exists and has now been included as a group within *Melaleuca*. I do not know if this will stand scrutiny in the future and it could be argued that the same thing is now happening with *Dryandra* and *Banksia*. Time will tell. I just want to summarise the overall effect of the new proposals on *Banksia* and *Dryandra* as we now know them and perhaps speculate a little on a brave new world of Australian plants if other conceivable “combinations” of genera occur.

What changes are proposed

Mast and Thiele claim they have followed the least disruptive path in adopting new names and combinations. The need for changes arises of course because, for example, the same species name occurs in both “old” *Banksia* and “old” *Dryandra*, eg *baxteri*, *brownii*, *pulchella* etc, 18 in total. They have attempted to use new descriptive names which relate to the original diagnostic feature on which the former name was based. Thus the “old” *Dryandra pulchella* becomes *Banksia bella*, the “old” *D. glauca* becomes *B. glaucifolia* and “old” *D. longifolia* becomes *B. prolata* (from the Latin *prolatus*, “extended, elongate”, a reference to the long, narrow leaves). The changes for proper nouns (people’s names such as Brown and Baxter) are much more convoluted and I won't bore you with the details. However, some of the names proposed are seemingly fairly inappropriate, eg *Banksia helianthi* for the “old” *D. quercifolia* where the new name supposedly is derived from the Greek *helios* (sun) and *anthos* (a flower). Do you think that *D. quercifolia* looks like a sunflower? Likewise, *D. speciosa* become *B. splendida* (from the Latin *splendidus* (shining, brilliant). This is hardly appropriate for flower heads which are pendant and

surrounded by dull grey bracts, although of course the original epithet "speciosa" (showy) is not particularly accurate either.

The rest of the name changes are what are called "new combinations" and are used when the "old" *Dryandra* name is discrete. Thus *D. arborea* becomes *B. arborea*, *D. carlinoides* becomes *B. carlinoides* and so forth for around 108 taxa. The Mast-Thiele paper does not include the six new taxa published in Alex George's paper in December 2005, so these names remain "legitimately" (at least for the moment) as *Dryandra*.

Speculations on some effects of such changes

Some of the problems which face users (gardeners, Australian plants people, nurserymen and horticulturalists) with such wholesale name changes include confusion, frustration with yet more name changes to the extent that most people will say, "I don't care what they call it, to me it's *Dryandra x*", and concern as to whether these name changes will ever stop. It does nothing for popularising Australian plants and certainly absolutely nothing if we are trying to persuade people to use species names instead of common names and recognise them in gardens. To make matters worse, the botanists who are proposing these changes seemingly do little to try to explain to lay people why their work is important and why changes are necessary. Why are DNA work and molecular studies so important and why are they seemingly the final arbiters when taxonomic decisions are being taken?

At the next stage, the nursery and horticultural trade and in Herbaria throughout Australia, the problems are immensely compounded. Old labels will have to be scrapped and a whole lot of new ones produced, names on stock plants will have to be changed and a whole new education program for the public will be needed, eg that all those plants you knew as "bottlebrushes" are actually *Melaleucas*. In Herbaria, it will be a mammoth and costly task to correct Herbarium sheets. With the proposed *Dryandra* into *Banksia* merge, it may not be too much as there are probably only three Herbaria with substantial *Dryandra* collections. But if *Grevillea* is absorbed into *Hakea*, and *Isopogon* and *Petrophile* are merged, the task will be colossal as all these genera occur in most states. Does anyone really want this and does it really advance our knowledge of Australian plants? I would be delighted to be shown to be wrong but at the moment it appears that much of this molecular work is "science for science's sake" with little concern for practical considerations. Sure, we want things to be "right" but how far do we go in pushing the technology? I guess that my challenge to the "new" taxonomists is to EXPLAIN to us in layman's terms just what they are doing, why they are doing it and why molecular systematics is seemingly the only answer. Is there any place for the "old" techniques and if so, do they have any chance against this onslaught? I think that they also owe it to us to foreshadow other possible changes eg *Verticordia/Chameleucium/Homoranthus* and perhaps even more combinations within *Melaleuca* and its (current) allied genera. And lastly I think that it is high time that there was a lot more dialogue between the taxonomists and other professionals in the horticultural, nursery and Australian plants businesses. Wanting to find the truth is one thing, but "science for science's sake" and hang the practical consequences, is something else again.

Tony Cavanagh
OCEAN GROVE

* Indicates paper referenced in Alex George's article.

Banksia and *Dryandra* or just *Banksia*?

Alex George

'Four Gables', 18 Barclay Road, Kardinya, W.A. 6163

email a.george@murdoch.edu.au

In *Australian Systematic Botany* vol. 20 issue 1, Austin Mast and Kevin Thiele published their foreshadowed paper combining the genus *Dryandra* R.Br. with *Banksia* L.f., with most of the necessary new specific names and combinations. Users of plant names must now decide whether to accept the change or stay with two genera.

Unfortunately, to understand Mast and Thiele's paper it is necessary to refer to earlier papers, and even then it is difficult to find and interpret some data. The cladogram in this paper is not easy to interpret. For example, between the branch leading to subg. *Spathulatae* and the terminal group for ser. *Dryandra* are three branches that are not defined except as part of the umbrella subg. *Banksia*. The caption tells us that it was modified from Fig. 1b of Mast *et al.* (2005) but that figure is a photograph of *Dryandra ferruginea*. Probably they are referring to the lower cladogram in Fig. 2, but it shows only two branches, so we are left somewhat in the dark here.

The molecular analysis confirms what systematic botanists have done since Robert Brown published the genus *Dryandra*—place it at the end of the assumed evolutionary line within Australian Proteaceae (for the purpose of this argument I include Brown's *Hemiclidia* in *Dryandra*). Had Mast and Thiele included similar data for other currently-recognised genera in the family these would presumably have branched off lower down the cladogram—though maybe they would then combine them all into one genus. Hence it's a matter of where the human decision is made (based all characters) to recognise branches as genera.

The molecular analysis as presented shows that *Dryandra* is a monophyletic (in laymen's terms 'good') taxon or 'clade' that we could have at the rank of genus. It also shows a number of similar groupings within *Banksia s. str.* (true *Banksias*), the number variable according to the different kinds of DNA analysed. The question then is: what taxonomic rank should be given to these groupings, and how may they be distinguished? This is the major failing of Mast & Thiele's paper, since their assessment of morphological characters used to support their groupings lacks accuracy. First, the character used to distinguish their subg. *Spathulatae* does not hold up since a number of species in their subg. *Banksia* also have spathulate cotyledons, e.g. *Banksia benthamiana*, *B. repens* (George, 1981, p. 259, Figs 8.29, 8.36; Thiele, 1996, p. 689, Figs 16.14, 16.36). The characters 'flowers in condensed heads' and 'capitate inflorescence' used on the main axis are different ways of saying much the same thing so are meaningless. Another, 'involucre of conspicuous bracts', also applies to *Banksia* so (depending on the interpretation of 'conspicuous') is not relevant. There are other characters to do with the involucre bracts that are more useful. 'Beaked follicles' is certainly a character that differentiates subg. *Spathulatae* from other *Banksia s. str.* but not all taxa of *Dryandra* have beaked follicles.

The morphological characters used for *Banksia s. str.* are presumably those in Thiele (1996), but no similar analysis has been presented for *Dryandra s. str.* It may be for this reason that all taxa of *Dryandra* appear as a single group on the cladogram. Morphologically, *Dryandra* is at least as diverse as *Banksia s. str.* and I would expect it to break into a number of branches (similar to the subgenera and series used in my account in the *Flora of Australia*, 1999). It seems extraordinary that *Dryandra* is given the rank of series, equating it to, for example, just *Banksia ser. Tetragonae* and *B. ser. Grandes*. Note, however, that *Dryandra subulata* fell within a clade of *Banksia* in the cpDNA analysis.

A morphological character very useful for distinguishing *Dryandra* and *Banksia* (but not taken into account here) is the way in which the floral and common bracts that subtend the

flowers are arranged—loosely in *Dryandra*, densely in *Banksia*. Also, in most *Dryandra* the common bracts elongate as the fruit develop, but they do not in *Banksia*.

Mast and Thiele's analysis is a hypothesis, and a useful one, but it doesn't tell us the answer to how these plants are actually related. DNA is but one component of a biological organism whose physical form we see, but we do not know *how* DNA translates into that form. There may well be factors that come into play that influence how the same or similar DNA is expressed outwardly, and to varying degrees. I believe that taxonomy should be practical, usable by informed but not necessarily expert users, i.e. it should be based upon readily observable morphological characters.

The new classification is not the final word, and there is no obligation to follow it simply because it is the most recent publication on the subject. They themselves seem uncertain of their results, since they state (p. 65) that their new classification 'is the least disruptive option at present'. This indicates that further research may lead to a revised classification, so it was premature to combine the two genera.

Mast and Thiele overlooked my paper 'Further new taxa in *Dryandra* R.Br. (Proteaceae: Grevilleoideae), *Nuytsia* 15: 337–346 (2005), hence those names remain unavailable in *Banksia*: *Dryandra prionotes*, *D. ferruginea* subsp. *magna*, *D. fraseri* var. *crebra*, *D. fraseri* var. *effusa*, *D. ionthocarpa* subsp. *chrysophoenix*, and *D. pteridifolia* subsp. *inretita*.

While this research is very interesting it has done very little to advance our knowledge of the species in *Banksia* and *Dryandra*, e.g for those involved in horticulture and conservation. It would be better to see such not-insignificant resources put towards groups such as micro-organisms that are essential parts of our ecosystems but for which we lack even the basic knowledge of what is there.

For bibliographic accuracy, note that the name *Banksia* L.f. was first published in 1782, not 1781.

For those wishing to read it all the following are the main papers.

George, A.S. (1981), The genus *Banksia* L.f. (Proteaceae), *Nuytsia* 3: 239–474.

Mast, A.R. (1998), Molecular systematics of subtribe Banksiinae (*Banksia* and *Dryandra*, Proteaceae) based on cpDNA and nrDNA sequence data: implications for taxonomy and biogeography, *Australian Systematic Botany* 11: 321–342.

Mast, A.R. & Givnish, T.J. (2002), Historical biogeography and the origin of stomatal distributions in *Banksia* and *Dryandra* (Proteaceae) based on their cpDNA phylogeny, *American Journal of Botany* 89: 1311–1323.

Mast, A.R., Jones, E.H. & Havery, S.P. (2005), An assessment of old and new DNA sequence evidence for the paraphyly of *Banksia* with respect to *Dryandra* (Proteaceae), *Australian Systematic Botany* 18: 75–88.

Mast, A.R. & Thiele, K. (2007), The transfer of *Dryandra* R.Br. to *Banksia* L.f. (Proteaceae), *Australian Systematic Botany* 20: 63–71.

Thiele, K.R. & Ladiges, P.Y. (1994), The *Banksia integrifolia* L.f. species complex (Proteaceae), *Australian Systematic Botany* 7: 393–408.

Thiele, K.R. & Ladiges, P.Y. (1996), A cladistic analysis of *Banksia* L.f. (Proteaceae), *Australian Systematic Botany* 9: 661–733.

New *Banksia* classification.

Jonas Dryander must be turning in his grave.

Botany using molecular research unfortunately is a technique that can only be studied in a laboratory with sophisticated equipment and computers, so is beyond the resources of most.

The latest classification of the genus *Banksia* has seen *Dryandra* absorbed into *Banksia*. I believe that with further DNA investigation other members of *Proteaceae* may well be linked, like *Isopogon* and *Protea*, and who knows what else could have DNA markers to match *Banksia* and *Dryandra*. Could we end up with a super genus of common ancestry? They are all Gwondwanan.

In the latest paper detailing the taxonomic change the type species of *Banksia* and *Dryandra* aren't specifically mentioned so possibly it doesn't require it (although it would have been nice to have it set out clearly). Possibly this data is, in cited references, of earlier work. This is a shortcoming of this paper in that all the determinations and processes are not readily accessible in the final paper.

It appeared to me, not a scientist that the determination was made in conjunction with some systematic botany characters, like cotyledon shapes and seed shapes and not others like how the bracts are arranged among the flowers or how the follicles are attached. Could other significant systematic botany characteristics, have been used as determinants? Should **not** DNA alone have been the sole determinant? Possibly by extending studies to utilise epi-genetics the findings may well have been altogether different.

I do however see the findings as interesting and systematic botanists have always recognised that *Banksias ilicifolia*, *cuneata* & *oligantha* appear to be mid way between *Banksia* and *Dryandra*. Indeed a new genus was considered for these three species but discounted since there are characters that link them strongly to other banksias. The option to recognize more than two genera was discussed in Mast's papers but rejected as they thought it would be even more disruptive and would undoubtedly have required much more research incurring extra expense.

I am bemused that the scientific energy was not used to obtain better understanding of e.g. a poorly known, genera of plants such as *micro fungi*. From my experience in the field and in collecting and growing the majority of species of both genera I have identified good characters for recognising two distinct genera. I don't believe the authors can justify their statement that; by combining *Dryandra* with *Banksia*, they are creating 'a single, easily recognised genus'. The only characters they give (on the cladogram in this paper) are that these groups share an interseminal dissepiment, have flowers in condensed heads, have vascular tissue in the wood rays, and have follicles with bony endocarp. The average user (including many professional botanists) could 'easily' examine only the second of these characters, as the others require considerable time and skill, suitable specimens (i.e. with mature fruit and seeds) and even equipment for anatomical study (to

check wood rays). Anyone unfamiliar with the plants would find it almost impossible to place species as diverse as *Banksia grandis*, *B. repens*, *B. violacea*, *B. ilicifolia*, *Dryandra ferruginea*, *D. nivea*, *D. sessilis*, and *D. preissii* etc. in a single genus.

As an educator of basic botany to people of all vocations as well as young children it is very easy to show how the seed holding mechanisms of banksia and dryandra are significantly different.

Banksias have follicles imbedded in dense insulating woody cones which have a fire retardant velvet layer (dense floral and common bracts). *Dryandra* have follicles attached by thin umbilical chords to a receptacle. These follicles can readily be pulled from the receptacle with your fingers, whereas banksia follicles, you cannot. *Dryandra* predominantly have involucrel or inflorescence bracts that are significant and retained, whereas in *Banksia* they mostly fall away with cone development or are miniscule. The fire resistant component of banksia cones is the velvet layer prominent on most species being markedly different from dryandra, which have fire resistant dead florets and bracts, to protect the follicles. Dead florets retained on the cones of many banksia species, in contrast, are the highly flammable fuel required to generate sufficient heat to open the follicles.

I believe the published data is not exhaustive enough to justify making such a major change to classification.

Sometimes DNA shows up relationships that aren't reflected in morphology.

The results are another hypothesis and not definitive.

Until a clip on the leaf meter is designed to recognise GPS co-ordinates (yet to be mapped for all individual plants in the world), and DNA markers of all genera are combined into a miniature computer with a readout to name the species.....why bother. Certainly record the scientific findings in papers for the future closer determination of species in anticipation of the technology being available to utilise it in the future.

Primate DNA analysis was found to have short comings on closer investigation.

I realise change is a part of the new world order but findings should be circulated and notified to a broader spectrum of interested parties for consideration and discussion prior to implementation, if species are to be renamed.

We have seen other recent reclassifications within genera that have proved to be flawed and indeed retracted.

The names are available in existing references for all *Banksia* and *Dryandra*, so there is no obligation to accept this new classification.

The systematic botany determinations, particularly within Proteaceae, are treasured historical fact and a valued part of the rich heritage of our country. Every effort should be focused on the retention of the status quo, particularly when no readily visible aspect of the new determination makes it easier for the general populace to identify the genera.

Change for change sake?

Kevin Collins. 4th June 2007.

Dryandra subpinnatifida var. *imberbis* at the Banksia Farm

On a recent visit to the Banksia Farm at Mount Barker, Kevin showed me his magnificent plant of *D. subpinnatifida* var. *imberbis*, one of several dryandras flowering there in late April. It must have 300 to 500 flower heads on it. It is absolutely stunning.

When Josh Byrne, from the ABC TV Gardening program was there last year he was intrigued by 'that Mondo Grass thing'. It wasn't in flower at the time, of course, but it is a wonderfully neat, compact mound that never needs pruning, ideal for a formal garden. Indeed, it would be impossible to prune or to collect seed capsules without damaging the plant.

This is only the third 'pure' plant I have seen. Of the two in different populations in the wild, one has died and the other is the one I photographed for *The Dryandras*. The plant I grew in Attadale, those at Cranbourne and the other wild plants have been contaminated as a result of hybridization with *D. squarrosa*. The leaf blade on a pure plant is smooth without prickly lobes. There are some narrow ones at the very base of the leaf, on the petiole, which give the species its name of *subpinnatifida*.

There are no plants of *D. squarrosa* in the immediate vicinity of Kevin's plant so we are hopeful of obtaining seed from it some day – when it dies perhaps, though we hope that won't be too soon. I am convinced, from my observations in the field, that *D. subpinnatifida* var. *imberbis* will become extinct in the wild, if it is not already, due to hybridization with *D. squarrosa*. I have also noted the same thing occurring with var. *subpinnatifida* in places where that grows in disturbed areas.

Margaret Pieroni 11/5/07



Dryandra subpinnatifida var. *imberbis* Banksia Farm April 2007



Hi-Vallee Revisited

Last month, Elizabeth George and I spent a delightful few days At Don and Joy Williams' 'Hi-Vallee' farm north west of Badgingarra. For those who haven't been there, this is one of the best dryandra 'hot spots' in the state. I have directed or taken many Study Group members there, over many years.

April is not the best month to see dryandras or, for that matter any other plants in flower especially in such a dry year. However, I wanted to be at Hi-Vallee during the Department of Environment and Conservation, (previously CALM) survey, hoping to be of some help.

Kathy, from DEC was trapping fauna at the time but was also keen to learn about the dryandras and verticordias on the property. I had been wanting to have another look at some plants that I thought could be *Dryandra kippistiana* var. *paenepeccata*. The seed capsules on plants I'd seen on previous visits were bigger than those of var. *kippistiana*, more like the size and shape of *D. sclerophylla*. The leaves were longer than the typical var. *kippistiana*, which is very common in many places on the property, with shorter than average, often curving leaves.



Dryandra kippistiana var. *kippistiana*
Leaf X1 Capsule and seed X2

D. kippistiana var. *paenepeccata*
Leaf X1 Capsule and seed X2

D. sclerophylla
Leaf X1 Capsule and seed X2

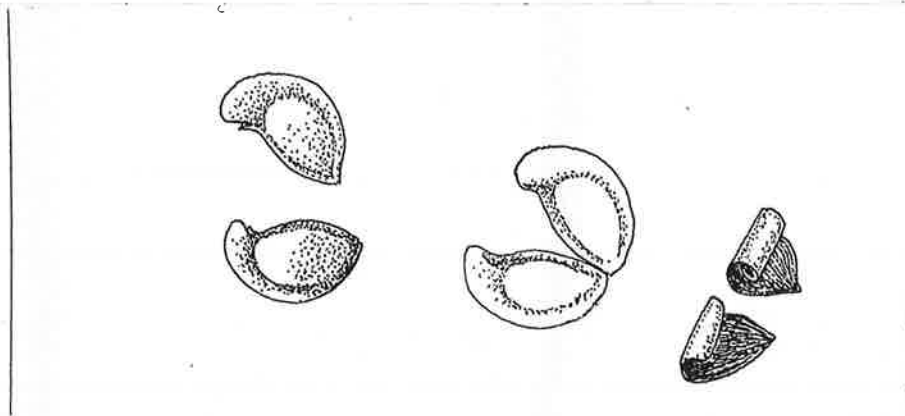
We found some of these 'intermediate' plants at most of the sites we visited. Only at one of them did we see it growing with typical *D. kippistiana* var. *kippistiana*. We collected and labelled specimens of the latter, the possible var. *paenepeccata* and *D. sclerophylla* for Kathy's reference and marked the plants so that she will be able to check them later on when they flower. Var. *kippistiana* is killed by fire whereas both var. *paenepeccata* and *D. sclerophylla* have a lignotuber and re-sprout. The possible var. *paenepeccata* plants were branching from under the ground so it is very likely that they are lignotuberous.

If these plants are *D. kippistiana* var. *paenepeccata* that will round out the number of *Dryandra* taxa on HI-Vallee to 20.

Joy took us to the north east corner of the property where the sheep are allowed to graze, to see the magnificent *Eucalyptus macrocarpa* which were flowering. In the vicinity, constant grazing has pruned remnant, isolated plants of *D. shuttleworthiana*, *D. stenoprion*, *D. bipinnatifida* subsp. *multifida* and *D. tortifolia*, causing them to become much larger and more compact than those in the bushland.

D. vestita was flowering here. Kevin and Kathy Collins and I were surprised to see it in flower at that time of year, last year on a different part of the property.

While we were looking at plants at another area where sheep occasionally roam, we noticed something odd about some of the *D. bipinnatifida* subsp. *multifida* plants. The old bracts surrounding the seed heads had been broken down and had disintegrated, perhaps from having been trampled or because of the heat and dryness. The seed capsules had been exposed and were lying on the ground with their valves separated and strongly curled back. This action must have caused them to 'spit out' the thin papery separator with its two wings still attached at the base and the two winged seeds. Some were quite a distance from the plant.



I have never used heat to extract the seeds of *D. bipinnatifida* because the capsules are not difficult to cut open. When I put one capsule in the oven, only one valve curled back slightly and the seeds were not ejected.

Kathy invited us to join her and her volunteer assistant on the two mornings when they checked the trap lines. At 6 or 7 sites on the property in differing habitats, fences of netting about 15 cm high have been laid out in a transect with tubular traps set into the ground that the creatures to fall into while running along the barrier. Egg cartons at the bottom of the traps break their fall and provide shelter until they are collected.

We were thrilled to see and photograph a variety of reptiles, a tiny Turtle Frog, a Common and a Fat-tailed Dunnart, an Ash Grey Mouse and three Honey Possums among the creatures captured, measured and recorded.. We had never seen any of the tiny mammals in the flesh before.

There were no dryandras or banksias flowering in the vicinity to release the Honey Possums on for a photograph but a few flowers on a *Eucalyptus pleuricaulis* provided a place for one of them and I got a great photo.

Last year, in spring there was an abundance of Honey Possums and Don and Joy have installed a chair next to a grove of calothamnus bushes for photographers and observers. It was just a matter of waiting a few minutes and the animals would come out and feed on the blossoms quite oblivious to the observers.

Many thanks again to Don and Joy, Elizabeth and Kathy.

Margaret Pieroni 11/5/07

Botanist farmers conserve their property



Don and Joy Williams... farmers and conservationists.
Photo - Sue McKenna/DEC

A BADGINGARRA farm with some of the richest and rarest native vegetation and wildlife in WA is now a portal for conservation.

Don and Joy Williams have set aside 350 ha of remnant vegetation on their sheep farm - Hi Vallee - to be managed under DEC's new conservation biodiversity initiative project.

Their concern for the future welfare of the bush resulted in them forming a partnership with DEC to ensure the land is properly managed for conservation after the farm passes into new hands when they retire.

The bush will be cared for by the Williams, DEC's scientists, botanists and wildlife experts.

At least five threatened and 33 priority plant species are on the property.

The splendid wren, honey possum, western bearded dragon, fat tailed dunnart, crested pigeon, bobtail and other reptiles are also there.

"When I moved to the farm 40 years ago I was told to clear 10

per cent of the land each year as a condition of sale," Don said.

"You can't blame the farmers for all the clearing because we had an official order to clear it, but how times have changed."

Joy said she and Don had always had a love of plants and many on their property were still unnamed and uncollected.

"Over the years we learnt that valuing the land did not mean clearing it to make a paddock but conserving it for the future," she said.

Don is encouraged to see so many people in the conservation industry.

"We're out there trying to preserve what little we've got left of our environment. This area may be the richest area in the world for plant species."

DEC Conservation Officer Kathy Himbeck will create a management plan for the conserved block including assessments about extant flora and fauna, dieback, weed management, feral animals (rabbits, foxes and cats) and fire management prescriptions. Fire breaks and fencing will also be updated during the project.

"Banksia Farm" news

Propagation. I have successfully propagated *Dryandra prionotes* from a section of underground stem. In May 2006 a four inch piece of stem with two small upright branchlets was successfully struck by immersing the stem in banksia honey and planting in coarse river sand mixed with German peat. In early Feb. 2007 I observed strong new leaf growth on both upright branches so I removed the piece from the tray to discover a mass of roots up to 100mm in length. It has been potted up into a native plant soil mix and is flourishing.

I have similarly grown a piece of *D bipinnatifida* subsp. *bipinnatifida* with two leaves left protruding from the soil. It has developed great roots but is yet to grow new foliage. I fear I damaged the tip of the underground root and it may not have a node left from which to shoot.

Another first for me is to strike *D. meganotia* from a tip cutting using the same method. My one and only very broad leafed form of *D. meganotia* was ailing so I retrieved a couple of tip cuttings. One has taken and is growing beautifully. The parent has since succumbed.

I feel the success with *D. prionotes* may well provide the answer to growing *D. ionthocarpa* subsp. *chrysophoenix* and *D. aurantia*, species for which seed is unattainable.

I have suffered several losses, possibly as a result of the past long dry and/or dieback: *D. foliata*, *D. ferruginea* subsp. *tutanningensis*, *D. pulchella* and *D. fuscobractea*. All have gone to heaven.

On the positive side I have **gained** two *D. preissii* which have established well and are sending up new shoots.

D. vestita, a whole 100mm tall and six years old, has several flower buds about to open. I also have healthy nursery plants of *D. erythrocephala*, *D. xylomelum*, *D. comosa* and replacements for *D. tridentata*, *D. cynaroides* and *D. hirsuta* ready to plant out with the promising opening rains we are getting at Mount Barker.

This will revise my total collection to nine short of all taxa. The four recently deceased plus *D. anatona*, *D. montana*, *D. ionthocarpa* subsp. *chrysophoenix*, *D. aurantia* and *D. erythrocephala* var. *inopinata*

I have actually lost ground as I lost both *D. anatona* and *D. montana* a few years back. Add in four recent losses. Six gone!! And only three new ones this year. A real challenge remains.

Margaret was very impressed with my *D. subpinnatifida* subsp. *imberbis* which, at about eight years of age has a conservative 300 flowers this year.....See Margaret's pics.

Kevin Collins, Banksia Farm. 11.05.2007.

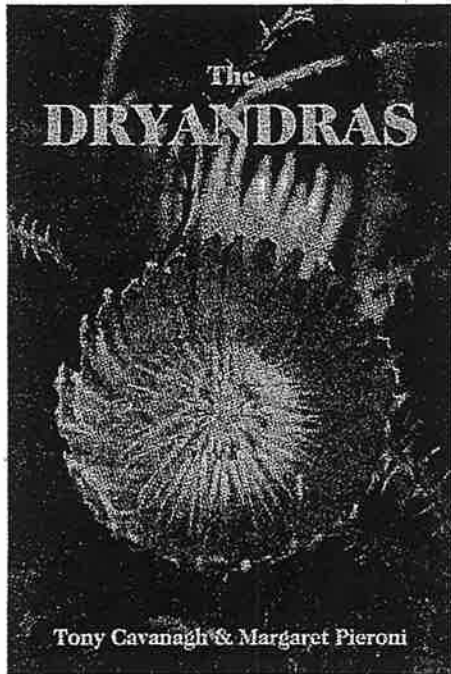
BOOK REVIEWS

The Dryandras

Authors: *Tony Cavanagh and Margaret Pieroni*

Published by the Australian Plants Society (SGAP Victoria) and the Wildflower Society of Western Australia. 237 pages, hardcover.

Reviewed by Jan Sked



How exciting it is to have another outstanding book produced through the efforts of one of our Study Groups. This book is the definitive guide to all the 135 known Dryandras and it provides comprehensive information on knowing and growing these fascinating plants.

The authors have had a long association with the Dryandra Study Group. Tony Cavanagh founded this Group in 1974 and has grown and studied more than 50 species of Dryandra in his garden in Ocean Grove, Victoria. Tony has a special interest in the cultivation of Australian plants in Europe in the 19th century and this is evidenced in the chapter on the discovery, naming and historical cultivation of Dryandra.

Margaret Pieroni took over Leadership of the Study Group in 1987 and Tony continued on in the role of Newsletter Editor for the Group. Margaret combines her love of Australian plants with her great skill as a botanical artist. For over 20 years she has travelled in Western Australia, studying and photographing all the Dryandra species and has cultivated over 70 species in her garden in suburban Perth before moving to Denmark on the south coast of W.A. Her artistic talents can also be found in other publications on W.A. wildflowers.

"The Dryandras" is a large A4 size hardcover book of 244 pages with over 320 full colour photographs, and botanical line drawings and distribution maps for each species. Line drawings, maps and the majority of the photographs have been provided by Margaret.

There are four introductory chapters to the book, covering:

- the discovery, naming and historical cultivation of

Dryandras

- their biology and ecology
- practical cultivation and propagation including tables to assist in choosing dryandras for different garden situations
- and the scientific classification of Dryandra, with keys to all species.

I found the chapter on the early history of Dryandras of particular interest. There is also an illustrated glossary of botanical terms.

The remainder of the book provides full information on all 135 species (ie. 94 species and 41 subspecies and varieties) as well as several unnamed species. These are arranged alphabetically by botanical name (common names are listed where applicable) with each species covered by a botanical description, distribution map, conservation status, habitat and climate information, flowering period and propagation and cultivation information. Each species has colour photographs of the flower head and the plant, and line drawings of leaf, fruit, seed and seedling.

In his Foreword to the book, Rodger Elliot AM states, "It is indeed wonderful to have a new book published which, in one volume deals in excellent detail on matters botanical, horticultural, historical and conservational. We are indeed fortunate to have two people such as Tony Cavanagh and Margaret Pieroni who, between them over the years, have developed marvellous expertise on many and varied aspects of Dryandras and this expertise

shines throughout the book."

I thoroughly agree with Rodger's comments. Although Dryandras are not well known here in Queensland, this book will give readers and gardeners an insight into their beauty and diversity and hopefully, with further research into grafting techniques, one day we shall all be able to grow these wonderful Western Australian wildflowers.

Recommended retail price is \$69.95. However, copies will be available to ASGAP members at the special price of \$64.00 plus postage of approximately \$8.00 to \$10.00. They will be available initially from APS (Vic.) and WSWA Book Sales and later from other State book sales sections.

Ask our Sales Officer to get a copy for you or contact any of the following:

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Book Review – "The Dryandras" by Tony Cavanagh and Margaret Pieroni

The Dryandras is the long awaited monograph of, and definitive guide to, growing the members of a genus that I regard as the ultimate of foliage plants, and about which to date, there has been very little information available.

This eye-catching, thoroughly researched and beautifully presented book is an important contribution to knowledge about our ancient Australian flora. Proteaceae, the family to which this genus belongs, evolved in the Eocene period, before we split away from Antarctica and WA has many early fossils belonging to this family; so it has been evolving here for a very long time. It was named after Proteus, the god of the sea, who assumed many forms. Plants in this family have always stimulated and intrigued botanists, horticulturists and the general public because of their unusual and non-conforming appearances; often presenting bizarre growth forms and/or spectacular and/or unusual flowers. Australia contains the greatest number of species in this intriguing family (about 1100 species in 46 genera of the world's total of 1700 species in 79 genera). Though many genera of this family e.g. Banksia, Hakea, Grevillea, and a number of non-Australian, but also spectacular genera such as Protea, Leucospermum and Leucadendron have been well publicised from both a botanical and a horticultural point of view, Dryandra until now has been relatively neglected.

Dryandra is a substantial genus of the family Proteaceae, closely related to Banksia. The species belonging to this genus often have unusual growth forms with striking foliage and quite large flower heads, usually in shades of lemon yellow to deep, bronze-gold, which often can be concealed, until closer inspection, by the leaves. Many grow naturally in low rainfall areas, thus they are pertinent for the currently necessitated low water garden.

There are today 94 species, 41 subspecies and varieties recognised as belonging to the genus Dryandra. They are all confined to the South Western corner of W.A. Seventy eight Dryandra taxa are listed as rare or priority species. Their conservation is of concern, particularly in the light of the expanding *Phytophthora cinnamomi* problem.

As Roger Elliot in his introduction to the book recognises, Margaret and Tony have presented us with the results of the expertise that they have developed over many years with regard to this genus; as well they have incorporating information from in particular; the horticultural experiments carried out by the dedicated ASGAP Dryandra Study Group, which has concentrated on endeavouring to grow these plants under a wide variety of climatic and edaphic conditions. This book seeks to marry scientific knowledge about this genus with practical horticultural guidance on how to grow them. The information presented is thorough and meticulous. It is scientifically based and up to date, yet offered in a manner that is approachable, easy to access and able to be understood by the amateur gardener and scientist alike.

Whilst Dryandra is one of the largest genera of the enigmatic Proteaceae family, many species are still relatively unknown in cultivation and it is hoped that the information contained in this treatise will provide a greater appreciation of their ornamental and indigenous value, as well as a helping in their cultivation and adding stimulus to their use as garden plants.

Their cultivation actually has a long history. It is of interest that they were propagated in European glass-houses in the 18th and 19th Century. For instance *Dryandra baxteri* was first collected by William Baxter near King George Sound in 1823. It was described by Robert Brown in 1830 and although it was grown in England as early as 1824, it is still not well known in cultivation in Australia.

Both authors have considerable experience in the growing of these plants. Tony founded the ASGAP Dryandra Study Group in 1974, (despite him being a Victorian and all of them being W.A. plants). He has observed, experimented and followed the growth of more than 50 species of this genus in his home garden in Ocean Grove, Victoria. Margaret, a renowned botanical artist, during more than 20 years of travelling in W.A., has studied and photographed every taxa of this genus; during this time discovering and recording a number of new species, as well as painting quite a few of them. She grew over 70 species of Dryandra in her garden in Perth before moving south to Denmark in 2004.

In conclusion, this book is the first definitive guide to the 135 taxa of Dryandra. It discusses their sequential discovery and naming, their biology and ecology. But as well it provides comprehensive and helpful information about propagating and cultivating them for your garden. The information given about each Dryandra taxon is very comprehensive and interesting. It includes a definition of the species name; details of the type collection and where the scientific name was first published; a scientific description; information on forms and variations; distinguishing features to assist with identification; a brief comparison with similar species; distribution in the wild; conservation status; habit, including details of rainfall and temperatures, flowering period and cultivation information, including horticultural features and germination time for seeds where it is known. Additional information is given for a small number of taxa in line drawings of the unique features they present, with brief textural descriptions. Two or three coloured plates are included for each taxon to show field habit and a close up of individual flower heads. A key to the species is provided and an individual hand-drawn, distribution map for each taxa, to assist with identification.

The tremendous amount of work undertaken by a dedicated few wildflower growers to obtain the detailed information relating to germination and cultivation, presented here must be admired. Credit must, in this review, also be given to Alex George for the taxonomic work he had carried out to produce the descriptions and identifications of the various taxa and to the extensive work involved in tracking type specimens and their history; some of which were collected by early European visitors to this land, and are lodged in far-flung overseas locations. And last but not least, the carrying out of what one might consider to be the impossible task of 'pursuing to the death' (undertaken by Margaret Pieroni herself) of photographic information on habit, habitat and flowering for most of the 135 taxa, be it for quite a number, initially of unknown season and occurrence, in unexplored terrain.

Marion Blackwell, National President of ASGAP (Association of Societies for Growing Native Plants).

WSWA Newsletter 2007.



THE DRYANDRAS

By Tony Cavanagh & Margaret Pieroni

The ever-increasing interest in Australian plants by gardeners around the world is being fed by an excellent array of specialist books on the diverse genera that make up our wonderful flora. Until now, however, there has been a dearth of detailed information on dryandras. The bulk of this lavishly illustrated volume is devoted to enabling the reader to identify all of the currently known dryandras, along with individual distribution

maps. There are also extensive chapters on the history, biology, ecology, cultivation and propagation of these banksia-like plants. This superb book has obviously been a labour of love and will find a ready audience among hardcore Australian plant enthusiasts and others who wish to broaden their native plant horizons.

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