AUSTRALASIAN PLANT SOCIETY
NEWSLETTER

PENTACHONDRA

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***Grevillea victoriae*, opening flower**

CONTACTS

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CONTENTS

From the editor, Judy Clark	1
APS News	3
Growing Bellendena montana, Jeff Irons	6
Grevillea victoriae, Gary Dunlop	8
More Geranium traversii, Peter Kohn	11
Diplarrena, Gary Dunlop	14
Kangaroo grass, Judy Clark	16
Creating hardy hybrids of Western Australian eucalypts, John Purse	24
Vonnie Cave: Profile of a friend, Kathleen Longbottom	26
Seed germination, Tony Entwistle	31
DIY smoke treatment, Jeff Layman	33
Germination times, Judy Clark	34
Bits and pieces	35

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***Richea scoparia* (centre) and *Orites acicularis* (bottom left) growing on Mt Wellington**

FROM THE EDITOR

Judy Clark

It is with much sadness that I have to report that Jeff Irons passed away on 17 April. He had been ill for some time. Jeff was the prime impetus for the formation of the APS in 1988, and was recognised as *the* expert on growing Australasian plants in Britain. His knowledge, enthusiasm and generosity will be sorely missed. I am sure all members will join me in expressing sympathy to his family.

A full appreciation of Jeff's life and work will appear in the November 2013 issue of Pentachondra, written by Tony Entwistle, a founder member of the APS. In this issue I would also very much like to be able to include members' recollections of Jeff and his expertise with Australasian plants. One way I remember plant people I have known is by plants in my garden which came from them, or about which they have provided help and advice. Did you ever get any Australasian plants from Jeff? Do you still have them? How are they doing? Do you recall any really useful advice that you got from him? Have you got any photographs of Jeff, or, even better, Jeff with plants? Please help to make issue 51 a real tribute to Jeff by contributing to it.

This issue includes two articles written by Jeff which he sent to me earlier this year, and which I had told him I would use. One is about growing a rarely cultivated plant called *Bellendena montana*, mountain rocket. In the wild it grows only in the mountains of Tasmania, in alpine and sub-alpine heaths and woodlands. If you would like to try growing it then you could order some seed from the APS seed list enclosed with this issue, although in his article (originally written for another publication) Jeff says you need a lot of seed to succeed.

Jeff's other article is about growing boronias, a genus which I love for their pretty flowers and for the delicious fragrance of many species. Would that I had had this article when I bought my first *Boronia*, for I might have taken better care of it. I lost it by doing exactly what Jeff says not to do: let it dry out.

The photo on the back cover is Jeff's third contribution to this issue. He thought it might be interesting partly because it shows how easy it is to see native vegetation in Tasmania: it was taken next to the car park on the summit of Mt Wellington, close to Hobart.

I always hope articles on particular species or genera will encourage readers to try them if they haven't already, or to respond with their own experiences if they have, as Peter Kohn does in writing about his experience of *Geranium traversii*). Maybe the articles by Gary Dunlop will encourage you to try the royal grevillea, *Grevillea victoriae*, or one of the two species

of *Diplarrena*, attractive plants in the iris family. Or, if you grow them already, to write about your own experience.

Kangaroo grass (*Themeda triandra*) is the subject of another article. When I write the word 'grass' the botanical pedant in me (feel free to skip this and the following paragraph) says 'a member of the family Poaceae', to which *Themeda triandra* does indeed belong. However in horticulture members of this family (true grasses) are often grouped together with other species which have strappy or spiky leaves and whose growth form is considered similar to that of grasses. As one example, I have a book entitled *Native Grasses for Australian Gardens* which as well as true grasses includes includes rushes, sedges, restios, mat rushes, flax lilies, billy buttons, kangaroo paws, native irises and more besides. The rationale for grouping all these plants together is that form and function are more important than botanical classification.

I must say that strappy species such as *Dianella* (flax lily: see issue 49, November 2012, page 11), *Anigozanthus* (kangaroo paw) *Orthrosanthus* (morning iris) and don't look very grass-like to me. They often have stiffer and spikier foliage, and they give away their different identity as soon as they flower. Their flowers more or less conform to expectations of what a flower should look like, and they look different from each other.

But true grasses, sedges (Cyperaceae), rushes (Juncaceae), restios (Restonaceae) and the like don't produce anything that looks much like a proper flower, and their small flowering parts look confusingly similar until you have studied them closely. To my mind, the appearance of their flowers, along with similarities in the structure of their flowering stems and their often softer foliage, clearly set plants from these families apart from those other supposedly grass-like species. So, although they differ botanically, the gardener in me tells me it is fine to group plants from these families together as 'grasses'. But if you would like to begin to distinguish look at the flowering stem: sedges have edges (flower stems are usually triangular), rushes are round, and the stems of true grasses are usually hollow.

Enough of my hobby horse. Returning to the contents of this issue, have you ever tried to grow one of the showy West Australian eucalypts only to see it succumb to cold? John Purse is attempting to rectify this situation by creating hybrids and his article provides a short account of his progress so far.

Kathleen Longbottom writes about her friend New Zealand plantswoman and photographer Yvonne Cave. Along with Valda Paddison she produced *The Gardener's Encyclopaedia of New Zealand Native Plants* which, by coincidence, I had recently added to my library. I purchased it on

the internet through Fishpond (www.fishpond.co.uk/), a company I'd not previously used. So I was somewhat nervous, especially as unlike other internet book retailers they don't keep their own stocks and a purchase takes a little time to arrive. But arrive it did, and I was pleased with the service.

On re-reading these meanderings I realise that I've not yet mentioned the weather! Perhaps it's because although last winter was cold here in Hastings, and spring seemed to take forever to arrive, temperatures didn't ever get much below zero. (I do realise it got colder elsewhere in the UK.) However, prolonged low temperatures (day and night) were combined with wet soil. This combination can be lethal to plants that don't like cold and like good drainage, but, touch wood, I didn't lose any Australasian species to cold and wet. *Correa* 'Dusky Bells' did turn up its toes but I had already noticed some dieback by last autumn so I don't think cold and/or wet was the reason. It was a healthy plant when I put it in the ground in 2011. And my other correas all seem to be fine (touch wood again).

Hopefully a fairly a miserable long winter will be followed by a better summer than last year . Curiously, whatever date we choose for our national meetings we seem to get good weather, which ought to be even more encouragement to come along to the National Botanic Garden of Wales on 30th June. (Please don't let these be famous last words!) Meantime, as always, many thanks to all those who have provided material for this issue.



APS NEWS

APS National Meeting and AGM 2013

The 2013 national meeting and AGM will be held at the National Botanic Garden of Wales (NBGW) on Sunday 30th June. The NBGW is a significant centre for botanical research and conservation with an important collection of plants from locations around the world that enjoy a Mediterranean climate. Longstanding members will recall that we had a national meeting there when it first opened, in 2000, and it will be interesting to see how it has developed over the years.

As always, and despite the rather forbidding term 'AGM', the whole day will be very informal and everyone is welcome. Above all, don't feel that you have to be very knowledgeable about Australasian plants to attend: you don't! The idea is that everyone learns more, both from the visit and from each other. And if members bring spare plants and seeds to swap time will be made to do so.

We will meet at 11am just outside the main entrance. The APS will pay the admission charge for attending members so please can

you arrive around 10.45 so that at we can enter as a group at 11 am. Should you be unexpectedly delayed please call Judy Clark on 07724 045701 or Jeremy Spon on 07909 088198. The garden opening time is actually 10am and if you want to look round before we start then keep your ticket receipt.

The 'business' bit will come first, lasting until about lunchtime. With two cafes and a restaurant there are plenty of places to eat if you don't want to bring a packed lunch. In the afternoon there will be a guided tour of the Great Glasshouse which contains the southern hemisphere plant collections. The plan is that this will be led by the horticulturist in charge who also happens to be an Australian. There will also be plenty of time to look round (closing time is 6pm) and there is certainly plenty to look at. And as the NBGW operates a 'return ticket' policy anyone planning to stay over should be able to return for free the next day (see website for details.)

The NBGW is located near Llanarthne in Carmarthenshire. Detailed information about how to get there can be found on the N BGW website. Briefly, public transport users can get a bus from Carmarthen train station. For car drivers the garden is 10 minutes from junction 48 of the M4 and ¼ mile from the A48, midway between Cross Hands and Carmarthen. Satnav users should enter SA32 8HN. My recollection from a couple of years ago is that signposting is good.

If you intend to **come please advise Judy Clark** (editor@ anzplantsoc. org.uk or telephone 01424 720369) so that you can be informed in the unlikely case of last minute changes. And for more information about the NBGW go to www.gardenof wales.org.uk/.

APS Southern Meeting: Wakehurst Place

Unanticipated circumstances mean that it has not been possible to complete organising a southern meeting in time for this newsletter. However, there will be one, albeit later than usual, in August or September, and we will be visiting Wakehurst Place near Ardingly in West Sussex.

Last time I was there, in October 2011, they had begun to rearrange and add to their southern hemisphere garden. Apparently this process is continuing, with the sixteen beds containing southern hemisphere plants being reorganised so that plantings are divided geographically: New Zealand, Tasmania, Australia, South America and South Africa.

According to the website (www.kew.org/visit-wakehurst/ garden-attractions-A-Z) the collection includes a rare daisy bush, *Olearia lacunosa*, a montane species from New Zealand, as well as *Banksia integrifolia* subsp. *monticola*, mature eucalypts, hebes and waratah (*Telopea*

truncata). I recall seeing a huge needle bush (*Hakea* species); I hope it hasn't been removed. And my notebook tells me that the garden then included *Allocasuarina littoralis, Correa lawrenciana* and *Pelargonium australe*.

Wakehurst Place also holds a national collection of southern n beeches, *Nothofagus*. This genus, found only in the southern hemisphere, contains about forty species and according to the website the Wakehurst collection contains fifteen of the nineteen species from South America and the antipodes.

Have you paid your subscription?

The APS financial statement for 2012 is enclosed with this newsletter. In addition, if you have not yet paid your 2013 subscription you will find a polite but firm reminder to do so. If you have paid between the editor receiving the membership list and the publication of this newsletter then please ignore the reminder.

The Treasurer would again like to urge members in the UK to pay by standing order as this reduces the need for reminders to be sent. If you would like to do so please contact treasurer Jeremy Spon (contact details inside back cover) to obtain a standing order form to send to your bank.

If you would like to attend this meeting come please let me know (Judy Clark, editor@anzplantsoc.org.uk or telephone 01424720369) as soon as possible (especially if you don't use email) and I will ensure that you receive full details as soon as they are available. In any case members who have provided an email address will automatically be informed.

Get your seed from the APS seed list

The 2013 seed list is enclosed with this newsletter. For £4 (€5 for members resident in Europe and £5 for members resident outside Europe) you can get up to twenty packets of seed: tremendous value. Seed manager Richard Christmas would be grateful if seeds could be ordered as soon as possible.

If you are new to growing Australasian plants from seed you might like to try species that are known to germinate reliably. Many members of the myrtle family, including *Callistemon* (bottlebrushes), *Melaleuca* (paperbarks), *Leptospermum* (tea trees), *Beaufortia*, *Darwinia* and *Kunzea*, are quite easy to germinate using the bog method while many wattles (*Acacia*) germinate well if treated with boiling water. The APS seed germination notes provide a lot more detail regarding the requirements of particular species and the editor will be happy to email them on request. There is also much useful information about different methods on the

ANPSA (Australian Native Plants Society (Australia)) website (asgap.org.au/seed.html). And if you fancy experimenting with germination promoting substances read Tony Entwistle's article in this issue.

The seed on the seed list comes from various sources, with most purchased but some supplied by APS members who have saved seed from plants grown from APS seed in the first place, or from seed of other known origin. Seed from members is welcome as long as it is named and details concerning its origin and when and where it was collected are included.

New members

The APS would like to extend a warm welcome to new members Patricia Gracey and Natalie Schweizer.

Pentachondra contributions

There wouldn't be a newsletter without members' contributions so please consider writing something for the next issue. You may already have read my plea for recollections of Jeff for the November issue (page 1) but other material will also be very welcome. The deadline for the next issue is 15th October 2013, but you don't need to wait till then to write something; you can send in a contribution at any time.

Contributions should be sent direct to me as editor (my email and address can be found inside the back cover.) Articles can be submitted electronically or as typed hard copy. If possible photos and drawings should be submitted electronically. Please don't compress photos before sending them – my computer just about manages large files – but please do send them in separate files from your article. Photos on their own are also very welcome but if you send a photo as a stand-alone item please supply a caption. Finally, don't hesitate to contact me if you have any questions about contributing.



GROWING BELLENDENA MONTANA

Jeff Irons

It has been estimated that there are 5000 cubic km. of dolerite below Tasmania. It was put there in Jurassic times and in places the molten rock welled up through fissures almost to the surface of the overlying rocks. Today those strata have worn away and the upwellings form and dominate Tasmania's landscape. This was brought home to me one Easter. Three of us had decided to visit Hartz Mountain, about 60 miles south of Hobart. About an hour after leaving the hut in which we had spent the night we reached a dolerite outcrop. On its top, in a crack, was a line of *Bellendena* plants, each displaying its little red flag of seed heads. Nearly fifty years later the sight is still vivid in my memory. (The photo on page 9

shows *B. montana* growing in the wild, but in the Walls of Jerusalem National Park.)

Bellendena montana has a complex dormancy and because there is no commercial incentive its germination has not been studied. Various suggestions have been made as to what amateurs can do to overcome the germination difficulties. One is that because the seed is so colourful it is usually collected before it is really ripe. I have tried leaving seeds on my own plants until they were black, then collecting and sowing. It has also been suggested that seeds should be collected while they are green and before the germination inhibitors have formed. I have tried collecting and sowing green seed. Like sowing black seeds it did not work. What follows is my own unscientific method.

Firstly, do not bother with small amounts of seed. You need quite a lot for reasonable success. Buy a gram[1] (or several people could club together and buy more) and sow all of it on the surface of an open mixture, in a 6 inch pot. Place outside, off the ground, in the shade and leave. Keep the surface free from liverworts.

After a few years germination will take place over about three weeks in spring. There may be as many as 15 seedlings. This will continue for four or five years. Always germination will be in the short spring period. Seedlings should be removed as soon as they germinate and transferred to a pot.

Here it is necessary to digress a little. *Bellendena* is the only plant in its genus, which is in the Proteaceae family. The family is mostly found on very poor soils and has developed a way of coping with their lack of nutrients that affects the way we grow them. All except three members have special very fine seasonal roots called proteoid roots. When present they make up half of the root mass and are in the upper layer of soil, even rooting into leaf litter. When growing *Bellendena* we have to provide suitable conditions for these roots which, providing conditions are right, form even in the first season. Without them growth is slowed down.

Tasmanian mountain soils have an average pH of 3.9. Experience has taught me that some species must have an acid growing medium. So a very acid compost is desirable. It also needs to be well aerated and should be low in nutrients.

Because many Proteaceae have sufficient food in their large seeds to sustain the seedling for a year or more I use a mixture of equal parts of peat and Perlite and do not add any nutrients. Seedlings are put in 1 to a 6 inch pot and placed in a cool, light, airy position. On no account must sun be allowed to play on the sides of the pot. It will raise the compost temperature and effectively steam cook the plant roots.

After the first year I give a little feed every now and then. Many Proteaceae are sensitive to phosphorus so I use a proprietary

zero phosphorus mix, with a little seaweed fertiliser added. I have tried using nothing except rain and wind blown dust. That seems to be quite effective! Phosphorus poisoning shows up by the leaves turning brown or black. In the former case all compost should be washed off and the plants repotted in a low nutrient mix. If the leaves turn black saving the plant is impossible.

Another factor is water. Plants of some species can be healthy and grow well, then when additional water is given, phosphorus becomes available and the plant dies. Because it 'locks up' phosphorus and so helps eliminate water induced stress, some growers add 5 to 10 percent of clay to their potting mix. Properly grown plants will bloom after five or six years.

Once you have your own plants they can be propagated from cuttings. Early spring and late autumn seem to be equally effective. Leaf size is quite variable and some seedlings will be seen to have larger leaves than others. This does not affect the time needed to produce flowers.

Many Proteaceae resent transplanting and open ground plants nearly always die when moved. This is because they are very sensitive to root rotting fungi, especially *Phytophthora cinnamomi*. Moving plants breaks their fine roots so enabling the fungi to enter the plant and attack it. Plants in pots rarely need repotting but because of the danger from death due to disturbance, they are best transplanted just as the proteoid roots begin to form. This can be determined only by experiment, removing a plant from its pot and observing whether any cobwebby white roots are present. If they are the plant can be repotted.

Note
1. Try Wildseed Tasmania, www.wildseedtasmania.com.au

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GREVILLEA VICTORIAE

Gary Dunlop

Any plant that flowers in winter is welcome in most gardens. The red flowered *Grevillea rosmarinafolia* and the yellow counterpart *G. juniperifolia*, which tends to prefer growing sideways than upright, have long been in cultivation, and usually flower intermittently in winter, even if they are not particularly showy.

Grevillea victoriae in contrast is almost spectacular. It is colloquially called the royal grevillea in Australia. As the name implies it grows primarily in Victoria but the habitat does extend into New South Wales. It principally grows in rocky areas, including dry and wet sclerophyll forest, heath, riparian scrub and snow gum woodland.

It is surprising that such a hardy and attractive plant seems to have only come into cultivation fairly



Bellendena montana
Walls of Jerusalem National Park, Tasmania



***Geranium* 'Kerrachar Carpet'**



Left:
***Grevillea victoriae*,**
showing its open growing and upright habit

Below:
Diplarrena latifolia



recently and is not more widely grown. It was first listed in Plant Finder by Peter Chapple of Spinners garden and nursery in 2012-3, and gradually several more nurseries have listed it.

G. victoriae has one peculiar quirk, in that the attractive orange buds are extremely slow in opening up into flower which means a very long flowering period. The cluster of buds droop like small bunches of grapes and appear in early autumn, The small plant that I obtained several years ago took a few years to commence flowering and I discovered the first buds in September. Despite regular checking I was beginning to despair of the flowers ever opening when I finally saw the first few flower buds finally opening (photo, front cover) in December, to display the characteristic form of individual protea flowers which become predominantly red adding richness to the flowers. The plant is open growing and broadly upright spreading in habit with glaucous narrowly lanceolate leaves, so the flowers are well displayed (photo, page 10). The shrub will grow to almost 4 m high and about half as broad.

The initial opening of some buds does not speed up the flowering process, and the opening of subsequent flowers is sporadic over many weeks if not considerably longer. This past winter the buds were, as usual, first displayed in early autumn, but were still opening out in early April, despite a 24 hour long sub-zero south-easterly gale force blizzard a couple of weeks before, and were showing no ill-effects of the long miserable winter and even worse Easter. As my plant survived the winters of 2009-10 and 2010-11 it is clearly hardy down to at least –14ºC as a young plant.

Unusually, for a member of the Proteaceae, it can be transplanted, which few plants of that family tolerate. I had planted my small plant too close to a path, and took the risk in moving it. Despite one of the main roots breaking off in the attempt to dig it up, and the remainder of the open roots system loosing all soil, it survived being transplanted to a better location without suffering any set back.

G. victoriae is certainly a shrub best planted where it can be easily seen from the house in winter, if you are lazy. Plant it as far away as possible if you require frequent exercise in winter, as it will require frequent visits to see if the buds are ever going to open!



MORE GERANIUM TRAVERSII

Peter Kohn

I was fascinated by the piece on *Geranium traversii* in the last issue of Pentachondra (number 49, page 18) and shocked at how scarce it seems to have become. When we moved to Kerrachar in

1993 we were very keen on hardy geraniums and had been successfully growing what we understood to be *G. traversii* var. *elegans* on the terrace outside our then Sheffield home at 600 feet (about 180 metres) - quite a cold spot. I don't remember whether we took a plant or seeds but we carried on growing it successfully at Kerrachar, in our New Zealand bed alongside aciphyllas and celmisias. We have always considered it one of the prettiest geraniums with its pearly pink flowers and lovely soft and slightly glaucous foliage. We collected seed and sold a few plants and even had the seed on the seed list we produced for visitors for several years. Sadly we didn't get round to collecting seed in our last summer and we no longer have it.

Like many New Zealand plants there was a tendency to hybridise and we got two interesting offspring. The first we named 'Mayfield Valley' after the area close to our first house. The plant came back to Sheffield and grew here at Junction Road for several years but has now gone. It was larger and more robust than its parent and quite close to *G.* 'Mavis Simpson' which I presume also has *G. traversii* as a parent. This is widely available and has an Award of Garden Merit.

The second plant arose much later and made a huge dense mat of foliage. We called it 'Kerrachar Carpet' (photo page 9) - brilliant ground cover but retreating to a central core in winter. It was smothered in flowers all summer and well into autumn and was asked for by many visitors. I successfully divided it once and towards the end split one of the plants into several pieces. One was given to a friend in mid-Sutherland and the rest were brought down to Sheffield. Sadly they did not survive the harsh winter in pots and the parent plant was no longer there either when we returned to Kerrachar next summer. We have emailed our friend to check on her plant but I don't hold out much hope - central Sutherland has very hard winters.

Towards the end of our stay at Kerrachar we acquired a white form of *G. traversii* - larger flowers but a less distinguished plants. We kept it for a couple of years and propagated one or two progeny. One went to Ben Rushbrooke at Garden Cottage Nursery. I found it more difficult to grow than the pink plant and gave up on it but Ben still has is for sale. We stopped propagating it and the parent died. We found that both forms were not very long-lived but we usually got seedlings of the pink form around the parent even if we didn't deliberately raise them so never had difficulty sustaining the plant.

I hope that Judy Clark's article will rekindle interest in this really pretty plant. Our experience was that it was easy to grow with reasonable drainage. It handled dry cold (except in 2012) Sheffield and very wet mild Kerrachar

equally well. I've been inspired to seek out seeds and start again.

PS. I've now established that my last plant of 'Kerrachar Carpet' has died and that Ben Rushbrooke (Garden Cottage Nursery) was still growing *G. traversii* (white form). Then I found that Derry Watkins of Special Plants was selling seeds of *G. traversii* var. *elegans* and ordered some of next year's seeds, this years crop being sold out. Like all Geraniums the seeds come in small amounts over a long time which is a nightmare if you are selling commercially.

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DIPLARRENA

© Gary Dunlop

Diplarrena is a small genus in the iris family comprising only two species, *D. moraea* and *D. latifolia*. The genus was established in 1800 by Jacques Labillardierie with the naming of *D. moraea*[1]**.** It was 73 years later before the second species was collected and named by George Bentham[2]. The generic name was derived from the Greek words *diploos* meaning double and *arren* meaning male, referring to the two fertile stamens[3]. In the UK the name of the genus was misspelt for almost two centuries as Robert Brown in his Prodomus Florae Novae Hollandiae in 1830 chose to spell the name 'Diplarrhena'. In translating some Greek words into Latin the addition of an 'h' is apparently optional, though the rules of botanical nomenclature dictate that the original spelling should be maintained.

D. moraea is found in Victoria and New South Wales on the Australian mainland, and in Tasmania, and whereas *D. latifolia* is endemic to Tasmania. Both species grow from coastal areas up to up to 1000 metre almost alpine regions, both species presumably becoming smaller overall at higher elevations. *D. moraea* apparently prefers moist well drained areas and *D. latifolia* prefers damp conditions[4].

The Australasian Plant Society web pages include a photo of *D. moraea*, though it could equally be one of *D. latifolia* as it is unlikely that anyone could tell the two species apart with confidence from the flowers alone (see photos, page 17). I grow several clones of each species, but identify them by the foliage.

The foliage of *D. morea* tends to be narrower and taller and it forms a more upright clump in growth, with flowers being held on stems well above the leaves. The leaves of the clones I grow vary between 30-75 centimetres tall with the flower stems being almost double the height in most cases. The several flowers on each stem open in sequence and are presented as a straight extension of the stem by a rigid perianth tube. When not in flower, the clump of foliage could easily be mistaken for a small to medium form of *Libertia chilensis* (or *L. grandiflora* as it is widely but wrongly known in gardening circles).

In contrast, *D. latifolia* has broader slightly glossier foliage (photo page 10) presented at between 45° and 60° to the ground. The several forms that I grow must be from relatively high elevation as they are significantly smaller that even the smallest form of *D. moraea* that I grow. The slightly glossy smooth leaves vary between 15-30 centimetres long, with the flower stems barely longer than the foliage in the smaller forms but noticeably longer in the largest form. The several, normally three flowers open in sequence, with the stems often presented at a similar angle to the leaves, especially in the small forms.

Surprisingly, the one book I have which provides detailed descriptions of both species[4] describes the maximum height of the flower stems of *D. latifolia* as taller than *D. morea* with flower stems from 30-120 centimetres as opposed to 50-100 centimetres and the maximum leaf length being 100 centimetres as opposed to 75 centimetresm. It also suggests that the flowers of *D. latifolia* are slightly larger than those of *D. morea*. I haven't compared them directly, but on casual inspection there is no noticeable difference. There can be a slight difference in the shape of the flowers within each and probably between species, but the main difference is the degree of purple feathering of the yellow coloured nectary guides, and on the underside of the dorsal petal above them. The purple colouring can also extend to the top of the dorsal petal.

Only one plant that I grow is distinctively different in that the flower has predominantly purple coloured nectary guides (photo, page 17) and perhaps more surprisingly it flowers several months later than all other forms that I grow, in late summer rather than spring when all the other plants flower, September as opposed to May. This plant has become associated with Helen Dillon as her garden is so widely visited, but I understand that she obtained the plant from Bob Gordon who raised it from seed from Tasmania.

Both species can be raised from seed though it is apparently not viable for long, or by division in spring, as that is when the plants the plants will be making new roots.

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GROWING BORONIAS

Jeff Irons

There can be few plants that have caused more frustration than *Boronia megastigma*. One

nurseryman actually told me that he had decided that it is ungrowable. This was in spite of the fact that others manage to produce it for sale every year.

The key to growing this, and indeed all boronias, is to provide lime free soil (or compost) that is very well aerated (well drained) and to keep the moisture level constant. A heather compost is suitable. Continually letting a *Boronia* get dry, and then re-wetting it, is one of the surest ways of killing it.

The simplest way to start growing *Boronia megastigma* (brown boronia; photo page 18) is from a bought plant. Transfer your purchase to a larger pot as soon as you get it home. Do not stand the pot on a windowsill, or on a sunny greenhouse bench. Instead, put it somewhere where the temperature does not fluctuate greatly. Aim to get the equivalent of dappled shade. Wherever it is, make sure that the sun does not shine on the pot. That will raise the temperature around the roots, and make the plant more susceptible to infection. A capillary sand bed (or capillary matting) is useful. It ensures that the roots are always moist, yet not wet. Keeping to these simple rules should ensure that your *B. megastigma* lives, grows and flowers.

An easy way round the problem of how to keep your plant alive is to grow a species that is less demanding than the brown boronia. *B. heterophylla* is one of them. Almost winter hardy, it has large deep pink flowers (photo page 18) that fade as they age. Like *B. megastigma* it has a delightful fragrance. The smell drifts out of the greenhouse, scenting the air for a considerable distance. Unfortunately, there is one problem: many people cannot detect the smell. It could be that the gardener of the family is the unfortunate one, and the non-gardener the beneficiary of these scented plants!

Boronias can be pruned when they are in bloom, treating the prunings as cut flowers. Otherwise prune after flowering, removing about one third to a half of the growth. Follow with a light dose of slow release fertiliser.

The best method of propagation is from cuttings. Taken after flowering or in the autumn, they root easily, though not always quickly. Layering is probably another practical method. It certainly works with the winter hardy *B. parviflora*, which self layers in August. Other species could be as amenable.

Seed needs to be pre-treated by pouring boiling water over it and letting it stand for 24 hrs before sowing in a lime free compost.

Boronias are in the same plant family as *Thalictrum*, *Skimmia*, *Citrus*, *Correa* and *Acradenia*. Like them, they do not have a very vigorous root system, so take 12 to 18 months to make sizeable plants If this is recognised, their propagation does not pose any special difficulties.

KANGAROO GRASS

Judy Clark

Writing about some New Zealand grasses in the previous issue (November 2012, page 7), Gary Dunlop remarked that grasses have not been much featured in Pentachondra. Some years ago Phemie Rose wrote about growing Australian restios[1] (issue 40, page 17) but I don't recall any other articles in recent years. Now I like grasses, all sorts of grasses, including not only true grasses (Poaceae) but also grass-like plants like sedges (Cyperaceae), rushes (Juncaceae) and restios (Restionaceae). Not only are many of them beautiful in their own right but well selected species can add structure, texture, and drama to a garden. I can't believe that Australasian ones could not be of interest to APS members.

It may be that some (many?) of them are difficult from seed. Phemie noted that restio seed was difficult to obtain, and that germination is not easy. I once tried to grow *Chionochloa rubra* (red tussock grass) from seed and failed miserably. However plants are widely available and it holds an RHS Award of Garden Merit (AGM), as does another popular grass from New Zealand, *Anemanthele lessoniana*, (pheasant's tail grass, formerly *Stipa arundinacea*). And all the New Zealand grasses that Gary discusses are commercially available in the UK, with *Astroderia richardii* (formerly *Cortaderia richardii*) also holding an AGM.

Australian species seem to be less widely available and are perhaps less well-known. Only one of the restio species that Phemie was growing (*Baloskion tetraphylum*, formerly *Restio tetraphyllus*) appears to be commercially available. Similarly, only a few nurseries offer attractive Australian grasses such as *Austrostipa elegantissima* (still *Stipa elegantissima* in the UK), *Austrostipa ramosissima* (still *Stipa ramosissima* in the UK) and *Poa labillardieri.*

A similar situation seems to pertain with Australian sedges. The New Zealand species *Carex buchanii* and *C. comans* are easily obtainable as is the hook sedge *Uncinia rubra.* (I find both red-brown *C. comans* and *U. rubra* handy for colour and as temporary space fillers.) Both genera are also found in Australia but the Australian species seem to be much less well known in the UK. This is perhaps unsurprising when one reads that they are not much cultivated in Australia either! Wrigley and Fagg note that native *Carex* tend to be ignored as garden plants and suggest that they should be cultivated more[2]. Of those included in their book only *C. appressa* seems to be available in the UK.

In contrast saw-sedges (*Gahnia* species) are recognised as very ornamental but are apparently not seen frequently in Australian



Left and below:
Diplarrena.morea **flowers**



Below left:
Diplarrena.latifolia

Below right
Diplarrena.latifolia
autumn flowering form







Boronia megastigma

Boronia heterophylla





Kangaroo grass, *Themeda triandra*, before starting into growth, showing its golden brown colour



Kangaroo grass spikelets



Left:
Red stems and foliage induced by winter conditions on a *Eucalyptus gunnii* x *loxophleba* selection growing in SE Ireland, April 2013.

Below:
Flowers of *Eucalyptus gunnii* x *caesia* hybrid on a plant in a frost-free polytunnel in March 2013.



gardens because of difficulties with propagating them. The most commonly cultivated saw-sedge is *Gahnia sieberiana*[4]. After seeing saw-sedge in the wild I purchased a plant of *G. sieberiana* from PlantBase (owned by APS member Graham Blunt, the only UK supplier listed in the RHS Plant Finder) but I managed to lose it. I would be interested to hear from anyone who has managed to cultivate it successfully in their garden, or indeed any of the less common species mentioned in this and previous paragraphs.

Kangaroo grass is another species that does not appear to be well-known in Britain, with only one source listed in the Plant Finder, but it is one that is appreciated as a garden plant in Australia. I have now been growing it since 2007 and I too think it a splendid plant. What's more, it has not proved too difficult to grow.

Its scientific name is *Themeda triandra* Forssk. and it is a member of the Poaceae. One of Australia's most widespread species, it occurs in every state and territory, in grasslands and grassy woodlands on widely varying soils, and in environments that vary from the arid interior to the alps[5]. In Victoria the temperate grassland communities in which it grows are under threat but I have found it growing on forest edges in the Otways. However it was seeing it in gardens in Melbourne that got me interested in trying it out in England.

Here it is necessary to digress a little. For many years *Themeda triandra* was regarded as comprising two separate species, *T. triandra* occurring in Africa and Asia[6] and *T. australis* found in Australia. Nowadays most Australian botanists think that there are not enough clear differences between plants found in Australia and those found elsewhere to warrant a split into two species[7] although the plant is still treated as *Themeda australis* in New South Wales[8]. I was, I confess, slightly disappointed to discover that kangaroo grass is not now considered to be an Australian endemic but although it is a cosmopolitan plant there seems no doubt that it is native to Australia.

Themeda triandra was named by Peter Forsskål[9], a Scandinavian who seems to have been something of a polymath and was a student of Linnaeus at Uppsala University in Sweden. The name is thought to derive from two different languages[7]. *Themeda*, the genus name, is said to come from the Arabic word *thaemed*, which means a depression in which water lies after rain, and which subsequently dries out. As a name it seems appropriate as kangaroo grass tolerates drought. The specific name, *triandra*, comes from the Greek words for three and man, and could have been chosen because he thought the male bits were organised in threes.

Kangaroo grass is used in re-vegetation projects so I was able to

find seeds quite easily in Melbourne, albeit I had to buy five grams of them. The packet came with detailed instructions for sowing the seed direct into the soil. I decided to sow it in a tray in the greenhouse, partly so I could monitor progress more easily, and partly because I could have more control over the temperature. Suggested sowing time for Australia was early summer when temperatures rise. This is quite warm even by UK summer standards, so I sowed in August, as the packet warned that germination is less successful in cooler (Australian) weather.

No information was provided about the sowing medium so I used a mixture of peat free compost, horticultural sand and perlite, and sowed as instructed at a depth of 5 to 10 mm. The packet warned against sowing too deep (below 20 mm) or on the surface. It also warned that maintaining constant moisture would not promote germination as kangaroo grass seed germinates best with irregular watering. As far as I remember I wetted the growing medium well before sowing and placed the tray in a sunny spot. Then, unintentionally, I let the tray completely dry out; some hasty watering followed. Germination began after about two weeks.

Looking back, I suspect I had a bit of beginners luck. Such literature as I have since read[5,7,10] reports that kangaroo grass seed can be difficult to germinate. Presumably I managed to sow it at an appropriate time, when it could experience something like the sort of high temperatures which have reportedly been found to promote high germination rates: 35^0C by day and 20^0C at night. And, again presumably, I managed to get the watering regime right. Finally I probably got the dormancy right. I later discovered that *T. triandra* has a dormancy period that varies according to where the seed comes from. The seed I used was dated May 2006 and I sowed it over a year later. When I tried again in 2009, with different seed collected from gardens earlier that year, I had no luck whatsoever. Possibly I sowed these seeds too soon and, not knowing about the dormancy period but because of my previous experience, threw the trays away when they didn't germinate fairly quickly.

My notebook tells me that my seedlings were overwintered in the greenhouse (kept just frost free) but my notes peter out after that. I suspect I didn't pot the seedlings up till the following spring. I didn't plant any out in my garden until 2009, when I set out a couple in the warmest and sunniest part. The soil is heavy clay but I probably followed my usual practice and added some grit. What followed was a rather severe winter compared to what we'd got used to but the plants survived. Moreover they have taken all that subsequent cold winters could throw at them. Not only that, seedlings started appearing after that first winter and have continued to do so.

I probably got a bit lucky here as well. Given its description as frost tolerant I hadn't expected kangaroo grass to be quite so weather resistant. However, as has already been noted it is found all over Australia and so there are probably local genetic races. I presume that, fortuitously, the provenance of my seed was such that it was able to produce plants that could flourish in the environment of my garden. This means not just coping with low winter temperatures and frosts but also relatively (compared to much of Australia) low summer temperatures and I guess that my seed could well have come from plants from an upland area.

The plant itself is a tufted perennial which flowers in the summer and is dormant in the winter, when young plants especially can look rather dead. Come spring growth restarts, a delicate soft green, but as the season progresses the colour changes gradually to a golden brown, remaining like this throughout the winter (photo, page 19). The arching flower stems begin to appear in summer and stand above the leaves. Apparently they can reach a height of up to 1.5 metres, though on my plants the stems are shorter than this and their nodding habit makes them appear less tall. The spikelets (which in true grasses contain the reproductive parts) are large and red to brown with a prominent leafy structure at their base (technically a spathe) and long black awns (photo page 19).

I find it looks well in my low border as a specimen plant although I plan to divide the biggest plant as it has now developed so many culms that it is starting to look a bit too chunky. It has now been planted in various different places in the garden, including amongst shrubs, to see how it does and how it goes with other plants.

Notes and References

1. Australian restios have been split into a number of genera.
2. Elliot WR and Jones DL, 2010, Encyclopaedia of Australian Plants, volume 9, Hachette Australia, page 362
3. Wrigley JW and Fagg M, 2003, Australian Native Plants, 5th edition, Reed New Holland, page 206
4. For more information and a photo go to http://anpsa.org.au/g-sie.html
5. Florabank, Themeda triandra, www.florabank.org.au/lucid/key/species%20navigator/media/html/Themeda_triandra.htm
6. Its common names differ elsewhere; in South Africa it is known as red oat grass or rooigrass
7. ANBG, Themeda triandra, www.anbg.gov.au/gnp/interns-2004/themeda-triandra.html
8. Australian Plant Census, www.anbg.gov.au/cgi-bin/apclist
9. Forsskal, P., (1775) *Flora Aegyptiaco-Arabica*: 178 [tax. nov.]
10. 2. Elliot WR and Jones DL, 2010, Encyclopaedia of Australian Plants, volume 9, Hachette Australia, pages 255-6

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CREATING HARDY HYBRIDS OF WEST AUSTRALIAN EUCALYPTS

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Anyone who is familiar with some of the more ornamental eucalyptus species from Western Australia (WA) will wish they had at least a couple in their garden. The varying combinations of shrubby habit, interesting foliage, extraordinary flower buds, and large red or yellow flowers almost inevitably appeal in some way. Add to this the attractiveness of the nectar-rich flowers to wildlife, and there would seem to be a whole set of species with attractive features. If only.... . There is of course a reason why they are unfamiliar in cultivation outside Australia and a few other locations – they have essentially no tolerance of frosts.

Despite their marked differences from the hardy eucalypts from south-east Australia that we are familiar with in the British Isles, many of the species from the south-west corner of WA are related to them taxonomically. The possibility of producing interspecific hybrids was reported in 1956[1], but was not followed up. In 2004 I had the opportunity to try to create further hybrids of this type, and this article is a short account of some of the findings and a description of several of the hybrids I've produced.

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

Taxonomically, the genus *Eucalyptus* is divided into several sub-genera and sections. The majority of hardy species that we are familiar with in the UK, and very many of the ornamental species from the south-west corner of Western Australia, are in the sub-genus *Symphyomyrtus*. However, these two groups of species are in different taxonomic sections within this sub-genus, so my crossings have attempted to produce intersectional hybrids. Such hybrids are 'wide' taxonomically, and precedents from other breeding work involving wide hybrids indicate that the proportion of crosses that produce vigorous seedlings will be low. This has certainly proved to be the case in my work – the majority of crosses produce no

seed, or rather wizened seed that fails to germinate. But some crosses do produce a small amount of viable seed.

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

The first of these exceptions was one seedling out of seven hybrid germinants from an *E. gunnii* x *caesia* ssp. *magna* cross that I made in 2005. Cuttings from this plant do root, though the strike rate is low, and so I've produced about twenty plants of this selection. I've planted these in various locations, and they produce handsome young plants. However, they faced challenging winters, and today the only survivors over 2 years old are two plants outdoors on Guernsey, two plants in a frost-free polytunnel in Kent, and one plant in huge pot that overwintered outdoors in a sheltered spot in Kent in 2012/13. The plants on Guernsey are becoming quite attractive, and appear to be starting to exhibit the weeping habit of mature *E. caesia* ssp. *magna* (Silver Princess).

These two plants have not yet initiated flower buds. Several other plants have initiated buds, only for the buds (or the entire plants) to be frosted. However, one of the polytunnel plants flowered in March this year (photo page 20). The flowers are a delicate pink, about 30mm across, in inflorescences of approximately 7 flowers. The flowers do produce copious quantities of nectar, and so should be attractive to wildlife, though in our dank March this year only ants found them.

This hybrid appears to be hardy to -6^{0}C, which is not sufficient for it to be a practical proposition in Britain. In any case, its poor rooting would make propagation on any scale unrealistic. So this hybrid will be an interesting but rare curiosity, though it may have potential as a parent for further breeding.

My second wide hybrid, produced from a cross made in autumn 2006, is a *E. gunnii* x *loxophleba*. The *E. gunnii* mother is moderately vigorous and highly floriferous. *E. loxophleba* (York Gum) interested me because its inflorescences are unusually well-displayed for a eucalypt in this sub-genus. But one unexpected feature of the hybrid selection soon became apparent – its foliage and young stems become an attractive red in response to cold weather (photo page 20). This hybrid also roots very readily. Its achilles heel is its modest cold tolerance – again to only around -6^{0}C without damage. The easy

rooting has given me no shortage of plants for trialling, but of course the severe winters have taken their toll on many of these. The oldest plants outdoors are two on Guernsey, planted there in 2011. They are growing well, but fail to produce the stem and foliage colouration there; presumably this is a consequence of the mild climate. Plants outdoors in Kent and SE Ireland have survived the most recent winter quite well, and have the attractive colouration. No flower buds have been initiated so far.

My third success in hybrid creation is a (*E. gunnii* x *pulverulenta* 'Baby Blue') x *cernua* three-way hybrid. Both parents are highly floriflerous from a young age. The *E. cernua* father is dwarf and has scarlet opercula (caps on the flower buds) and yellow flowers. The hybrid has no trace of the glaucousness of the mother, and looks very much like the father. It too roots exceptionally easily. The original seedling (which germinated in 2009) initiated a mass of flower buds in summer 2012, while still in a pot, though most of the buds have since abscised; hopefully the remainder will flower this summer. This hybrid appears to be less frost-hardy than the other hybrids.

The latest set of hybrid seedlings are eight *E. vernicosa* x *cernua* that have germinated this spring. It is far too early to say whether all these seedlings will be vigorous or rootable, but if they are then the prospect of reasonably compact and hardy hybrids will hopefully be quite good.

Clearly, this work is ongoing, potentially for a long time. However, the results so far are encouraging in all but one respect. The difficulty is clearly that hardy eucalyptus mothers have not contributed sufficient cold tolerance for the hybrids to have any real potential in all but the very mildest parts of the British Isles. However, they may have potential in locations with more Mediterranean-type climates that experience some mild frost in winter. If any members have gardens in such areas, and would be interested in trialling such selections, do let me know!

Reference

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



VONNIE CAVE: PROFILE OF A FRIEND

Kathleen Longbottom

We have known Vonnie Cave since 2000, from when we were on the way to the Ross Sea, Antarctica, on a 32 day voyage from New Zealand. We set off from Dunedin and called at the Bounty Islands and then the antipodes. The next destination was Campbell Island. Rodney





Divaricating plants: close-up and grouped together



Otari Reserve, Wellington: *Pseudopanax ferox* showing juvenile (left) and mature (below) foliage



Russ, the organiser, who was briefing us on the wonderful flora we were to expect on this island, kept referring to a person we had not met before in order to verify his statements. This was Vonnie, and it transpired she usually takes to her cabin for a while on the first days of a voyage to recover from sea sickness.

The day on Campbell Island was magical, and was one of the highlights of my (long) life. We were very lucky to have calm seas and sunshine, a very rare occurrence. The mega herbs were the main attraction, with albatross nesting among the vegetation. *Pleurophyllum speciosum*, *P. criniferum*, and *Anisotome latifolia* were the main attractions. We were knee deep in these plants but Vonnie was able to point out small plants such as tiny orchids which would otherwise have been overlooked.

On the return leg we visited Macquarie Island which is Australian, and has some of the flora of Campbell, but the next real plant hunter's paradise was the Auckland Islands. We visited two of them, the main island and Enderby, the latter being another amazing place. This is where I first became aware of divaricating plants[1], more of which later. A whole article could be written on this island alone!!

But back to Vonnie. We arrived for a short visit last month at her Wanganui[2] home which she and her husband developed over many years. They also created the garden together but sadly her husband Harry died in 1989. It happened to be her eighty-fifth birthday, and the photographic society had organised a barbecue in the Bason, a public garden which Vonnie has overseen for many years.

Her garden is a delight, with something different around every corner. She and Harry had a great interest in camellias, so there are, I think, around 300 in the garden. Beneath some of them are swathes of clivias, not to mention amazing cymbidiums which flower prolifically. Another main feature is the collection of wonderful succulents. Vonnie has written three books on this subject, all with wonderful photography. Also in the garden is a huge *Puya* which sends up great spathes of beautiful jade green flowers.

Vonnie has just compiled a programme entitled *50 years of Pentax*. All those years ago she went to her first photographic convention, the next year she won a national award, and so from then on she was hooked. This and her love of all things flora has led to many things. The book writing started modestly with *Gardens around Wanganui* and has snowballed from there including photographs for other books in various countries around the world. She has also done some plant hunting trips including Austria, China and Western Australia,

where she has been nineteen times. Most were as leader of the group.

Vonnie has a vast knowledge of New Zealand plants, and is the photographer for *The Gardener's Encyclopaedia of New Zealand Native Plants*[3]. All this, together with the massive amount of work she has done for the Camellia Society around the world, led to her becoming a Member of the New Zealand Order of Merit in 2011. She is still full of enthusiasm about many things and is great person to know.

Earlier I mentioned divaricating plants (photos page 27). During my annual visit to Otari Reserve[1] in Wellington I discovered more about these fascinating plants. The one we might know best in this country is the wire netting bush *Corokia cotoneaster*. I know Jeremy Spon has one, and so have I! (*And so have I*! Ed.) I have now discovered there are an astonishing number of divaricating plants in New Zealand, and no definite conclusion has been formed for the reason. One suggestion is that the denseness of the bushes prevented them being grazed by the now extinct large flightless birds called moas. Another, more plausible idea, is that it has evolved to protect the plants from harsh exposed situations as the leaves and flowers are in the middle of the plant and are less likely to be damaged by frost and wind. This would certainly fit the case on Enderby Island where it was certainly harsh.

In most of these plants the habit is permanent, but there are some where it only occurs at the juvenile stage; for example *Dacrycarpus dacrydoides* (kahikatea), *Prumnopitys taxifolia* (matai), *Pennantia corymbosa* (kaikomako), *Plagianthus regius* (ribbonwood) and *P. divaricatus* (coastal ribbonwood). At the entrance to Otari one is confronted by a stand of *Psudopanax ferox* in its juvenile form (photos, page 28), but that and other juveniles are another story.

Those species which remain divaricating in the adult form include various pittosporums (*P. divaricatum*, *P. anomalum* and *P. obcordatum*); diverse members of the Rubiaceae including some coprosmas (*Coprosma virescens*, *C. crassifolia* and *C. rugosa*); *Discaria toumatou* (matagouri) which is thorny as well; the *Muehlenbeckia astonii* complex; *Myrsine divaricata* (weeping mapou); and *Melicytus crassifolius*.

PS If anyone is interested in visiting the Sub Antarctic Islands I can give them some information.

Notes

1. See also previous article by the author; Pentachondra issue 46, May 2011, page 25.
2. Wanganui is on the west coast of the North Island.
3. Cave Y. and Paddison V., 2002, *The Gardener's Encyclopaedia of New Zealand Native Plants* (2nd edition), Random House, New Zealand

Garden visits

APS members are welcome to visit me (your editor) if passing by – just contact me first! If you would welcome visitors to your garden please let me know and I'll put the details in Pentachondra.

SEED GERMINATION

Tony Entwistle

It is as well to start by reminding ourselves of the basic botany. A seed contains the fertilised (pollinated) embryo. Often minute, the embryo is surrounded by either the endosperm or the cotyledon, which contain the starch reserves of the seed. Enclosing this is the testa, often thin, and the pericarp, often hard, thick or woody. Seeds need warmth, oxygen, moisture and (sometimes) light to get started.

Seeds contain inhibitors which need to be leached out. This can happen very quickly with many 'easy' seeds once they become moist. Varying amounts of inhibitor are an evolutionary advantage strategy for the plant. If all its seeds germinated together they could easily be destroyed by subsequent harsh weather, such as a drought. Hence even with seeds which germinate quickly and easily there will always be a few latecomers – if you wait for them.

A few seeds are best sown as soon as they are ripe but most need a period of dry storage for their embryos to develop fully, at room temperature or in the fridge (in a container, kept dry with silica gel). Many seeds remain viable for years, for example *Callistemon* (bottlebrush) seeds, but seeds from some families, such as the Asteraceae (daisies) and the Apiaceae (carrot family), tend to have a short life.

Some seeds require particular environmental conditions to germinate, such as exposure to cold or heat. For example, exposure to cold occurs in nature when seed falling to the ground in autumn germinates the following spring. Cold stratification can speed up this process: seeds are sown normally for a few weeks, then transfer red to a fridge for a month or so, and then back to normal. Many trees, shrubs and hardy perennials need such treatment but the genus is not necessarily a guide. For example, some *Eucalyptus* species need stratification but others don't.

Hard seeds benefit from soaking in warm water overnight. For some, such as *Acacia*, near boiling water is even better. Hard seeds can also be rubbed in sandpaper, peeled, chipped or nicked to promote germination.

Other treatments involve synthetic or naturally occurring chemicals, a variety of which have been shown to stimulate germination, either alone or in combination. These include acetic acid, citric acid and concentrated sulphuric acid (for very woody seeds); bleach (1%); malt extract; ethylene, ethylene oxide, trichloroethylene (an anaesthetic – curious to put seeds to sleep in order to wake them up!); polyethylene glycol for vegetables (a strong laxative – maybe it will get those parsnips on the move!); gibberellic acid (GA3); cyanide (used for barley germination in

brewing); hydrogen peroxide (1%); rotenone (derris); potassium nitrate (200 mg per 100 ml); and smoke. Of these, ethylene, gibberellic acid and smoke are worth further mention.

Ethylene is given off by ripe fruit. One tip is to place a chunk of unskinned ripe banana inside the polythene bag with your sown seeds.

Gibberellins are natural substances found in all plants. There are many sorts but we are only concerned here with gibberellic acid (GA3). It boosts what there is in the embryo and acts via RNA and DNA to produce amylase which converts starch into sugar and gets the seed growing. GA3 treatment has been shown to eliminate the need for cold stratification in many seeds and has helped in germinating some previously 'impossible' items. Examples of Australian plants for which GA3 is reported to enhance germination include *Persoonia* species (geebungs) and kangaroo grass.

If you want to purchase some gibberellic acid try one of the sources listed in the box. You will be very lucky if you find any at a garden centre – if you ask for it you will be met with a blank stare as if you were talking gibberish!

I have written previously in Pentachondra (issue 42, May 2009, page 39) about the use of smoke but newer members may not have this information. It has been known for many years that there is excellent germination of many native plants after bushfires, which are common in Australia, South Africa, California and the Mediterranean. Smoke treatment is reported to help with the germination of many Australian genera (see box). Smoke papers and smoke granules can be purchased (see box,) or you can make your own smoky water although I have found this difficult.

Some Australian genera which include species responsive to smoke

Actinotus	Hibbertia
Adenanthos	Hybanthus
Agonis	Isopogon
Alyogyne	Kennedia
Anigozanthos	Lasiopetalum
Arthropodium	Lechenaultia
Billardiera	Leucopogon
Blancoa	Lomandra
Boronia	Macropidia
Brunonia	Patersonia
Burchardia	Petrophile
Caesia	Pimelea
Calytrix	Pityrodia
Clematis	Pomaderris
Codonocarpus	Ptilotus
Conospermum	Ricinocarpus
Conostylis	Scaevola
Dampiera	Spyridium
Dianella	Stackhousia
Epacris	Stirlingia
Eriostemon	Stylidium
Exocarpus	Tetratheca
Gahnia	Thysanotus
Geleznowia	Trachymene
Grevillea	Velleia
Gyrostemon	Verticordia
Hakea	Xanthorrhoea

It is obvious that further detailed information about treatments to stimulate germination is needed. and both amateurs and professionals can contribute through experimenting, testing and trialling. Please let us know what you have tried and how well it worked, or not, as the case may be!

PS In my view the best book on this subject is *Seed Germination* by N. Deno, 1993, with two supplements. Download from hdl.handle.net/10113/41279.



DIY SMOKE TREATMENT

Jeff Layman

Basically, I put several leaves (usually *Eucalyptus*, but if not that whatever Proteaceae are available) on a small wire frame (such as chicken wire) inside a small earthenware flowerpot or something similar, placed about 5 cm off the bottom. The pot is put in the propagator with the well-watered seed pots. A BBQ gas-lighter is used to set fire to the leaves. As soon as they have stopped burning the propagator lid - vents closed! - is put on. I check that the leaves really have stopped burning, as I missed that once and melted a small area of the lid!!! The leaves usually continue to smoulder for a minute or two, but I leave the lid on for a couple of hours. I then lift the lid and use a small hand sprayer to wet the surface of all the pots so that any smoke in the water is carried down to the seeds. I repeat the smoking and spraying 2 or 3 times over the next fortnight, depending on

Where to buy seed treatments

Gibberellic acid

Sigma Aldrich Co UK supply 1 gm bottles for £50 and 500 mg bottles for £37. This will last a very long time as a solution of 100 mg / 100 ml is all that is needed. It does store well at room temperature. Their address is The Old Brickyard, New Road, Gillingham, Dorset SP8 4XT. Or 100 mg sachets cost $4 plus $1.50 p&p from JL Hudson Seeds, Box 337, La Honda, California, 940200337.

Smoke products

A packet of 5 papers made from fynbos smoke from Kirstenbosch Botanic Garden costs R100 including p&p. To purchase search for "Kirstenbosch instant smoke plus seed primer". Jungle Seeds, (PO Box 45, Watlington, OX49 5YR) sell the same product for £12 plus.

The Australian company Nindethana seeds (www.nindethana.net.au/growing-tips/treatments.aspx) also sells smoke paper, starting at $AU4 for one disc (plus p&p), enough to make 50 ml of smoke water. They also offer smoked vermiculite starting at $AU6 for 100 gm (plus p&p).The recommended application rate is 120 gm per square metre.

howmuch germination has taken place. All seeds are treated in this way, even if it has been reported that smoke treatment could impair germination.

Originally, I soaked the Australian leaves in a strong solution of potassium nitrate. They were dried well, and then I used to set fire to the leaves. They soon went out, but the potassium nitrate kept them burning a bit longer than if I omitted it. I now don't bother with that step now, I must admit.

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GERMINATION TIMES

Judy Clark

In his article on page 31 Tony Entwistle summarises what a seed needs to germinate. He also explains how seed has to be ripe, or ready to germinate, and outlines some of the methods that can be used to 'wake up' a seed so that it does germinate, or does so more quickly than might otherwise be the case. A third factor that needs to be reckoned with is seed life, or how long the embryo remains viable. As Tony points out, some seeds have a naturally short life, while post collection longevity depends crucially on how well a seed is stored. That noted, once your seed is contented and ready (or primed) to wake up, for how long might you expect to wait before it germinates?

I have kept records of germination times for many of the Australian plants that I have tried to grow from seed. The table presents some of this data, all of it for species that I have found reasonably easy to germinate. Most of them are from the Myrtaceae, Asteraceae, and Fabaceae families.

For members of the Myrtaceae (*Beaufortia*, *Callistemon*, *Leptospermum* and *Melaleuca*) I use the bog method, sitting the pots in a tray of water. I usually surface sow small seeds, water them in,

Germination times

Genus or species	Time, days[1]
Acacia	11 - 67
Allocasaurina pusilla	34
Asterotrichion discolor	7
Aotus ericoides	19
Beaufortia sparsa	16
Callistemon	7 - 31
Brachyscome	5 - 7
Callitris rhomboidea (stratified first)	51
Calothamnus rupestris	15
Hardenbergia violacea	20
Helichrysum scorpioides	22
Kennedya coccinea	7
Isotoma axillaris (needs light)	15
Leptospermum	15 - 31
Linum marginale	18
Melaleuca	12- 34
Orthrosanthus laxus	38
Pelargonium australe	29, 42
Rhodanthe chlorocephala subsp. *roseum*	4,5
Senna 'artemisoides'	12
Templetonia retusa	21
Viminaria juncea	18, 21
Xerochrysum viscosum	16

1. Where a range is given it includes all the species in that genus that I have tried. Where more than one time is given I have tried the same species more than once.

and then cover them with perlite. Hard seeds, such as those of *Acacia* species, I usually soak for varying times, depending on what I have read about their germination needs. Similarly, if I have read that smoke might assist germination I add smoke granules to the pot. All my seed pots are kept in a greenhouse and I did not use a heated propagator for any of the species listed. I don't by any means claim that the methods I use are the 'right' methods for the plants concerned, just that I got a result using them.

I have had lots of failures, but with practice I have got better at understanding what might work, and better at achieving it. Even so, as long as I have enough seed I tend to keep some back in case of failure, or failure at the seedling stage. Cot deaths are another story and one reason for my sowing seed of the same species more than once is that it germinated and then the seedlings died.

Lots of Australian species are known to be difficult from seed (and in Australia these plants tend to be propagated vegetatively). If you really want a plant it is worth experimenting: try another soil mix or a different treatment, sow at another time of year or in different conditions. It is also well worth keeping pots of seed, especially 'difficult' seeds, for as long as you've got the space to do so. You do need to remember to tend to them periodically but if you do there's every chance that one day you could get a pleasant surprise.

BITS AND PIECES

The seed site

The seed site (theseedsite.co.uk/), which Jeff Layman suggested that members might be interested in, is a website devoted entirely to seeds. It looks to be very comprehensive, with topics including collecting seeds, storing seeds, sowing seeds, methods of germination and germination times, plus hundreds of photos of seeds, seedpods and seedlings. The range of plants is huge but it does includes a few Australasian species; for example *Callistemon*, *Leptospermum*, *Hardenbergia*, *Alyogyne* and *Cordyline* are to be found on the germination database which includes germination times based on the author's own experience.

Australian plants at Kew

I went to Kew in March primarily to see the David Nash exhibition. I would have paid a visit to the Temperate House anyway but it so happened that some of his larger sculptures had been placed amongst the collections there. These works, in wood and bronze, looked marvellously natural in among the Australian (and other) plants, but I was glad I went for another reason: the Temperate House, designed by Decimus Burton and the largest surviving Victorian glasshouse in the world,

is about to undergo a comprehensive restoration.

There were already signs of preparation for moving some of the larger plants, such as the channel dug around a big *Banksia serrata*. According to the horticulturalist I spoke to plants will start to be moved in 2014, and the Temperate House will then close to the public. (She didn't give a specific date).

The Temperate House holds plants from Africa, Australia, New Zealand, Asia and the Pacific. Along with restoration of the glasshouse the plant collections too will be rejuvenated. Hopefully this will prove something to look forward to, but it looks as if it could be quite some time before the work is completed. This year could be the last chance for quite some time to see less hardy southern hemisphere plants at Kew.

New Plectranthus species discovered in Papua New Guinea

Maurits de Vries alerted me to an interesting news item which had passed me by. Earlier this year a team of local and international scientists spent four weeks surveying the Hindenburg wall, a 50 kilometre stretch of limestone in the Papua New Guinea Mountains. The expedition discovered over 80 new species of plants and animals including insects, bullfrogs, butterflies and carnivorous plants. Plants found included a new species of *Rhododendron* and a new species of *Plectranthus* (cockspur).

Plectranthus belong to the dead-nettle family (Lamiaceae) and some (many?) species are very beautiful. Unfortunately as far as I know none of the attractive species have much if any hardiness: my soft and silvery leaved *Plectranthus argentatus* plants keel over at the first touch of frost. Fortunately this is an easy species to propagate by cuttings which will overwinter happily in a just frost free greenhouse.

Royal Academy exhibition

The Royal Academy exhibition **Australia**, which will run from 21 September to 8 December 2013, will be the first major exhibition of Australian art to be seen in Britain for over half a century. It spans 200 years from 1800 to the present day, will include over 200 works, and, if the preview at www.royalacademy.org.uk/exhibitions/australia/ is anything to go by, promises to be worth attending just for the early landscape paintings. (Thanks to David Ware for sending in this news.)

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