PENTACHONDRA

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Lophomyrtus x ralphii 'Wild Cherry'

AUSTRALASIAN PLANT SOCIETY

Promoting the cultivation and conservation of Australasian plants, and their closest relatives, in northern hemisphere gardens

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APS NEWS

From the Editor

2021 has not been an easy year, in general and for our Society. Your committee trusts that members have managed to keep covid at bay and sends condolences to those who have lost family and friends. Hopefully you have all found some solace in plants and gardening, especially during lockdowns and if shielding.

There have been some big changes in our Society. Most members will know that Robbie Blackhall-Miles, our chairman, felt that the time had come to step down from this role. In the seven years that he has occupied it he had done an enormous amount for our Society.

In his words: *My time as chairman of the APS has seen so many things happen for the society: we set up a new mission and strategy for the society, we got a new logo, we attended Hampton Court Flower show and we set up a new website. We also re-evaluated our constitution and we changed the way we do Annual General Meetings. We built a library, we joined the RHS plant societies group and we affiliated ourselves with Plant Heritage so that we could work harder for plant conservation. Most of all, we were one of the few plant societies to see its membership grow.*

For all this and more Robbie has the heartfelt thanks of every member of the APS committee, and I'm sure from every member too.

Two other difficulties that surfaced in 2021 are our dependence on PayPal to collect membership subscriptions and obtaining stock for the seedlist. Do read the Treasurer's report and if you pay your subscription via PayPal please consider whether you use another method. And keep your fingers crossed that we can resolve the seed list problems.

Finally, I apologise for this issue of Pentachondra arriving a little late. It is dated December and it should come out in December. I feel it is time that Pentachondra had a new editor but in the meantime I desperately need some help!

Happy New Year, and may all your gardening dreams come true in 2022.

From Robbie Blackhall-Miles

After a relatively quiet year last year all things planty seemed to step up a gear for me

It doesn't look like this situation is going to quiet down any time soon for me either. With that in mind I am sorry that the time has come for me to step down as chairman of the Australasian Plant Society.

Everyone on the committee gives their time voluntarily and, as is the way in life, sometimes more free time is available to give and sometimes less. Over the past few years it has been increasingly difficult for me to find sufficient time in my schedule to give to the society and this summer it became apparent that I was not going to be able to commit to the APS over the coming years.

The APS and all of you, its members, are very important to me and so, of course, I will be remaining a member of the Society, playing my part where I

can, enjoying the benefits of membership such as the seed list and Pentachondra and even getting actively involved in things where I can.

At some point in the future, I may even find myself able to play a committee role in the society again and at such a point I will eagerly step up and give my support. Meanwhile the rest of the current committee will be remaining in their roles and assisting a new chair in moving the society forwards.

I have enjoyed my chairmanship greatly, I hope I leave it in a better place than when I came to it and I look forward to seeing how the society progresses in the future.

14 October 2021

Subscriptions are due!

Subscriptions are due on **1st January 2022**. A renewal form is enclosed with this issue for those who who do not automatically renew their membership. Annual subscriptions are £15 for members resident in the UK and £18 for members resident elsewhere.

If you pay by standing order or PayPal, or you have already paid for 2022, you do not need to do anything, **unless** any of your details have changed. If so, please contact the Treasurer directly.

And if after reading what the Treasurer has to say on page 4 you wish to change your method of payment please don't forget to tell him!

The APS is looking for a new chairperson

Throughout all the changes of the past seven years Robbie as chair has provided the guiding hand that has steered our society towards a better future. This will remain the aim of the new chairperson, whether actively driving change or simply overseeing it.

The chairperson's main duties are:

- Acting as a sounding block for the committee in the decisions they take on behalf of the society.
- Acknowledging and undertaking correspondence on behalf of the society and distributing such correspondence to relevant officers or members for response.
- Dealing with requests for help and advice and engaging with the committee and wider membership on these matters.
- Preparing the agenda for the AGM and any other meetings and acting as chair of such meetings.
- Providing a written or verbal annual report at the AGM.
- Driving the society forward and keeping it motivated by its mission and goals.

Could you take on this role?

The committee hopes that a chairperson elect will come forward before the 2021 AGM which will be held on the 19th February 2022. Be assured that we will all do all we can to support the new chair as they settle into their role. If you are interested and/or would like to find out more please contact **Jeremy Spon** at **membership@anzplantsoc.org.uk**.

Wanted: help with Pentachondra

The May 2008 issue of Pentachondra was my first as editor. This means I have been doing the job for 13 years. I am not getting any younger and there are other things I would like to have more time for, not least my garden! If Pentachondra is to continue in its present form then it's time for a change.

Currently the editor's job involves the following:

- obtaining articles and photographs from members and other sources;
- checking and editing contributions for spelling and grammar, plant name accuracy, and (very infrequent) factual errors;
- arranging and formatting articles and photographs to produce a forty page publication;
- proof-reading the finished version;
- distributing Pentachondra to members.

I can see that this could seem rather daunting , but there is no reason why all of these tasks should be carried out by one person; it's just how things have always been done. If I can't (yet) entirely relinquish the editor's job there are three aspects with which I really need help.

First, I would really welcome someone to take over the production stage: that is, taking the contributions and turning them into printer ready copy. It's hard to estimate how long this takes me as I do bits as I go along and I use Word 2007 - maybe a couple of days? I would provide all the material; all the production editor would have to do is put Pentachondra together.

Second, distribution, a bit boring but absolutely essential. Distribution involves collecting the magazines and any inserts from the printer; checking the current membership and printing out address labels; sticking labels and stamps on 200 plus envelopes; stuffing the envelopes; and posting them. All in all this takes me about a day. The printer we use is located in Hastings but the magazines could be sent on by courier. Alternatively a more conveniently located printing business could be contracted.

Third, Pentachondra is what it is because members contribute articles. Sometimes I have been inundated with contributions while at other times (including this issue) I receive fewer. It would be great to have one or more contributors willing to provide something like a regular column.

If you are interested and/or would like to find out more please contact **Judy Clark** at **editor@anzplantsoc.org.uk**. Any expenses incurred are of course reimbursed.

AGM 2021

The 2021 AGM had to be postponed and is now scheduled for Saturday 19th February 2022, at 5pm, on Zoom. We know this is difficult for some members but we cannot at the moment risk organising a face to face meeting and then having covid intervene to prevent it. Invitations will be sent out nearer the time - keep an eye on your inbox.

Events 2022

Covid meant that in the end all events planned for 2021 had to be cancelled. We hope we are not being too optimistic in planning some for 2022.

RHS Wisley Specialist Plant Society Show 2022
Saturday and Sunday 18th and 19th June

The APS and the Hebe Society are joining together to put on a display at the RHS Specialist Plant Society Show. The 2020 and 2021 events were cancelled but in previous years this show has proved an excellent way to promote the APS and show a wider audience some of the wonderful Australasian plants that can be grown in the UK.

If you are interested in helping at the show and/or providing plants for the display please contact **Gary Firth** at **meetings@anzplantsoc.org.uk**. The Wisley entrance fee is waived for all helpers.

RHS Wisley Hilltop Display: Saturday 8th October

This display, which will be in the new centre of horticultural excellence at RHS Wisley, Hilltop, will be another joint effort with the Hebe Society, and provides another opportunity to promote the APS.

If you are interested in helping on the day and/or providing plants for display please contact **Gary Firth** at **meetings@anzplantsoc.org.uk**. All helpers get free entry to Wisley and members of the APS and the Hebe Society who are not RHS members will get entry to the gardens on the day at the reduced price of £7.50.

Abbotsbury Subtropical Gardens Saturday 9th July

Abbotsbury Subtropical Gardens near Weymouth in Dorset are one of your editor's favourite places to see Australasian plants. The variety is huge and includes the National Collection® of the New Zealand genus *Hoheria*. There is continual experimentation to see what will thrive in the ground in this admittedly mild location, so you never know what you might come across. Abbotsbury is also noted for its rhododendrons and hydrangeas, its camellia groves and its magnolias, not to mention stunning views of the Jurassic Coast and Chesil Beach. Plus there is a great specialist plant nursery, parking is free, and adult entry is only £10.

APS member Sean Boast who is in charge of the Australasian areas and does a lot of propagation has kindly agreed to show us round. Further details will be provided nearer the time. In the meantime, if you want to get an idea of what Abbotsbury has to offer then try http://abbotsbury-tourism.co.uk/gardens/gallery/.

Wakehurst Place
August

Wakehurst Place (part of Kew gardens) near Haywards Heath in West Sussex is another favourite of your editor. Is anyone interested in joining me on an August visit, specifically to see the Southern Hemisphere Garden, and more generally for some socialising and lots of plant chant. If so, please contact **Judy Clark** at **editor@anzplantsoc.org.uk** and I'll arrange a date. Wakehurst is fairly accessible by public transport and I would be happy to collect any takers from Haywards Heath station.

Planning future events

Could you, with help from the committee, host or organise an APS meeting? In the past we have visited public parks and gardens, specialist nurseries, and private gardens. In particular we are very aware that the

all the events planned for 2022 are located in the south of England. One reason for this bias is that almost all your committee members hail from the south of England and we are much less familiar with places that APS members might like to visit in other parts of the UK. Organisation is also much easier if there is a local person to help.

If you have any ideas for meetings for 2022 or even 2023 **Gary and Maria** at **meetings@anzplantsoc.org.uk** would be very pleased to hear from you.

From the Treasurer

Over the last few years, the APS has become increasingly dependent on PayPal to collect membership subscriptions and other payments. However, members may not be aware that PayPal deducts a fee from every payment received, a fee which is rather higher than that charged by banks. For every £15 annual subscription the APS loses 74p. Last year, (2020,) PayPal deducted fees totalling £88.22 from our income. As more and more new members join online, and pay using PayPal, these fees will increase.

There is also a potential problem with money laundering regulations - yes, apparently these do apply to us! If there are perceived deficiencies in the information that PayPal considers is needed to comply with these regulations our account could be suspended. This has happened to other PayPal users and if it happened to us we would be unable to collect members' subscription payments, with potentially disastrous effects on our Society's finances.

In view of this, the committee would like to reduce our dependence on PayPal by encouraging members to consider switching to other methods of payment, such as online bank transfers or standing orders. In the future we will also be looking into using Direct Debit to collect subscriptions, and enabling new members to pay with credit or debit cards outside of PayPal.

I am therefore asking members who currently pay their subscriptions via PayPal (almost entirely by recurring payments set up when they first joined) to consider setting up a standing order (that is, a recurring annual payment) from their bank account to replace their PayPal payment. (**NB** This only applies to members resident in the UK as PayPal remains the only practical way for us to take payments from overseas members.) Most people will be able to set up a standing order themselves using online banking, but if needed the Treasurer can supply a form to be sent to your bank.

As an incentive to make this change, the first payment taken under the standing order can be set up for January 2023, regardless of when renewal is due during 2022, which means that any member setting up such a standing order will have a number of months membership free.

Alternatively, if a members prefers their membership not to be renewed automatically, they can ask for their PayPal recurring payment to be cancelled, and pay at the beginning of the year using online banking when they receive a renewal reminder in the December issue of Pentachondra. Members who currently pay by cheque may also find it more convenient to pay by bank transfer. In any case, the banking details needed to set up payments are as follows:

Bank: Natwest

Account Name: Australasian Plant Society

Sort Code: 60-19-24

Account Number: 29872677

Anyone who has any queries about this, including needing a standing order form, should contact the Treasurer (**Jeremy Spon** at **membership@anzplantsoc.org.uk**). And if you do set up a standing order, please notify the Treasurer, so that your membership details can be updated, and any PayPal payments halted.

Jeremy Spon

Seedlist news

Unfortunately our efforts to import seed for the seedlist have been thwarted by circumstances beyond our control, namely a Royal Mail fiasco. We are really sorry about this but the problem will take some to sort out. We hope members will bear with us.

Seed is still available and can be ordered using the 2021 list. However many items are in short supply so before ordering please contact APS seed manager **Janet Miller** at **seeds@anzplantsoc.org.uk** to find out what is available. If you have lost your copy of the seed list it is available from the members area on the APS website **www.anzplantsoc.org.uk**.

Write for Pentachondra

As always, many thanks to those members who have taken the time to contribute to this issue. Articles based on members' experiences of growing Australasian species provide a unique are how we increase our joint knowledge of how to cultivate them in the northern hemisphere, and represent a . Do consider contributing to the next issue - everyone has something to share.

Essentially, the only thing required of a piece for Pentachondra is that it has some connection with Australasian plants and their close relatives. If you are short on inspiration try flipping through a back copy or two to see the topics others have written about: particular species or groups of species; plants they have cultivated; growing under specific conditions, such as in containers; their own gardens; places they have visited; books they have read; and so on. Length is not important, and if you don't fancy writing an article photographs on their own are welcome as long as they come with a caption.

The deadline for the next issue is **31st March 2022**. Please send contributions as word documents or similar (not as pdfs) and please do not compress photographs. If you have any questions about contributing please don't hesitate to contact **Judy Clark** at **enquiries@ anzplantsoc.org.uk**.



UPDATE ON THE GREENHOUSE CHAINSAW MASSACRE

Jeff Layman

What a strange growing year 2021 has been. Rain, drought, wind, cold, heat, and we're not at the end yet. Just about everything I cut back in the greenhouse (see Pentachondra 66, May 2021, pages 5-7) has started regrowing, with the exception of a *Calothamnus quadrifidus* (one-sided botlebrush),

and possibly a *Chorizema cordatum* (flame pea). As I have another *Calothamnus quadrifidus* (supposedly subsp. *homalophyllus*) which looks pretty much identical, it doesn't really matter. The *Leucophyta brownii* (cushion bush, which it wasn't), and was not a *Melaleuca*, has started regrowing. I eventually found a buried label, which I could barely read, but seemed to be *Ceratopetalum gummiferum* (NSW Christmas bush). I think I remember getting APS seed of that many years ago, as I hadn't tried any Cunoniaceae. That plant is growing back well, and has several shoots around 80 cm long.

Another plant not mentioned in the orginal article, but coming back well, is *Hymenosporum flavum* (native frangipani). This flowers well most years - allowing for the ravages of tortrix moth larvae - and is a strong grower. I haven't tried cuttings, but if I could get any to root it might be worth trying one or two outside in a very sheltered spot.

I am hoping that the *Knightia excelsa* (rewarewa, NZ honeysuckle), which has sprouted from its stump and is now around 75cm tall (photo page 9), will follow its example. All the other plants appear to be growing back, some rather too vigorously! In particular, the *Isopogon formosus* (rose coneflower) has needed to be cut back twice since last the major hack. It really does grow at the most amazing rate, but it's worth it as it flowers well.

One oddity is that the *Chorizema cordatum* seems to have disappeared. I can find no trace of its main stem, although it could be hidden in a large clump of *Anigozanthos flavidus* (tall kangaroo paw, red form). I do have a G*astrolobium cuneatum* (river poison) nearby so it's not a substantial loss. Finally, as expected, *Allocasuarina verticillata* (drooping sheoak) did not survive being dug up and moved.

One of the other plants I hacked was *Bauhinia yunnanensis*. As it's name suggests it's not an Oz plant but it has responded amazingly. I've had it for at least 15 years and it had never flowered. Funnily enough, when we last visited Doug Smith I saw one growing in one of his greenhouses. The plant was at least twice as big as mine. I asked him if his had flowered, and he said it hadn't. Anyway, mine now has!

For the other non-Oz plants, unfortunately the *Macfadenya unguis-cati* has still not flowered. I've been trying to get this in flower, both inside and outside a greenhouse, for around 20 years. I know others in the UK have flowered it, but I have had no success. Its days in the greenhouse are coming to an end. *Iochroma australe* (now *Eriolarynx australis*) has already grown back and flowered. I have a couple of these outside, not even in a sheltered place, and they survived last winter. If they survive this winter, I might remove the one in the greenhouse and grow msomething else in its place.



TASMANIA – LIFE ON A GREEN ISLAND

Kylie Hodges

I spent the first 30 years of my life in Tasmania, the beautiful island state at the bottom of Australia. Tasmania has a unique set of microclimates. Standing in the centre of Hobart within

30 minutes by car you could be on top of a mountain, in the centre of a temperate rainforest, or on the beach. You may have snow on top of Kunanyi (Mount Wellington) whilst basking in glorious sunshine on Sandy Bay beach. There's a joke in Tasmania: 'if you don't like the weather, come back in half an hour'. I grew up on Mount Nelson (a Hobart suburb), interestingly named after David Nelson, who was a gardener at Kew Gardens and later a botanist on the third voyage of Captain James Cook.

As many people have experienced, the coronavirus lockdown and the various restrictions have been very difficult. Although I have lived in England for 20 years, I still have strong family connections in Tasmania, and I had plans to go back for Christmas 2020. There is absolutely no sign that Tasmania will reopen to overseas travellers any time soon, and as I write this, Hobart has entered a snap lockdown. To cope with the distance and the homesickness I devised a plan to plant some of the trees and shrubs of my childhood in my front garden. My mother is a very proficient plantswoman with an encyclopaedic knowledge and from afar has been instrumental in helping me choose plants and adapt them to life in my north western garden, in Bury on the outskirts of Manchester. I also joined the Australasian Plant Society to help me with my knowledge and to meet others who share a passion for these amazing plants.

I had a longing for a *Eucalyptus*; these trees are the basis of my childhood memories. As a Brownie I even planted one at the Royal Tasmanian Botanical Gardens in Hobart. I am reliably informed it is still there and growing magnificently. Specifically for me the tree of my childhood is *Eucalyptus globulus* (blue gum). One of the limitations I have is that I live in an end of terrace ex council house property, so my desire for a huge gum tree was vetoed by my husband. To my delight, *Eucalyptus gunnii* (cider gum), endemic to Tasmania is easy to obtain here. I am growing mine in a pot (photo opposite) and intend to coppice or pollard it every 3 years or so to keep it small. Although the young leaves are prized in flower arrangements here in the UK, it's the mature, long green leaves that have a stronger scent that I love.

I have owned a *Callistemon* 'Splendens' for some time now, with pride of place in the centre of the garden, by a window. It reliably and spectacularly blooms every year, albeit about 3 weeks later than those grown by my southern friends around London and its surrounds. I decided to add a *Callistemon pallidus* this year. These lemon bottlebrushes grow on the foothills of Kunyani, where I spent my teenage years, going on bush walks and meeting friends for adventures. It has yet to bloom and I look forward to updating you with stunning pictures of it next summer!

To accompany my plants in the front of my house I have chosen *Acacia dealbata* (silver wattle). Once the wattle blooms you know that winter is finishing and spring is well and truly on the way. It also marks the beginning of the hayfever season, but perhaps that is the cost of the beautiful fluffy yellow flowers that cheer me up so. I am not holding my breath for flowers this spring but time will tell.







above
***Eucalyptus gunnii* (left) and *Billardiera longiflora* (right) in Kylie Hodges' garden**

left
***Knightia excelsa* in Jeff Layman's greenhouse, resprouting well after being cut back to 30 cm**





above:
***Grevillea gillivrayi*, Grand Terre, New Caledonia**

left:
Songlines: Tracking the Seven Sisters Artwork by Tjampawa Katie Kawiny evoking the desert carpeted with flowers after rain

I then went on a hunt for *Leucophyta brownii* (cushion bush, which in the UK is largely sold under it's previous name of *Calocephalus* in the UK) In Tasmania these lovely cushion like plants are mainly seen in seaside settings, where they form large cushions. In the UK they are often treated as annual plants and used to provide a silvery filler for Christmas seasonal baskets. I have these in pots at the moment, at the feet of my other Australian plants but I am hoping to try and encourage them on the ground. I don't think the drainage in my garden is quite good enough, but all we can do is try!

My latest addition was my mother's suggestion of her favourite bush plant, the Tasmanian endemic *Billardiera longiflora* . This climbing plant is often found scrambling over trees and shrubs in the bush, however in my garden it's happily twining it's way around an obelisk (photo page 9).

My absolute favourite plant of my homeland also features in my garden. Now I find that this plant is so common in the UK I often wonder how many people know it is found in Tasmania. I am referring to *Dicksonia antarctica,* one of three tree fern species native to Tasmania. When I was growing up was always called man fern. Mine isn't a tree and won't be for a good while yet, but as I type this in October, it is enthusiastically producing more fronds and I have great hopes for it. I hate using micro plastics so I am currently knitting it a 'cardigan' of sorts with pure wool, to protect it from frosts, but also to provide a source of mulch. Whilst many of my Tasmanian plants are in pots, my 'tree' fern is in the ground as I feel it will be better there in terms of moisture retention.

I have long wish list now, including *Tasmannia lanceolata* (pepper berry) and of course I would need two, a male and female; a *Telopea truncata* (Tasmanian waratah), although I must confess I prefer the New South Wales emblem, *Telopea speciosissima*; and huon pine, *Lagarostrobus franklinii*, which I have recently discovered is available in the UK. These pines are now protected, and it makes me sad to think we actually owned a huon pine table when I was growing up. I have been privileged to see these unusual trees growing in the wild, some of which are estimated to be over 2000 years old.

I hope over time to increase my skills in plant propagation and participate more in the life of the Australasian plant society. I am very much an enthusiastic beginner.



GREVILLEAS OF NEW CALEDONIA

Peter Olde

This article first appeared in the ANPSA (Australian Native Plants Society (Australia)) Grevillea Study Group Newsletter 110, June 2018 pages 6-8, and is published with the permission of the author.

New Caledonia is an isolated French-administered archipelago in the South Pacific Ocean comprising several islands that lie approximately 1200–1500 km east of Townsville, Queensland. It is situated at the northern end of what has recently been recognised as the eighth continent of

the world, Zealandia. Zealandia is an almost entirely submerged landmass and is recognised as a drowned continent because of the extent, thickness and density of its crust. It was once part of Gondwana but rifted from Antarctica between 150 to 85 million years ago (mya), and from Australia, to which it was attached along its eastern coast, between 85–60 mya. By a process of sea-floor spreading, it drifted to its present position about 50 mya.

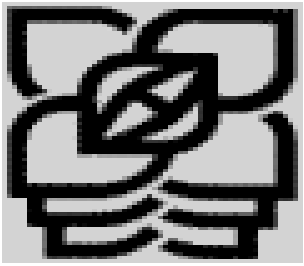
The continent consists mainly (93%) of submerged continental shelf, but was completely submerged 23–25 mya, according to geological evidence. Subsequent tectonic movements have seen New Caledonia, Lord Howe, Norfolk and New Zealand re-emerge as islands. New Caledonia re-emerged on a ridge after a series of folds in the earth's mantle during which oceanic mantle obducted over the original Cretaceous schist. This led to the formation of a thick layer of ultra basic substrates, including peridotite, ferricrete, serpentinite and laterite. The bed-rock is high in nickel, magnesium and iron and very low in other nutrients. Unlike New Zealand at the southern end of Zealandia, volcanism played no significant part in its formation.

The main island of New Caledonia, Grande Terre, is the third largest in the South Pacific and is a landmass of 16,000 sq km. with a mountainous backbone, covered mainly in rainforest. The diverse climatic and geological conditions and the mountainous relief of the main island have given rise to a series of vegetation types with an exceptionally rich diversity of endemic species,' the main component of which is evergreen rainforest with a high number of ancient ferns such as *Angiopterisevecta, Marattia* and tree ferns. The rainforest on another island, the Isle of Pines, is developed mainly on limestone. The geography of Grande Terre features two rainforest types, highland and lowland, as well as areas of heathland known as 'maquis', coastal mangrove flora and dry tropical forest (now rare).

Much or all of its land surfaces appear to have been submerged for up to 20 million years at some point, reemerging in the Eocene between 43 and 25 mya. Under this hypothesis, all endemic Gondwanic flora must have been extinguished by submersion. Yet Gondwanic-derived flora today comprises the major part of the endemic New Caledonian rainforest flora. In fact, New Caledonia has the highest rate of endemic plants anywhere in the world. The conflict between the geological and biogeographic evidence has resulted in several studies over recent years. The main conclusion is that long-distance dispersal and some outcropping islands with remnant flora allowed for reintroduction to the newly emergent land mass. However, the situation is not straightforward. There are 20 species of *Araucaria* (14 endemic) in New Caledonia, a gymnosperm family with a lineage dating back some 250 million years. Although it might be assumed that the endemic species of New Caledonia evolved there from plants that originated when it was part of Gondwana, molecular phylogenetic evidence suggests that all species are sister to the Norfolk Island pine, *Araucaria heterophylla*, which arrived there relatively recently by cross-water

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dispersal. The endemic *Araucarias* must have evolved quickly and relatively recently. The same inferences do not apply to other Gondwanic relics such as *Amphorogyne*, *Paracryphia* and *Phelline*, leaf cuticle fossils of which have been found in New Zealand, suggesting a former wide distribution and contraction of the Gondwana flora.

There are 43 species of *Proteaceae* in New Caledonia which are divisible into nine genera, one of which is *Grevillea*, with three endemic species. All genera appear to have evolved from one or two dispersal events. The *Grevillea* species are found in the maquis or rainforest margins, not in the rainforests. Maquis vegetation has been characterised by Bramwell (2011) as '*low, sclerophyllous, evergreen, heathlike plants with stunted Araucaria trees and is found from sea level to the mountainous regions on Grande Terre, and other nearby islands*'. The maquis is a response to the special conditions of the depauperate, ultrabasic substrate soils, such as peridotite and serpentinite, rich in nickel, magnesium, chromium and manganese which are toxic to many plants. Peridotite is a dense, coarse-grained igneous rock consisting mostly

of the minerals olivine and pyroxene. It is also ultramafic, as the rock contains less than 45% silica. It is high in magnesium, reflecting the high proportions of magnesium-rich olivine, with appreciable iron. Many component species have spectacular flowers and there is much variation in species composition. One of these, *Dodonaea viscosa*, was perhaps the most spectacular. Difficult to believe it is the same species as the Australian plant.

Both *Grevillea exul* and *G. gillivrayi* are found in abundance on maquis, sometimes growing together, close to Noumea, although their distribution is much wider. Perhaps the most beautiful is *G. exul* subsp. *rubiginosa* which is a hardy plant that forms into an attractive dark green shrub or small tree. It is mainly distributed in the south of Grand Terre with scattered populations in the north. Terminal, bird-attractive, white or cream toothbrush racemes en masse are a feature and the flowers and leaves have a variable indumentum of red-rusty hairs. A rare pink-flowered form, probably a sport or genetic mutant, has been photographed but has not been seen in recent years. Robert Virot (1968) divided the species into two subspecies, with two varieties in one and two forma in the second. There is considerable variation in leaf width and the characters used to define the different infraspecific characters are somewhat nebulous. I felt safe referring to all the plants simply as *G. exul*. This species is widely used, like all *Grevillea* species to revegetate mine sites and we in Australia should consider growing it from seed and planting it here. Of all *Grevillea* species, *G. exul* most closely resembles *G. robusta* which is widely planted in New Caledonia. The two may share a common ancestor. According to Virot, *G. exul* is confined to serpentine substrates. Serpentinite is a metamorphic rock that is mostly composed of serpentine group minerals, antigorite, lizardite, and chrysotile which are produced by the hydrous alteration of ultramafic rocks. These are igneous rocks that are composed of olivine and pyroxene (peridotite, pyroxenite).

Grevillea gillivrayi (photo page 10) is mostly found in the south of Grand Terre and on a few adjacent islands in maquis. The inflorescences are erect, cylindrical and vary in colour from cream to red, most being a shade of pink. They have an untidy habit, usually with leaves at the base and emergent whip-like canes carrying the flowers and a few leaves above. Virot divided the species into two varieties, one of which var. *glabriflora*, is known from two specimens collected on Mt Dore. Unfortunately, var. *gillivrayi* has also been collected from this location and the recognition of two formal varieties is hardly warranted, if at all. There is some variation in leaf width. A narrow-leaved form is found around the Dumbea River near Noumea and in a few other places but there are many overlaps in both shape and width between the two varieties that prevents classification. Recent writers have confirmed my own view that the recognition of infraspecific taxa is not justified.

Grevillea meisneriis similar in habit to *G. gillivrayi* but the inflorescences are much shorter and decurved. The pistils are longer than all other species and the perianth is quickly deciduous. It is

found mainly in a few locations in the northern half of Grande Terre but we only saw var. *meisneri*, and then at its most southerly location in serpentine maquis 7km S of Pouembout, near Kone, growing with several species of *Stenocarpus*, including the very desirable *S. milnei*. Virot recognised two varieties in *G. meisneri* and I cannot really comment on them. According to Virot's key, the difference between var. *meisneri* and var. *rhododesmia* lies in the glabrous nature of the external surface of the tepals and the floral rachis of var. *rhododesmia*. Both varieties are recorded from on or near the dome of Tiebaghi which really begs the question about their biological difference.

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For sale

Australian Plants – A Guide to their Cultivation in Europe

This excellent book was written by Thomas Ross and Jeff rey Irons, one of the founders of the APS. It contains detailed information about selected Australian species that can be successfully cultivated in Europe along with a list of the characteristics and cultivation requirements of another 500 plants. This data draws on personal experience; the authors cultivated almost all of the plants listed in the book themselves, in gardens in Britain, Germany and Spain.

The temperature data are particularly useful. As hardiness varies with circumstances a 'danger zone' is given for every plant listed. At the upper limit plants growing in less than ideal conditions are likely to be harmed; at the lower limit even established plants will most probably be severely damaged and may die.

Eucaflip

This full colour photoguide is designed to enable easy identification of all 29 eucalypt species native to Tasmania. It was recommended by the late John Purse as the best guide for identifying eucalypts in the UK, as the species most commonly grown here are from Tasmania. It illustrates the key diagnostic features - fruit, buds, bark and leaves - with life-size photographs. It is laminated and light enough to carry. When fully open it measures 92 by 48 cm but it folds up to 23 by 12 cm.

Contact **enquiries@anzplantsoc.org.uk** to buy Eucaflip for £7.50 plus postage, or Ross and Irons for £10 plus postage.

MODERN BOTANICAL ARTISTS AND AUSTRALIAN PLANTS

Jeff Layman

Australian plants, with their very attractive and unfamiliar flowers, have been objects of fascination for botanical artists since their discovery 250 years ago. That fascination continues, sometimes in unexpected ways.

In March I received an email, via the APS website, from a botanical artist. In 2010 she had been in Cape Town, and had seen a plant which intrigued her. It was not in flower and only had seedheads. As she was in South Africa she assumed its origin was the fynbos, but she was not able to identify it.

Fast forward 10 years to a Mother's Day bouquet, which included *Eucalyptus camphora*. While checking eucalyptus images online to find that plant, she spotted *E. macrocarpa* which was unmistakeably the plant she had seen in Cape Town! She wanted to draw the plant from a living specimen, and an internet search led her to my gallery on the APS website. This includes photos of *E. macrocarpa* which had been in flower in 2018). It was perhaps not surprising that she had mistaken *E. macrocarpa* for a South African plant. Anyone who has seen *Leucadendron argenteum*/ (silver tree) might well believe that *E. macrocarpa* was related or grew near it in similar conditions..

I had no objection to letting her draw the plant, but covid restrictions made it difficult until September. I had warned her that it was very unlikely to be in flower, as it had no bud at the time and was very reluctant to flower; my previous experience almost 30 years earlier with a different plant was that it had flowered only once in a dozen years. She said that its leaves alone made it attractive enough to draw. So early in September, on an unfortunately somewhat cloudy day, she made some sketches of the plant. She will then use a reduction cut process to make prints, which I hope to see in the new year.



LOPHOMYRTUS

Gary and Maria Firth

We hold the Plant Heritage National Collection® of *Lophomyrtus*, a member of the *Myrtaceae* family that is found only in New Zealand. It consists of just two species, both evergreen shrubs or trees, noted for their colourful leaves which are purple, chocolate, red or bronze-green.

Lophomyrtus bullata (ramarama) is a spreading shrub or small tree with rounded puckered leaves and small pale pink or white flowers It is a native of the North Island and near Nelson on the South Island, growing on the margins of lowland forest and flowering November to February. In its native New Zealand it is a tree growing to 6m but is generally much shorter, to about 2m, in the UK. Leaves are 1.5–5cm long and usually brownish or yellowish. Flowers are 12mm, with petals 4mm. The only cultivar encountered within the UK, *L. bullata* 'Matai Bay' was largely lost following the severe winters of 2010 and 2011.

Lophomyrtus obcordata (rohutu) grows to a similar height but is more

Lophomyrtus cultivars

***L. bullata* 'Matei Bay'** Rounded and heavily puckered brownish green leaves. New shoots are bright red maturing to mahogany brown. Very difficult to source since the cold winters of 2010 – 2011.

***L.* x *ralphii* 'Black Pearl'** A compact evergreen with rich, deep purple, highly textured leaves. The white fluffy flowers are carried all over the plant in June.

***L.* x *ralphii* 'Gloriosa'** Attractive evergreen shrub with dainty green leaves variegated cream & tinged pink.

***L.* x *ralphii* 'Kathryn'** Deep purple foliage.

***L.* x *ralphii* 'Krinkly'** Red to bronze toned puckered foliage. Growing to 2m high x 1m wide.

***L.* x *ralphii* 'Little Star'** A low, spreading, evergreen shrub with tiny rounded green leaves that have pink-tinted, cream margins. From late summer to early autumn, it produces fragrant, white, salver-shaped flowers. I suspect that might actually be a selection of *L. obcordata.*

***L.* x *ralphii* Logans form** Crimson stems and small dark green leaves with a central yellow splash.

***L.* x *ralphii* 'Magic Dragon'** This is a new variety with richly coloured leaves in burgundy, cream and pink. It is a selection from the 'Red Dragon'.

***L.* x *ralphii* 'Multicolor'** Young shoots rose-pink becoming mottled green and greyish green marginated creamy yellow.

***L.* x *ralphii* 'Pixie'** Small rounded leaves turning deep maroon in winter. Struggles to recover if defoliated by cold weather.

***L.* x *ralphii* 'Purpurea'** Very dark purple leaves.

***L.* x *ralphii* 'Red Dragon'** New shoots bright red maturing to darker red.

***L.* x *ralphii* 'Red Pixie'** Purple red leaves and small pink flowers in summer.

***L.* x *ralphii* 'Red Wing'** Has vibrant deep burgundy foliage

***L.* x *ralphii* 'Traversii'** Grey-green aromatic leaves, edged white. Height 60cm.

***L.* x *ralphii* 'Tricolor'** Small rounded evergreen leaves coloured pink, white and green.

***L.* x *ralphii* 'Wild Cherry'** Has deep reddish bronze leaves. Will grow to around 2m in height (photo front cover).

tree-like in form. It occurs throughout the North Island and northern part of the South Island. It has very small inversely heart-shaped leaves and produces clusters of tiny white flowers in summer that are followed by small dark red to purple-red berries (photo page 19).

Lophomyrtus x *ralphii* is a naturally occurring hybrid of *L. bullata* and *L. obcordata*. The leaf size and colours vary enormously, including glossy greens, creams, reds and purples (photos page 19, front cover). They are often used as hedging in New Zealand and elsewhere. Several dozen cultivars have been registered; however less than a dozen are currently listed in the RHS Plant Finder and many of these are difficult to track down in the UK.

Cultivation

In most parts of the UK the plants need to be grown in a sheltered position in sun or part shade in moist but well drained soil. They will tolerate temperatures down to -5°C or somewhat lower once established. They do not however like the cold, drying winds from the east (the so-called 'Beast from the East'). Most of my plants slowly defoliated over the months following the cold spell of February 2021 and only started showing new growth from around mid June. Fortunately I have learnt from previous experience to never give up on many Southern Hemisphere plants until at least the end of July. Planting in full sun helps bring out the full colour intensity. They may also be grown in pots outdoors but wintered in frost free conditions.

Propagation

The species may be grown from seed or from cuttings. The cultivars are grown from softwood cuttings in spring or semi-ripe cuttings in autumn. I prefer to use 'Root Riot' cubes for this purpose as they give a high strike rate and individual cubes can be checked regularly for rooting. Rather than pinching out the plants when young I prefer to grow them as single stem plants in deep rose pots (photos opposite). This produces a robust plant with a deep root system which is more likely to recover from severe winter conditions. If they do defoliate following severe weather new growthwill normally arise from the robust central stem.

Pruning

I prefer to grow these plants to produce a natural shape with minimal pruning, only removing damaged growth after winter. Stronger pruning will of course produce a denser more compact plant but the many thinner stems are less likely to recover if defoliated.

Pest and diseases

The plants suffer from few problems with pests and diseases in the UK. The only problem I have ever come across is a small sawfly caterpillar that 'glues' the terminal leaves together, effectively pinching out that shoot if not removed in time.

Culinary and medicinal applications

The ripe berries of *Lophomyrtus bullata* were eaten by the native Maori people of New Zealand. It has been suggested that these and other native fruit contributed to their low incidence of non-infectious disease. Recent studies have demonstrated high concentrations of anthocyanins in the fruit. Other active compounds extracted from this shrub have been shown to be active against the bacterium *Bacillus subtilis* and also to have cytotoxic activity against certain human cell lines when grown in tissue culture.



OUT AND ABOUT IN DARWIN

Nicky Zanen

During the middle of July 2021, at short notice, I flew to Darwin to start my next foray into the Kimberley (the northernmost of the nine regions of Western Australia); the Mitchell Plateau this time. But it was not to be. On arrival at Darwin airport the Western Australian government closed the borders to Victorians!





above:
Lophomyrtus* x *ralphii
'Multicolor'

left
above: ***Lophomyrtus obcordata***
below: ***Lophomyrtus x ralphii***
both planted in deep rose pots

below
***Lophomyrtus* x *ralphii* 'Tricolor'**











Eastbourne colonists

Acaena novae-zelandiae

top: **burr showing barbed spines**

above right: **leaves**

left

self-sown cabbage palm, *Cordyline australis,* on the beach

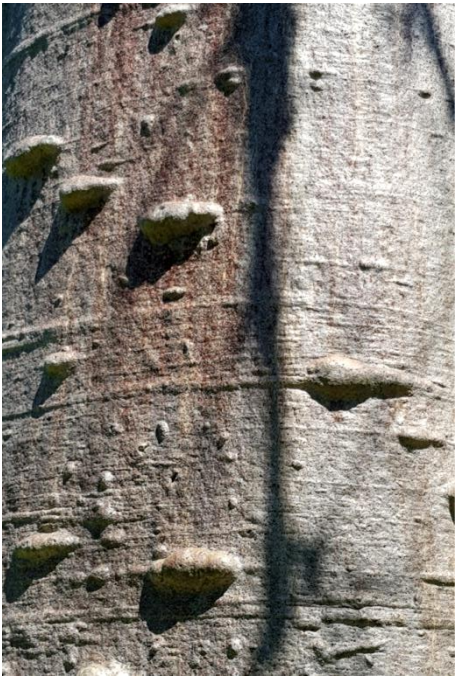


Hedge hebe, *Veronica* x *franciscana*, a welcome immigrant in Judy Clark's garden

Lotus lilies *Nelumbo nucifera* Corroboree Billabong







Out and about in Darwin

above: ***Calytrix exstipulata***

left: ***Mallotus nesophilus*** **trunk with gall growths**

below: ***Acacia holosericea*****, with its spiral seedpod**



This gave me a chance to explore a new area, so I invite you to come along with me on an exploration of Darwin and its environs.

The Corroboree Billabong is approximately 90 minutes out of Darwin and reminded me of the Kimberley with its abundant birdlife. It is part of the Mary River system. The boat cruise gave us many saltwater crocodile sightings, and at one stage we sailed past water lilies with the biggest leaves I have ever seen (photo page 21) It turned out, these were lotus lilies, *Nelumbo nucifera*. Like the water lilies, their leaves are hydrophobic, even when the leaves have started deteriorating. It was also pointed out that the leaves follow the sun, just like sunflowers do. The main difference between the lotus and water lilies is that the leaves and flowers of the lotus grow well above the water.

Lotus and water lilies were a vital source of food for the local aborigines. The seeds have a peanutty taste and can be eaten raw. More mature seeds can be roasted and crushed for a coffee like beverage. The young leaves and roots were also cooked or eaten raw.

Along the roadsides on our journeys we passed a distinct pink flowering shrub (photo opposite). At Litchfield National Park I was finally able to photograph this. Described as turkey bush by our guide, who mentioned he likes to pick the leaves and rub them on his skin to repel insects. It turns out it was *Calytrix exstipulata*. Not only are the leaves good as an insect repellent, they were also used by the Bininj as a liniment for sore muscles by mixing the leaves and flowers with hot water. The wood of the shrub makes excellent firewood and is also used to craft clapsticks, woomeras and prongs for spears.

There are three main species of paperbark in this area; *Melaleucaargentea* (silver-leaved paperbark), *M. viridiflora* (broad-leaved paperbark), and *M. leucadendra* (weeping paperbark). The leaves of all these species were used as a bath to treat colds, for headaches, for wrapping and storing foodstuffs, and to flavour meat in cooking. Trunks are used to make canoes. The nectar is feed for birds, bees and flying foxes. *M leucadendra* was also used for wrapping bones and corpses for burial purposes, bandages and fish traps.

We were visiting the Bamboo Creek Tin Mine where I spotted a wattle, *Acacia holosericea*, with an interesting spiral seedpod (photo opposite). On closer inspection, there were green ants moving up and down the branches. We were told the ants would be eaten by the locals, but I have to admit, I wasn't prepared to try that. The Aboriginal people also ate the white larvae found inside the leafy nests; it has a lemon taste. The ants and larvae were also pounded and mixed with water to produce a lime flavoured drink to relieve colds, headaches and sore throats.

Where you find green ants, you often find butterflies like oak-blues of the genus *Arhopala*. The caterpillars are attended by the green ants that keep them protected from predators in return for sweet secretions. Mature caterpillars curl up inside fresh young leaves, spin their cocoon and pupate.

In May 2020 the ABC Australia reported that "*the native Australian ant is a surprising ingredient in new food and drinks. From cheese to gin, they are adding zing. But they are tricky to harvest – and pack a punch when they bite! And they are selling for up to $650*

a kilogram." They added that Chris Lloyd from Adelaide Hills won a gold medal at the World Cheese Awards with goats cheese wrapped in lemon myrtle topped with green ants.

Just 2km out of the city are the George Brown Darwin Botanic Gardens. These were named after George Brown who was their curator from 1971 to 1990, and then mayor of Darwin from 1992 until 2002. He led the restoration of the gardens post Cyclone Tracy (1974), during which eighty nine per cent of the plants were destroyed.

I headed to the African-Madagascan garden which has a significant collection of baobab and boab trees. Not far from the visitors' centre I saw a bottle shaped tree in a large grassed area. However, this was not a boab, but a member of the Euphorbiaceae, the yellow ball flower, *Mallotus nesophilus.* 'Nesophilus' means island loving. This tree is found in the northern part of Western Australia, Northern Territory and Queensland. The fruits are edible and sweet when ripe and the wood was used to make spear throwers. I was fascinated by the trunk - big gall growths (photo page 22) on it making you feel you would have footholds if you climbed the tree.

When I looked up *Mallotus* I found there is another tree, *M. claoxyloides,* also known as green kamala, whose leaves release a warm 'forest fragrance' which enhances the atmosphere of a garden. I liked the sound of that.

The Baobab Garden had a terrific collection of trees from Madagascar. With delicious names like grandidier's baobab, *Adansonia grandidieri*, at high risk of extinction; *A. suarezensis*, Suarez baobab; *A. za*, the most widespread baobab in Madagascar; *A. rubrostipa*, the fony baobab; and *A. perrieri*, Perrier's baobab. Perrier's is one of the rarest baobab species appearing on the IUCN Red List of Threatened Species as endangered, and we have some growing in Darwin. The pollinators of the Madagascar baobabs include fruit bats, hawk moths and lemurs.

The African Baobab, *Adansonia digitata*, is found scattered in low woodlands of the African savannah, where there is very little rainfall for 4 to 10 months of the year. This resource rich tree provides a wide variety of products. Its seed, leaves, roots, flowers, fruit pulp and bark are edible and may be used in sauces, porridges and drinks. The dry fruit pulp contains 7 to 10 times more vitamin C than oranges and can be dissolved in water to make a lemonade tasting drink.

Root bark and leaf extracts have antiviral and antibacterial properties and are often used in traditional medicine treatments. The wood and bark of the tree provide material for canoes, rope and string, cloth, sacking, baskets, mats, hats and packing fibre.

Australia's own boab, *Adansonia gregorii* is found in the Kimberley and the western edge of the Northern Territory. Many parts are edible including the seeds and fruit pulp. Today it is grown commercially in the Kimberley where the tree root is sold as a gourmet food source.

Since coming home I found that the George Brown Darwin Botanic Gardens host a community food garden known as the Snake Bean garden. Community members grow fresh food in a sustainable way, with the following enticing mix of tropical fruit, vegetables, herbs and spices including sugar cane, coffee, cardamom, ginger, gotu kola, sweet leaf, aloe vera, lemongrass,

eggplant, tomato, pumpkin, pawpaws, and chillies.

The screw palm, *Pandanus spiralis* (photoback cover), was very common throughout my travels, tough enough to grow next to the beach and throwing out a beautiful fruit. However, these fruits can cause severe mouth irritation and diarrhoea if not roasted beforehand. Terminal buds and white leaf bases were also eaten, and the leaves would be split and woven into domestic items including mats, baskets, dilly bags, arm bands and rope. The roots or leaves were also used to make drumsticks, and the trunks to make rafts. A preparation from the core of stem was eaten, drunk or applied to treat diarrhoea, stomach pain, colds, mouth sores, toothaches, sores and wounds, ulcers and yaws.

One of my last visits was to Aboriginal Bush Traders. On the Esplanade, very close to the city, the restaurant was more of a kiosk next to the historic Lyons Cottage. This is one of the few buildings to have survived the Japanese bombings during the Second World War and the 1974 Cyclone Tracy. Formerly known as the BAT House (the British Australian Telegraph Company Residence) it was Darwin's first stone residence, built in 1925.

The menu had a number of options but I settled for fresh damper with bush tomato relish, aniseed myrtle and pepper berry leaf and a 'Wild Rosella Spritzer'. The Wild Rosella is actually preserved *Hibiscus sabdariffa*, which possibly came to Australia in the 16th or 17th Century from West Africa via the West Indies and Asia, and is marketed as a bush food. Maybe 400 years justifies this title. The drink was sparkling mineral water on ice and served with finely chopped lemon myrtle, *Backhousia citriodora.* It was very refreshing and I found two rosella flowers tucked underneath the ice cubes. They had products for sale as well, and I bought wattle seed to replenish my stocks, but was disappointed that this came from New South Wales.

I hope this Out and About has brought back pleasant memories for those who have been to Darwin, and is enough to entice those who haven't been to put Darwin on their bucket list. A waiver though, the plants and trees I have described are probably better suited to tropical conditions.

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Native Plants of Northern Australia – John Brock

And the World Wide Web.

This article first appeared in the September 2021 issue (no. 257) of Growing Australian, the quarterly Newsletter of the Australian Plants Society Victoria. It is reprinted with kind permission of the author. Longstanding members will remember Nicky as APS secretary when she lived in England.



EUCALYPTUS COCCIFERA IN BRITAIN AND IRELAND

Judy Clark

Bedgebury National Pinetum in Kent is one of my favourite places and I'm lucky that it's only half an hour away by car (otherwise it's a train to Etchingham and a 6 mile walk) Its purpose is the conservation of rare and endangered conifers from around the world so it's a good place to see southern hemisphere species such as rimu (*Dacrydium*

cupressinum), huon pine (*Lagarostrobos franklinii*), wollemi pine (*Wollemia nobilis*) and celery top pines (*Phyllocladus* spp.) .

Despite its name Bedgebury's 140 or so hectares are not restricted to conifers. For example, fifteen different species of *Eucalyptus* can be found there, most comprising of multiple plantings. One of these is *Eucalyptus coccifera* which I saw in flower when I visited in June this year (photos pages 21, 30 and 31). And there are many more specimens at Bedgebury, in total 35, something I discovered whilst exploring Bedgebury's living tree collection online[1].

Eucalyptus coccifera is known in Australia as the Tasmanian snow gum or snow peppermint but here in the UK it is often given the common name of Mount Wellington peppermint. However it is actually much more widespread, being found in much of central, south east and eastern Tasmania, mostly in upland areas. Mount Wellington (Kunanyi), just outside Hobart, is where the type specimen[2] was collected on October 30th 1840 by Ronald Campbell Gunn[3]. According to Burns (2012)[4] Gunn, who migrated to Tasmania in 1830, was the most notable of Tasmania's 19th century plant collectors. His name is commemorated in at least 39 plant species, including *Eucalyptus gunnii* (cider gum), *Nothofagus gunnii* (deciduous beech or tanglefoot), *Richea gunnii* (bog candleheath), and *Persoonia gunnii*, all of which, like *E. coccifera*, are Tasmanian endemics.

However, *Eucalyptus coccifera* was not first 'discovered' in 1840. Specimens had been collected as early as 1833[5], by Gunn and by Robert William Lawrence (after whom *Correa lawrenceana* is named) also collected it. Gunn and Lawrence became friends soon after Gunn arrived in Tasmania in 1830, and in 1832 Lawrence introduced Gunn to the eminent British botanist William Jackson Hooker for whom Lawrence had been collecting. Lawrence died a year later but Gunn continued to collect for over 40 years, sending most of his specimens to Hooker and his son Joseph Dalton Hooker[6].

As can be deduced from its full name *Eucalyptus coccifera* Hook.f., it was JD Hooker who named the species, formally describing it in WJ Hooker's *London Journal of Botany* in 1847, and citing both Lawrence and Gunn[7]. Five years later Lawrence and Gunn were again cited as sources in WJ Hooker's *Curtis's Botanical Magazine* where it is claimed that the species was first detected by Lawrence, and subsequently found by Gunn, suggesting that Lawrence was the first to put *Eucalyptus coccifera* on record[8].

The generic name, *Eucalyptus*, refers to the cap (operculum) that covers the flower bud and protects the developing flower. It was coined by the French botanist Charles-Louis L'Héritier de Brutelle, who was the first to publish a description of a eucalypt, *Eucalyptus obliqua*, in 1788[9]. The *coccifera* part of the name (technically the specific epithet) seems to have been inspired by Lawrence's noting that a species of *Coccus* (a scale insect) was infesting the foliage. To begin with Hooker named it *E. coccinellifer* and only later altered the name to *E. coccifera*[10], but in both cases the second part comes from a latin word meaning 'to bear' or 'to carry'. In the account published in Curtis's botanical magazine it is given the common name of 'Coccus-bearing Gum-tree'[11].

Now I love eucalypts, not least because they conjure up the landscapes of my

Bedgebury Pinetum: trees and shrubs from Australia and New Zealand

The information below is drawn from the Bedegbury Pinetum Explorer. On the website (bedgebury.arboretumexplorer.org/) each specimen listed is linked to a map showing its location.

Gymnosperms

Araucariaceae

Agathis australis Kauri
Wollemia nobilis Wollemi pine

Cupressaceae

Athrotaxis cupressoides Pencil pine
Athrotaxis laxifolia
Athrotaxis selaginoides King Billy pine
Callitris oblonga Tasmanian cypress pine
Callitris rhomboidea Oyster Bay pine, Port Jackson pine
Diselma archeri Cheshunt pine

Podocarpaceae

Dacrycarpus dacrydioides Kahikatea
Dacrydium cupressinum Rimu
Lagarostrobos franklinii Huon pine
Microcachrys tetragona Creeping pine
Halocarpus bidwillii New Zealand mountain pine
Phyllocladus aspleniifolius Celery-top pine
Phyllocladus trichomanoides Celery pine
Phyllocladus trichmanoides var. *alpinus* Mountain celery pine
Podocarpus acutifolius Needle-leaved totara
Podocarpus laetus Mountain totara
Podocarpus nivalis Snow totara
Prumnopitys ferruginea Miro
Prumnopitys taxifolia Matai

Angiosperms

Argophyllaceae

Corokia cotoneaster Wire-netting bush

Asteraceae

Olearia viscosa

Cunoniaceae

Eucryphia lucida Leatherwood
Eucryphia milliganii Dwarf leatherwood

Fabaceae

Sophora microphylla Small-leaved kowhai

Myrtaceae

Callistemon linearis Narrow-leaved bottlebrush
Callistemon pallidus Lemon bottlebrush
Callistemon pityoides Alpine bottlebrush
Eucalyptus amygdalina Black peppermint
Eucalyptus brookeriana Brooker's gum
Eucalyptus coccifera Tasmanian snow gum
Eucalyptus dalrympleana Mountain white gum
Eucalyptus delegatensis subsp. *tasmananiensis*
Eucalyptus gunni Cider gum
Eucalyptus morrisbyi Morrisby's gum
Eucalyptus nitens Shining gum
Eucalyptus nitida Smithton peppermint
Eucalyptus pauciflora subsp. *pauciflora* Cabbage gum
Eucalyptus perriniana Spinning gum
Eucalyptus rodwayi Swamp peppermint
Eucalyptus subcrenulata Tasmanian alpine yellow gum
Eucalyptus vernicosa Varnished gum
Eucalyptus viminalis Manna gum

Nothofagaceae

Nothofagus cunninghamii Myrtle beech
Nothofagus truncata Hard beech

Pittosporaceae

Bursaria spinosa Prickly box
Pittosporum bicolor Cheesewood

Proteaceae

Cenarrhenes nitida Native plum
Hakea lissosperma Needle bush
Persoonia gunnii

Winteraceae

Tasmannia lanceolata Mountain pepper

childhood, but I'm not very good at identifying them, though of course you don't have to identify a gum tree to enjoy it). Nevertheless some things do stick. The drawing (see page 31) that accompanies the account in Curtis's botanical magazine clearly shows one character that I remember being pointed out to me many years ago: the apex of the adult leaf of *Eucalyptus coccifera* tapers to a long hooked point. Or, using the more precise language of botany, "*the apex suddenly acuminated in a long uncinate mucro*". Several other characters[12] which help to distinguish *E. coccifera* from other eucalypts are its smooth bark; more or less elliptical adult leaves; branchlets, buds and gumnuts covered in a waxy bloom (glaucous); and buds usually in groups of three or seven, sometimes more (see photo page 31). Specimens whose provenance is Kunanyi are more likely to have buds in threes.

In its native habitat the Tasmanian snow gum normally reaches a height of between 5 and 8m at maturity but it can reach 20m. At higher elevations plants are usually small multi-stemmed shrubs or trees with low spreading branches, while taller trees tend to be found in sheltered habitats at lower altitudes. In the areas where it grows it can be found from 650m right up to the tree-line, about 1200m, where it may be dominant in forests and woodlands.

It was probably introduced to cultivation in England no later than 1840, though it could have been earlier. In 1851, in The Journal of the Horticultural Society of London[13], a specimen said to be eleven years old was reported growing at Veitch's nursery in Exeter. It was confirmed by 'Dr Hooker' (presumably JD) as *E. coccifera* because it matched material collected by Gunn from Mount Wellington in 1840 (30th October), and from the 'Western Mountains' in 1833[14]. Even if Gunn's 1840 collection included seed given sailing times it is hard to see that it could have reached England before 1841. But, the 1833 collection date tells us only that seed could have arrived earlier than 1841, not that it did, and of course the reported age of Veitch's tree could be mistaken.

Whatever its origin, Veitch's specimen, "*a fine open spreading tree, 20 feet high*" was described as "*perfectly hardy*" while the specimen growing against a south wall in the Horticultural Society's London garden was said to have "*lived for many years .... without being injured*". Another healthy specimen grew at Powderham Castle near Exeter, and was believed by Elwes[15] to probably date from the original introduction of the species in 1840, and also to be the source for the illustration in Curtis's botanical magazine.

After measuring the Powderham tree in 1907 Elwes proclaimed it the "*finest Eucalyptus in Britain*". It was then 75 to 80ft tall (23 to 24.5m) and still vigorous. His co-author Henry documented several other large specimens of what they called 'mountain pepper' growing in both Britain and Ireland. The tallest were to be found in Cornwall, Devon, Dorset and Hampshire, including a 65ft (20m) specimen growing at Menabilly (near Fowey, Cornwall) that had been planted in 1884. Ten year old trees at Tregothnan were reported to have reached 20 to 25ft (6 to 7.5m) while at Abbotsbury thriving specimens had reached 25 to 30ft (7.5 to 9m). In contrast a thirty-five year old plant at Tresco was still only 12ft (3.5m) in 1894. Henry does not speculate on the cause - its dwarf habit could have been related to, among other factors, seed provenance, environmental conditions and soil type. Elwes however attributed

the Powderham Castle tree's vigour to its growing on sandy loam over red sandstone, high on a river bank and close to the water.

E. coccifera seems to have been less happy in the London area. A 3 year old tree at Coombe Wood (Croydon) died after 3 years while at Kew even using seed collected from trees growing at the top of Mount Wellington was not successful. On the face of it the climatic conditions ought to have been suitable so maybe something else was going on. In contrast two ten year old specimens at Belvoir Castle (Leicestershire) had reached 25ft by 1909.

On the west coast of Scotland the Tasmanian snow gum was said to one of the most successful eucalypts, doing well at place including Loch Fyne, Monreith, Dalkeith, Roseneath (Argyll and Bute), Inverewe and Kinloch Hourn (Knoydart). However at this time Henry was writing *E. coccifera* had not been tried extensively in Wales or on the island of Ireland from, though he does mention flourishing specimens in Wicklow, at Kilmacurragh and Mount Usher, and Rossdohan in Kerry.

In 1851 it had been predicted[16] that *E. coccifera* "*may be expected to prove one of the hardiest of the Van Diemen's Island trees*". Nearly one hundred years later Arnold-Forster[17] was of a similar opinion: *E. coccifera* was one of the eucalypts most likely to succeed in colder parts of the country. He cited a plant at Mount Usher which had "*stood 26^{o} of frost without apparent injury*" (6^{o}F or -14.5^{o}C.). Today Ross and Irons[18] give the danger zone for *E. coccifera* as -14^{o} to -19^{o}C and even the RHS rates it at H5[19]. Arnold-Forster also calls attention to the species' wind tolerance, citing a thriving specimen in his exposed garden on Zennor Moor in Cornwall. At the highest altitudes of its native habitat *E. coccifera* has to cope with very strong winds; for example at the top of Kunanyi gusts can reach 200 km/h[20].

Fast forward to today and *E. coccifera* still grows in many places where it was recorded in the past. Unsurprisingly, the biggest trees still grow in the milder parts. The Tree Register of the British Isles[21], a database containing over 200,000 notable trees in Britain and Ireland, has 49 entries for it, almost all of which are found in the south and west of England, Wales and Scotland, or on the island of Ireland. Some of them are very big indeed.

The tallest (height champion[22]) at 34 m, much taller than the species gets in the wild, lives in a private garden in Knoydart in the Scottish Highlands and was last measured in 2016. Its girth is 330 cm, which makes it relatively skinny compared with the fattest. The girth champion of Great Britain and Ireland comes in at a whopping 662cm, as measured by the late Alan Mitchell in 1963. It may have died nearly 60 years ago[23], but the Powderham Castle specimen has not yet been bested. However at 26m, a little taller than when Henry estimated its height 1907, it is only the third tallest *E. coccifera* on the Tree Register. The second tallest (height champion of Wales) grows in the arboretum at Plas Newydd on Ynys Môn (Anglesey). It was planted in 1981 and had reached 27m by 2016, but its 220 cm girth makes it relatively lean. The girth champion of Wales is also to be found at Plas Newydd, at 224cm and 23.5m tall; it too was planted in 1981.

A relative dwarf at 16.5m but second only to the Powderham tree at 506cm, the girth champion of Ireland (measured in 2003) grows on Rossdohan Island. As

already mentioned, Henry knew of a tree at this location, and also of one at Kilmacurragh where today the height champion of Ireland is found; 23m tall with a girth of 402cm. Henry also knew of *E. coccifera* at Kinloch Hourn, location of the current girth champion of Scotland, at 496cm round and 23m tall. In comparison the girth champion of England is petite at 280 cm, but like the Powderham tree it grows in Devon, as a pollard in a plantation at Bovey Tracey. The height champion of England is even thinner, at 141 cm but just pips the Ireland height champion at 24m. Planted in 1990 at Westonbirt Arboretum it was measured in 2014[24].

These are the very biggest Tasmanian snow gums known, but the rest, be they county champions or simply remarkable trees, are still pretty impressive. In fact, the shortest Tasmanian snow gum on the Tree Register, growing in a private garden in Cornwall, comes in at 9m while the thinnest at 85cm is a 21m specimen at the Sir Harold Hillier Gardens in Hampshire.

These statistics might suggest that *E. coccifera* is a tree for the park or arboretum, rather than the garden; not necessarily, at least if the garden in question is of a reasonable size. I don't have experience of growing it myself (my garden is small), but it is not inevitable that all plants are destined to become giants, at least in the medium term. Eventual size, and growth rate (according to Ross and Irons Tasmanian snow gums don't grow that fast[25]), will anyway be related to growing conditions and climate, and seed provenance may play a role too.

The tree I photographed at Bedgebury was at a guess about 3-4m high with a spread of 2-3m. It was grown from seed collected in Tasmania in 2004[26] so it is probably about 15 years old. It is multi-stemmed, which may be related to seed provenance (if so this tree may never get very tall), or may be because it has been damaged in the past and re-sprouted from the base (if so probably reducing its height for its age).

Tasmanian snow gums form lignotubers, and also possesses epicormic buds[27]. In the wild these traits enable trees to regenerate after stress, such as that caused by fire or drought. In cultivation they do the same, whether the stress results from cold, lack of water, or being cut back. So if (when) an *E. coccifera* does outgrow its space, it should respond well to pruning, coppicing or pollarding

Pretty cold hardy and wind tolerant to boot, with its attractive foliage and decorative trunk the Tasmanian snow gum makes a very ornamental addition to the garden. According to reputable suppliers it does well in a container so maybe I could find room after all.

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Eucalyptus coccifera

top left
illustration from Curtis's botanical magazine 1852

top right
smooth decorticating bark

left
buds with waxy bloom and developing gum nuts



above: **Eucalyptus coccifera flowers**
below: s**ome of Michael Sullivan's correas**



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10. op cit 3

11 op cit 8

12. For a full description see the Flora of Tasmania online, https://flora.tmag.tas.gov.au /treatments/myrtaceae/#8-e-coccifer

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19. RHS Find a plant, www.rhs.org.uk/plants/6880/eucalyptus-coccifera/details; H5 = hardy in most places throughout the UK even in severe winters (-15 to -10).

20. Australian Government Bureau of Meteorology: Climate statistics for Australian Locations Kunyanyi (Mount Wellington pinnacle) www.bom.gov.au/climate/averages/

21.The Tree Register of the British Isles (TROBI) www.treeregister.org

22. Champions are the tallest or fattest recorded for each species. They come in three categories: the whole of Britain and Ireland; for each of England, Wales, Scotland and Ireland; and for each county.

23. International Dendrology Society, Trees and Shrubs online, Eucalyptus coccifera, http://treesandshrubsonline.org/

24. Is it still there? I couldn't find this tree on the Westonbirt Arboretum Explorer, https://westonbirt.arboretumexplorer.org/.

26.. op cit 19 pp111-2

27. op cit 1

28. A lignotuber is a woody growth often visible at the base of a tree. Epicormic buds are located beneath the bark.



PROGRESS WITH BREEDING CORREAS: THE FIRST FLOWERS

Michael Sullivan

This is my third article on the progress of *Correa* seed sown in 2019. The first was on collection and germination, the second on the development of the plants, and this one is about the first flowering.

To begin I would like to say that I started with seed purely because I was not able to purchase any of the wonderful correas raised by Peter Ollerenshaw in Australia and so I decided to have a try myself. This was an ambitious task as I was only at the beginning of understanding how to grow correas. When the first seed germination was visible I was surprised and elated, and to watch them develop into shrubs was a daily uplift.

I had a few electronic discussions with Peter and doubts were shown about my potential results as the seed was produced without emasculation (stamen removal from the seed parent before pollination) or other control. It was mentioned that the species I had collected seed from were more likely to self pollinate and be identical to the parent. I was hoping that the bees would mix up the genes for me, as I had positioned together several varieties that would normally be separated by hundreds of miles in their natural habitat and so would not normally hybridise.

About 75% of my new plants have flowered or will flower this year; some

are very heavy in bud. Of those that have flowered all but three are good. Some very good and to my mind better than the parent at this stage. I am judging this only by the flower (photo page 32), but plant structure, stability, and so on need to be appraised over time to be confident that an improvement has been made.

The plants have been heavily tip pruned and kept in150mm pots and so they need to be given an opportunity to fully grow before I decide if I am just getting overexcited. But if flower comparisons are made I am certainly doing ok. I have several seedlings from *Correa* 'Pink Mist' that are clearly better that the parent. I also sowed seed from *Correa reflexa* var. *nummulariifolia* and although the parent is yet to flower this year several seedlings from it are in bloom. All are very different in shape and all shades of light green. Some start off creamy and slowly change to a delicate green. All the seedlings from *C.* 'Marian's Marvel' so far are a poor imitation of the parent and so will not be grown on.

I am totally blown away with the results, I had thought that only one or two would be good enough to select for growing on. But it looks like there will be at least 30 that will need larger pots this year and that means some will have to go outside my greenhouse. It also means that there will not be room to repeat the seed sowing. Overall I am really pleased. This project has given me constant interest and I can honestly say that it has provided the most stimulating horticultural experience that I have ever had.

GOING WILD

Judy Clark

Plants are by nature sedentary so if their offspring are to move very far from their parents their seeds, fruits, and any other bits that can give rise to a new plant, have to be able to travel. Some species rely on wind or water, while others are adept at hitching a ride with animals, birds, or people and their goods and possessions. And at least as far back as historical records are available humans have deliberately spread plants far and wide, whether for food, for medicine, or just for pleasure.

Most deliberately introduced plants are of course only kept going by human intervention, but some escape the confines of garden or farm and make it on their own, either temporarily or permanently. Accidental arrivals can find life harder but if they are lucky enough to land where they can flourish they too may go wild.

For many years one source of inadvertent introductions from Australia and New Zealand was wool waste or 'shoddy'. A few years ago Gordon Hanson wrote about these wool aliens in Pentachondra (49, December 2012, p. 16). Seeds arrived in imported raw wool and those that survived the cleaning process were dispersed via the waste. At first this was dumped, or discharged into the local river, but later it was used as organic manure and so seeds were spread more widely. Not all were native Australasians; in fact a high proportion of plants arriving via raw wool imported from Australia and New Zealand were species that had been round the world and back again, being European species that had been introduced to the southern hemisphere in the first place. Raw wool has not been imported for many years so

wool aliens are now found much less frequently.

Most Australasian wool aliens proved to be casuals; that is, they failed to establish a permanent foothold in Britain though they may have been introduced many times over. However a few have become locally naturalised, reproducing without human help and becoming long-term additions to Britain's flora.

Two of these are members of the daisy family: *Cotula australis* (annual buttonweed), and *C. coronopifolia* (buttonweed). The first has been naturalised in south Devon since 1946, and is now found further field, mostly in rough ground or arable fields. *C. australis* was (still is?) grown in gardens and so could (also) have made its way from cultivation. So could *C. coronopifolia* which has been cultivated in Britain since 1683 and known in the wild since 1869. It is now thought to be naturalised rather than native in Australia (its original home is southern Africa). Another member of the genus, *C. alpina* (alpine cotula), is widespread on grassy verges in upland northern England and Scotland. Until 1995 it was mistakenly identified as *Leptinella squalida* (syn. *C. squalida*), a species introduced via horticulture and first recorded in the wild in 1913.

In recent years trade regulations have made it more difficult for seeds to hitch a ride but Australasian plants have continued to escape from gardens. *Geranium traversii* is a delightful little plant endemic to New Zealand's Chatham Islands which I identified growing on rough ground on Bexhill seafront in 2011, a place not unlike its native habitat (see Pentachondra 49, p16). It had evidently seeded from a plant in a nearby garden. I collected seed from these plants and the species is still growing in my garden but it's fate in the wild looks less rosy. There were still a couple of plants when I looked in October 2020, but what with tidying up and the spread of tree-mallow and pampas grass I shall be surprised if *G. traversii* remains there much longer.

Other escapees from cultivation have been more successful. Several years ago a seedling that I didn't recognise appeared in my garden. It didn't look as if it belonged to one of my plants so I potted it up and waited. Eventually it produced a cluster of beautiful blue-violet flowers each with two conspicuous stamens which made me certain it was a hebe. It turned out to be hedge hebe, *Veronica* x *franciscana* (syn. *Hebe* x *franciscana*) (photo page 21). First recorded in the wild in 1904 it is now the most common naturalised hebe, known from sites all round the coasts of Britain and Ireland as far north as the Orkneys, as well as in London.

Hedge hebe is a cultivated hybrid, but some species have naturalised too. Narrow-leaved hebe *V. salicifolia* is just as widespread as hedge hebe though it is only well naturalised on the coasts of Cornwall, Devon and the Isle of Man. I don't grow it myself but on the allotment next to mine it makes a fantastic hedge, and insects love the flowers, so I am keeping my eye out for seedlings. Other hebe species which may be starting to fully naturalise in milder coastal areas are Hooker's hebe (*V. brachysiphon*), Dieffenbach's hebe (*V. dieffenbachii*) and Barker's hebe (*V. barkeri*).

The tolerance of some New Zealand daisy-bushes (*Olearia* spp.) to coastal conditions led to them being planted as hedging in the milder parts of Britain and Ireland, and some of them have gone wild too. According to Stace

(2019) the best established is *O. macrodonta* (New Zealand holly), found scattered in Ireland, the Isle of Man and western Britain. Others that have been recorded as self sowing and could fully naturalise include *O. traversii* (syn. *O. traversiorum*), *O. paniculata* (akeraho) and *O. avicenniifolia* (akeake).

Several years ago I found seedlings of *Olearia solandri* (takupurenga) in cracks between paving stones near where it is planted on Eastbourne seafront. This pretty shrub has yellow twigs, small dark green leaves and masses of white flowers, and thanks to one of those seedlings I .now have a fine specimen in my garden. This is another daisy-bush that could be on the way to naturalising. It won't of course persist on the pavements of Eastbourne but self-sown specimens have been recorded in the south west and I recall reading (I hope correctly) that it is found at Braunton Burrows on the Devon coast.

Eastbourne is also where, in 2017, I saw a good sized cabbage-palm, *Cordyline australis*, growing on shingle (photo page 20) and I'm pretty sure it got there on its own. Self-sown plants are known to persist in western Britain, the Isle of Man, Ireland and the Channel Islands and seedlings occur more widely. I get seedlings in my garden and I have also noticed them in my local park. I guess the seeds are spread by birds; I have seen starlings eating the white berries on my specimen.

Another escapee, a plant that I have recorded from time to time in East Sussex, is *Oxalis exilis* (least yellow-sorrel). It was probably brought in as a rockery plant and was first recorded in the wild in 1926. Over the years it has spread widely in lowland areas, especially in England; It seems to be universally accepted as a native of New Zealand but authorities differ as to whether belongs to the Australian flora or not; Australian authorities class it as native but Kew (Plants of the World online) begs to differ. Disagreement seems to turn on what counts as *O. exilis* and what doesn't, and any resolution probably awaits more research. Least yellow-sorrel is also entrenched in my garden; it probably arrived as a hitch-hiker on a purchased plant. Although I like its bright green clover-like leaves and small yellow flowers it spreads if allowed to seed and can be difficult to eradicate from where it's not wanted.

Least yellow-sorrel is primarily a garden 'weed' but feral species that spread extensively in the wild can pose more serious problems. *Crassula helmsii* (New Zealand pygmy weed, swamp stonecrop), another small perennial which is native to Australia and New Zealand, has turned out to be one such. Introduced as a garden plant before 1914 (most likely from Australia) and first recorded as naturalised in Essex in 1956, it has since proliferated in aquatic and damp habitats, especially in lowland England. Unhappily it has the capacity to form monocultural mats which can suppress natural vegetation, something I have too often observed in ponds and ditches in the south east. It has been banned from sale in the UK since 2014 and it is an offence to cause it to grow in the wild.

Another dodgy naturalised perennial is *Acaena novae-zelandiae*, a species found in both Australia and New Zealand where its names include bidgee-widgee and bidbid but not, to my knowledge, pirri-pirri-bur, its common name in the UK. It is grown in rockeries and as a ground cover on poor soil, supposedly for its attractive foliage (photo page 20), though I can't see it myself. First introduced in wool shoddy,

it also escapes from cultivation, not least via dumped garden waste and naturalised populations derive from both sources.

It spreads easily because the burs that contain the seeds stick tenaciously to wool, fur, fabric, feathers and the like, enabling seeds to be widely dispersed by animals, birds and humans. Examined closely, each bur is a mass of carmine-red barbed spines (photo page 20). These spines grow from beneath the sepals after flowering and their apical hooks, working like a velcro fastener, easily attach themselves to any and every suitable surface.

First recorded in the wild in 1901, pirri-pirri-bur is the most widespread of at least five naturalised *Acaena* species. It is not yet as widespread as *C. helmsii* but in some places it is proving very problematic; Lindisfarne National Nature Reserve in Northumberland for example. Like *C. helmsii* it forms mats that can dominate natural vegetation and it likes habitats such as heaths, cliffs and dunes, the very same habitats where at risk native species often occur. In Northern Ireland it is offence to plant *A. novae-zelandiae* in the wild; Plantlife believes this should be extended to England and Wales.

Naturalised Australasian species in Britain and Ireland are relatively rare compared with those from other countries, and most, with neither large nor widespread populations, are also (as yet) relatively rare in the wild. However with a warming climate more may break out of our gardens and it is possible that some might go on to endanger our wild flora. Plant Alert is a citizen science project set up to help identify at an early stage which garden plants (not just Australasians) might become problems in the future. To take part, go to https://plantalert.org.

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BITS AND PIECES

compiled by Judy Clark

Songlines: Tracking the Seven Sisters

The Box, Plymouth, until 27th February 2022.

My highlight of early December was a visit to Plymouth to see the National Museum of Australia's superlative award winning exhibition *Songlines: Tracking the Seven Sisters* (www.theboxplymouth.com/events/exhibitions/songlines). This exhibition, which includes paintings, ceramics, sculptures, textiles and film and features more than 100 different artists, has been entirely conceived and curated by First Australians. Theirs is the world's oldest continuing culture and the exhibition aims to preserve some of its stories; here the ancient creation sagas that are the Seven Sisters dreaming stories.

I hope the photo on page 10 is sufficient to demonstrate that this exhibition really is worth visiting. I liked it so much that I

hope to go again before it closes. After leaving Plymouth the exhibition travels to the Humboldt Forum in Berlin (17th June to September 2022) and then to the Musée du Quai Branly in Paris (4th April to 2nd July 2023). Note that due to covid these dates are provisional.

Maria Hitchcock - My Garden Path

This short piece, shown on ABC's Gardening Australia in early October, is well worth watching. Maria Hitchcock's garden is located in Armidale in NSW at an altitude 1100m. In the winter severe frosts can be experienced, not to mention snow, so what thrives in Maria's garden might also grow here in the UK (photo **page XX**). Take note of what she says about trees; overhead protection is key to getting many species through UK winters (not to mention good drainage). Plus Maria holds the Australian National Collection of Correa. To download go to www.abc.net.au/gardening/factsheets/my-garden-path---maria-hitchcock/13563648.

Worrying about weeds: Australia's invasive species The Conversation Hour, 24 November 2021

I have often been struck by how many European plant species I have seen when visiting my home state of Victoria. I don't mean in gardens, I mean in uncultivated areas, rural and urban. Apparently 12% of Australia's flora comprises naturalised species, a higher percentage than on any other continent. From listening to this radio programme it seems that more and more Victorians are waking up to the problems that some of these newcomers are causing. Most of the troublesome species have come in as ornamental plants, but not all. *Cardamine hirsuta*, known as hairy bitter cress here and flickweed there, is just as much an unwanted plant there as it is here, and I can't imagine that anyone would have deliberately imported it. To download go to: https://www.abc.net.au/radio/melbourne/programs/theconversationhour/the-conversation-hour/13636018



CLIMATE CHANGE IS TESTING THE RESILIENCE OF NATIVE PLANTS TO FIRE

This article was first published in T he Conversation of September 20, 2021 (https://theconversation.com). The authors are listed on page 27.

Green shoots emerging from black tree trunks is an iconic image in the days following bushfires, thanks to the remarkable ability of many native plants to survive even the most intense flames. But in recent years, the length, frequency and intensity of Australian bushfire seasons have increased, and will worsen further under climate change. Droughts and heatwaves are also projected to increase, and climate change may also affect the incidence of pest insect outbreaks, although this is difficult to predict.

How will our ecosystems cope with this combination of threats? In our recently published paper[1], we looked to answer this exact question — and the news isn't good. We found while many plants are really good at withstanding certain types of fire, the combination of drought, heatwaves and pest insects may push many fire-adapted plants to the brink in the future. The devastating Black

Summer fires gave us a taste of this future.

What happens when fires become more frequent?

Ash forests[2] are one of the most iconic in Australia, home to some of the tallest flowering plants on Earth. When severe fire occurs in these forests, the mature trees are killed and the forest regenerates entirely from the seed that falls from the dead canopy. These regrowing trees, however, do not produce seed reliably until they're 15 years old. This means if fire occurs again during this period, the trees will not regenerate, and the ash forest will collapse. This would have serious consequences for the carbon stored in these trees, and the habitat these forests provide for animals.

Southeast Australia has experienced multiple fires since 2003, which means there's a large area of regrowing ash forests across the landscape, especially in Victoria. The Black Summer bushfires burned parts of these young forests, and nearly 10,000 football fields of ash forest was at risk of collapse. Thankfully, approximately half of this area was recovered through an artificial seeding program.

What happens when fire seasons get longer?

Longer fire seasons means there's a greater chance species will burn at a time of year that's outside the historical norm. This can have devastating consequences for plant populations.

For example, out-of-season fires, such as in winter, can delay maturation of the Woronora beard-heath compared to summer fires, because of their seasonal requirements for releasing and germinating seeds. This means the species needs longer fire-free intervals when fires occur out of season.

The iconic gymea lily (photo **page XX**), a post-fire flowering species, is another plant under similar threat. New research[3] showed when fires occur outside summer, the gymea lily didn't flower as much and changed its seed chemistry. While this resprouting species might persist in the short term, consistent out-of-season fires could have long-term impacts by reducing its reproduction and, therefore, population size.

When drought and heatwaves get more severe

In the lead up to the Black Summer fires, eastern Australia experienced the hottest and driest year on record. The drought and associated heatwaves triggered widespread canopy die-off. Extremes of drought and heat can directly kill plants. And this increase in dead vegetation may increase the intensity of fires.

Another problem is that by coping with drought and heat stress, plants may deplete their stored energy reserves, which are vital for resprouting new leaves following fire. Depletion of energy reserves may result in a phenomenon called "resprouting exhaustion syndrome", where fire-adapted plants no longer have the reserves to regenerate new leaves after fire. Therefore, fire can deliver the final blow to resprouting plants already suffering from drought and heat stress.

Drought and heatwaves could also be a big problem for seeds. Many species rely on fire-triggered seed germination to survive following fire, such as many species of wattles, banksias and some eucalypts. But drought and heat stress may reduce the number of seeds that get released, because they limit flowering and seed development in the lead up to bushfires, or trigger plants to release seeds prematurely.

For example, in Australian fire-prone ecosystems, temperatures between 40°C and 100°C are required to break the dormancy of seeds stored in soil and trigger germination. But during heatwaves, soil temperatures can be high enough to break these temperature thresholds. This means seeds could be released before the fire, and they won't be available to germinate after the fire hits. Heatwaves can also reduce the quality of seeds by deforming their DNA. This could reduce the success of seed germination after fire.

What about insects? The growth of new foliage following fire or drought is tasty to insects. If pest insect outbreaks occur after fire, they may remove all the leaves of recovering plants. This additional stress may push plants over their limit, resulting in their death. This phenomenon has more typically been observed in eucalypts following drought, where repeated defoliation (leaf loss) by pest insects triggered dieback in recovering trees.

When threats pile up

We expect many vegetation communities will remain resilient in the short-term, including most eucalypt species. But even in these resilient forests, we expect to see some changes in the types of species present in certain areas and changes to the structure of vegetation (such as the size of trees).

As climate change progresses, many fire-prone ecosystems will be pushed beyond their historical limits. Our new research is only the beginning — how plants will respond is still highly uncertain, and more research is needed to untangle the interacting effects of fire, drought, heatwaves and pest insects.

We need to rapidly reduce carbon emissions before testing the limits of our ecosystems to recover from fire.

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Note and references (added by editor)

1. Nolan, R.H. *et. al* (2021). Limits to post-fire vegetation recovery under climate change. *Plant, Cell & Environment* volume 44 issue 11 (https://doi.org/10.1111/pce.14176 free access via Researchgate).

2. Mountain ash is one of the common names for *Eucalyptus regnans*.

3. Paroissen, R. and Ooi, M. K. J. (2021). Effects of fire season on the reproductive success of the post-fire flower *Doryanthes excelsa*. *Environmental and Experimental Botany* Volume 192 December 2021 (https://doi.org/10.1016/j.envexpbot.2021.104634).

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Screw Palm, *Pandanus spiralis*, Darwin