



Isopogon & Petrophile *Study Group*

Newsletter No. 30

March 2022

ISSN 1445-9493

Website <http://anpsa.org.au/iso-petSG/>

STUDY GROUP LEADERS/NEWSLETTER EDITORS

Catriona Bate & Phil Trickett

Email: isopetstudygroup@gmail.com



Petrophile linearis (Yeal Swamp Road, Yanchep National Park, Western Australia), our profile petrophile species.

Back issues of the *Isopogon & Petrophile Study Group Newsletter* are available at

<http://anpsa.org.au/iso-petSG/IPSG-news.html>

Exchanging cuttings & seed

This is a way to share propagation material between study group members. All States apart from Western Australia allow material to be mailed from NSW. If you would like to be sent cuttings/seed, here are the steps (may vary for seed-only requests):

1. Email us to check that material is currently available. NB: cuttings are more plentiful than seed. (isopetstudygroup@gmail.com).
2. Once availability is confirmed, purchase an **EXPRESS POST** satchel from Australia Post (Small \$11.95 or Medium \$15.70), self-address it, put in an envelope and send to:
**Isopogon & Petrophile Study Group
PO Box 291
ULLADULLA NSW 2539**
3. We will then package up your cuttings/seed and send it back to you **Express Post**.
4. An email will be sent to you on the day the package is mailed so that you can be ready to propagate as soon as the parcel arrives!

Species currently available are:

Isopogon – anethifolius, anemonifolius (1.5m or 0.3m size), adenanthoides, axillaris, buxifolius var buxifolius, 'Coaldale Cracker', cuneatus (shrub or dwarf coastal form), dawsonii, divergens, dubius, fletcheri, formosus, latifolius (shrub or low form), linearis, mnoraifolius, nutans, spathulatus, 'Stuckeys Hybrid', trilobus
Petrophile – pedunculata, pulchella, recurva, sessilis, shirleyae

We need to expand the available species list to include all species growing in members' gardens. If you can provide material from other species, please let us know so we can add them to the list.

IN THIS ISSUE

Editorial

[From our members](#)

[A pedunculata paradise](#)

[Did Georgiana Molloy discover an isopogon?](#)

The hidden history of *I. dubius*

[Dryandra Woodland declared a national park](#)

[Crickets as pollinators](#)

Conservation news from WA –

[Bushfires hit south and wheatbelt
WSWA position on prescribed burning](#)

[I. sp. Canning Reservoir survey](#)

[Forms of species may have different DNA](#)

Profile – [Isopogon petiolaris](#)

Profile – [Petrophile linearis](#)

[The amazing Dr Rye](#)

[Seed propagation tips from the Shire](#)

[Coaldale Cracker grafts – was the hype premature?](#)

[I&P activities at the National Conference](#)

[Financial report](#)

Dear members

We had a bumper season last spring/summer with glorious displays in our garden and in the local bushland. You will have to take our word for it as covid ensured we had very few visitors to the garden to enjoy it with us. In this issue, we cover the best display we have ever seen of one of our local species, *Petrophile pedunculata*. Over in the west the wildflowers last year were also fantastic but again covid ensured only the locals got to enjoy it. We are looking forward to visiting WA this year to continue our research after a two year hiatus.

After two cool, wet years following our 2019/2020 drought and bushfires which heavily impacted our garden, we thought conditions might be settling down. Not so! A very wet last three months of 2021 was followed by a record 1209 mm for the first two and a half months of 2022. To say our garden is suffering is an understatement! We are losing lots of plants

each week, even grafted isopogons and local 'hardy' plants like *Banksia serrata*. The loss of some of our isopogon grafts is unexpected. In this newsletter Phil ponders the possible reasons why these plants have died, given that all the plants of the stock plant *Isopogon* 'Coaldale Cracker' in our garden are unaffected by the waterlogged conditions.

No chance of fire on the eastern seaboard this year but bushfire and related conservation issues continue to be a topic of concern. Southwest WA has borne the brunt this year. We have a number of reports from WA in this issue covering the effects of bushfire and new conservation efforts. It's great to see one of our favourite wildflower hotspots, Dryandra Woodland, finally given the strongest protection with national park status. We remind you just how important this declaration is for the conservation of not just I & Ps, but a range of other flora and fauna, notably the iconic numbat whose population has made a remarkable recovery in recent years from the brink of extinction. However, a recent visit to the Snowy Mountains National Park reminded us that not even a national park is safe from major infrastructure projects (in this case, Snowy 2.0).

In some good news, we get some tips from probably Australia's largest and most successful propagator of isopogons and petrophiles from seed. You might be surprised to learn that this is the Sutherland Community Nursery in Sydney which specialises in local species. Their seed-raising methods have resulted in incredible germination rates. Could this provide a much needed breakthrough for our Study Group members?

Our profile plants this issue include probably our most spectacular and best-known petrophile *P. linearis* (affectionately known as Pixie Mops). Pixie Mops should be in everyone's garden, but its temperamental nature lets it down far too often. We also feature the eastern isopogon species *I. petiolaris*, underappreciated but tough in many situations and a good small size for gardens. With Pixie Mops it is the flowers which impress but *I. petiolaris* (although its flowers are nice) stars all year round with interesting foliage.

We also report on two important botanists – Dr Barbara Rye from the WA Herbarium and early WA settler Georgiana Molloy. Separated by 160 years or so, their achievements in a male-dominated field are not well-known. Georgiana Molloy's contribution to our knowledge of isopogons has never been documented before, and you probably did not know we have one of the world's all-time top-10 women authors of plant names, Dr Rye, leading current work on isopogon and petrophile taxonomy.

Our research on pollinators continues – this issue we explore some unusual candidates – crickets and katydids. And our members have some amazing photos, success stories, and information to share. Last spring was really something and they have the photos to prove it. Check out members' bush sightings, pollinator news and even some seed x-rays. We hope they inspire you. We hope to meet as many members as possible at the upcoming Kiama conference (see later in this newsletter for more information).

Catriona & Phil

From our members

Dave Bishop, Yass NSW

I'm an old bloke who has been growing native plants since I spent about 2.5yrs in Antarctica, back in the early 70's (actually joined the Antarctic Division in Oct 69 when I transferred from the RAAF). I think it must have been the lack of green stuff that got me to appreciate plants. I did do a collection of mosses and lichens while down south as I often went out with the geologist. Only found out recently that what I collected is actually recorded in the National Herbarium of Victoria, so they most likely have covid now!!

Over the years I have needed to change my favourites as I moved around the country with my work, starting in Adelaide I had a nice grey sandy patch which allowed me to grow a wide range of Banksia etc, joined the SGAP back in those days. Next move was to Eltham in Vic, joined the Yarra Yarra group, then Brisbane, then back to

SA, and joined the Northern Yorke Peninsula Group, where I really got to love Eremophilas, seeing that most didn't mind the limestone conditions.

Six years ago I moved from Moonta Bay SA to Yass NSW and started with a blank canvas. Have a lot of Eremophilas, although this past really wet frosty winter had me lose a few. I was shown how to do grafts with Eremophila while in SA and only recently have started doing them again here in Yass, and have been quite pleased with the results. I only have one Isopogon formosus (lost one awhile back) which is currently looking very healthy and full of flowers. Only one Petrophile canescens, now about five years old with a few buds starting to form again at this time. I was interested in trying some more and from your article maybe trying some grafting, hence the need to join the group and learn.



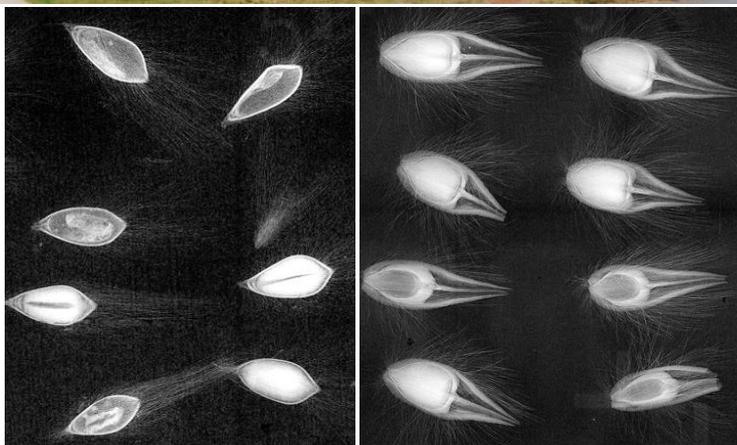
Left, Dave's 1800 sqm block before, October 2015; below, after, July 2021.

Since moving to Yass I became aware that not a lot of people were growing Australian Natives, so I started a

facebook page YASS AUSTRALIAN NATIVE PLANTS which now has about 600 or so followers and before covid I was giving talks to garden groups around the region, plus showing people how to do cuttings etc. I think I'm starting to get people interested!!



Just to keep the old brain working I travel into the ANBG once a week (depending on covid) and for the last few years have been x-raying the seed stock assessing the viability. I have found this quite interesting. Left, Isopogon anemonifolius seed x-ray, right, Petrophile circinata seed x-ray.



Tessa Barratt, Blue Mountains NSW

I would like to update you on my observations of Isopogons and their pollinators as a follow-up to my email to you in August. I have had a difficult time getting photos due to windy conditions but have observed many

Leioproctus bees on *I. anemonifolius* in my local area. Brian and I have also been taking turns to check on that *I. fletcheri* in Blackheath which, at the time of my last visit (17th October), had yet to open its flowers. I will be heading to the upper Mountains soon and will take another look. Once it opens I will try to stick around for an hour or so to observe what insects pollinate it.

In the meantime, I was recently put in touch with one of only four bee taxonomists in the country, Michael Batley, who reviewed my photos and footage. I asked him if it was possible to identify the Leioproctus bees that were working the buds of the Isopogons and this is what he had to say: *"I did look at your Isopogon pictures, but wasn't able to identify the Leioproctus species. I was very interested because I have collected a couple of undescribed Leioproctus from Isopogon along the Putty road. The problem with Leioproctus is that there are a lot of undescribed species and many are all black so that it is often hard to*

separate species without dissecting male specimens to examine their genitalia. I have a list of over 40 species that I know from male genitalia are undescribed.

The large *Leioproctus* in your pictures does not look like *L. nigrofulvus* to me and the species of similar size that I collected from *Isopogon* was not that species. I am still trying to catch a male to get a better idea of what it may be. The very tiny *Leioproctus* looks like a species that I have been finding on *Isopogon* and *Mitrasacme*. My bees are very tiny for *Leioproctus* (about 5 mm long for females and 4.5 mm for males). I have written a description of the species but just when I will be able to include it in a publication I don't know.

I will keep you posted on any discoveries I make on the *Isopogons* I look at. I will also be keeping a keen eye on the *Petrophiles* when they flower. On a side note, since embarking on this project. I have gone a bit wild and planted *I. anethifolius*, *I. dawsonii* and *Petrophile pulchella* in my garden to join with my *I. anemonifolius*... All because I want to see their bees, ha ha!

Fiona Johnson, Blayney NSW

I've just (finally) read the IsoPet edition of Australian Plants. What an absolute cracker. You must have put an enormous amount of effort into it but it's brilliant. So much interesting and useful information. And it's inspired me to have a little play with grafting, and seed collection/growing. Congratulations.

Liesbeth Uijtewaal, The Netherlands

That info on the actions of bees was very interesting indeed and the video is amazing. However, those bees may break into the flowers prematurely but then again they don't do anything illegal really since after all they can still pollinate the flowers? In botany 'illegal actions' by insects involves stealing nectar without pollinating the flowers e.g. by making a hole at the base of a tubular flower not coming anywhere near the pollen/stigma. Whatever, it still is an interesting find. Clever insects too!

A shame you don't seem to be able to grow *Isopogon* from seed: I simply put them on moist towel and wait. After a couple of weeks waiting I might put them in and out of the fridge to fool them into thinking it's time to germinate. Not sure this does the trick but it definitely doesn't stop them. It's generally only a very low percentage of seed that germinates, 10% maybe? Need to check that in my lists.

Tom Gleeson Glenbrook NSW

I've been a (very silent) member of the Australia Plants Society since 2014 and have really enjoyed your articles on *isopogons* and *petrophiles*. I really love *isopogons* in particular. *Banksias* are another favourite species. I live in Canberra and have been growing some *isopogons* in my garden. I've attached photos of two which recently gave beautiful flowers: *I. anemonifolius* (left) and *I. formosus* (right).



By the way, I really enjoyed the special edition of Australian Plants which was dedicated to *isopogons* and *petrophiles*. What a great read that was! Many thanks.



I came across this beautiful *Petrophile pulchella* recently in the Blue Mountains, along Fortress Ridge overlooking Govett's Creek to be specific. The flowers and foliage looked very nice with the mist/rain drops on them. For context, I've included a pic of the area in which the *Petrophile* was growing.



Anthony Meyer, Ngunnawahl, ACT

You probably don't remember my saying that I have been watching a plant of *Isopogon prostratus* at Clarence near Lithgow for some decades. I was recently able to check on it again following the 2019-20 fires. I found the plant with a blackened stem and gnarled looking root exactly where I had seen it before in the 1980s. On this occasion I found another plant which also looks as if it has endured fire. I'm sure these are not



seedlings. They are next to a triangular road feature off Old Bell's Line of Road, close to where high tension power lines cross the road. They would be moderately safe from roadwork. They are in an area of sandy heath with *Eucalyptus apiculata*, *Hakeas*, *Persoonias* and a low growing *Banksia marginata*. There was a *Stylidium* and *Burchardia* everywhere on the day.

Thanks for your update on the I. prostratus plants you have been following. The stems look to be formed pre-fire? They appear to be older than regrowth after the fire. Is that your view that the plants may not have been burnt out in the fire and these stems survived the fire? We have been checking out I. prostratus plants at Wog Wog and they have been very slow to recover, though it is happening. These were completely burnt to the ground in the fires.

Rhonda Daniels, Sydney NSW

All I can really say is that I have observed lots of foliage growth from all our Sydney rain. It will be great if everything is still alive when it comes to flowering time.

Ian Roberts, Blyth SA

November 2021: Some pics from this year's flowering. Thanks for ID's. Hope you can get back on the road soon.... We finally had a decent rain - first for year. 55mm over 3 days. Given all my plants a good drink.



Above, L to R: *I. formosus* and *I. axillaris* (nursery) and *P. biloba* (garden).

Below, L to R: *Petrophile ericifolia*, *Petrophile heterophyllus*, *Petrophile filifolia* (especially specky).



March 2022: We would gladly have taken a couple of inches from you. About 20 mm since Nov here at Blyth. Plenty not far away & up to 50mm in one event for those folks. I've been kept busy watering every 10 days – what a country. Nursery plants have not had such a good year. Germination of all seed terrible, & I had to sow Euc seed 3 times to get plants. It has been more humid this season than any I can remember, so perhaps seed rotted (overall a pleasant summer with very few 35+ days). Not a single I or P germinated from over 30 batches, smoked or not. I lost a lot of cuttings during the humid rainy Nov, especially Eremophilas. Cuttings of I & P from last winter fared better & have some healthy plants to sell & plant on my hills block.

Paul Kennedy, Elliminyt VIC

The Isopogons have stood up to a variety of weather conditions from a very wet July to end of November 2021, then three months of practically no rain over summer and a lot of strong easterly winds and now 75mm of rain in March. The only loss was a Isopogon "stucky's hybrid" (right) which may be a bit sensitive anyway to climatic conditions. I tried to pull the dead plant out but its roots were still firm in the ground. I still have a healthy plant on higher ground so we will see how it survives this year. The others I have are axillaris, formosus, latifolius, scabriusculus and trilobus. If I could get to plant sales I would probably have a few more. The rest of the garden has mostly survived [apart from some hakeas and banksias]... I feel for you standing inside your house watching 802mm of rain fall and the garden looking so waterlogged. Having been through a bushfire as well you must wonder what can come next. Only Kimberley plants could possibly take that rain and survive after a cyclone.



Kevin Collins, Mount Barker WA

We've had a few more successes with cuttings: *I. attenuatus*, *I. Ravensthorpe*, *I. formosus*, Broad leaved *P. squamata* (Point Anne), *P. longifolia* & *P. striata*. From seed: Dwarf form of *I. trilobus* -1- (Cave point), Tiny leaf form *P. squamata* -1- (Wellstead), *P. longifolia* -6- (Cheynes headland), *I. cuneatus* -1- LOW (Cheynes headland). Others looking promising...*P. ericifolia*, *P. teretifolia* (DWARF - Cheynes headland), *I. trilobus* (DWARF - Caves point) & *I. divergens*.

Update March 2022: These are the species I have had grown successfully from cuttings in the past year. *I. Ravensthorpe* 5 from 8, *I. teretifolius*, *I. attenuatus* (took 2 years to crank up), *I. formosus* with *I. divergens* looking promising. *I. trilobus* dwarf (now 2 years old & still green- but no roots whereas tall inland forms strike easily). I did manage to get a few seeds up but only one survivor which is flourishing. *P. teretifolia*, *P. striata* (Erica), *P. teretifolia* (dwarf form, 6 from 8), *P. filifolia*. More *P. rigida* & one unknown Sp. to me. From seed: one dwarf *I. cuneatus* from Cheynes headland, a couple of *P. filifolia* & Wellstead tiny leafed *P. squamata*.



Some of Kevin's unusual forms: *I. trilobus* (dwarf), *P. teretifolia* (dwarf), *P. squamata* (Point Ann form).

We have fared well over Spring with only one loss. *I. dubious* (*dubius*). "That explains it"???" Good winter rains and not the excessive heat encountered Perth & further north. Cuttings planted out that flowered well were *P. rigida*, *P. brevifolia*, *P. squamata* & *P. teretifolia* & *I. teretifolius*.

Miriam Ford, Hurstbridge VIC

I thought you might like an update from me in regard to the cuttings you sent just after Melbourne cup day in 2021. They all went in on the 15th Nov, 2021 and I potted up quite a few today (070122) and Stuckey's Hybrid several weeks ago (below). The strike rate has varied from 10 to 80%.



I will send some other photos of the plants I now have in the garden from the original set of cuttings I obtained from you a few years ago. The *Petrophile pulchella* (left) is budding up which is most exciting.

Marilyn Sprague, Mandurang, Vic

I'm quite determined to get my contribution in on time. I've missed the quick deadlines recently. Our summer/spring here in Mandurang (Central Vic) produced a mild summer and above average rainfall in spring and it appears to have been perfect for Isopogons and Petrophiles. Isopogon dawsonii, Petrophile squamata, Isopogon formosus (green leaf form) (the grey leaf form struggles here-maybe I should graft it?) are budding up beautifully.



I've just checked my grafts: Isopogon latifolius-long stem – R/S Isopogon Coaldale Cracker. I have 4 and they are very slow. They have responded to the rainfall ... that's giving me a lesson, BUT, I absent-mindedly planted them close (about 3m away) to some Quandongs, and like all the other plants in that area they are feeding the Quandong and are slow. I'm considering digging out these Isopogon grafts and shifting them to a safer place. I'll wait 'til winter. Has anybody else transplanted their grafted plants? Meantime my Isopogon cuneatus – R/S Coaldale Cracker is 1.5m tall. It's nowhere near the Quandongs!

Above left: Isopogon cuneatus graft (left) is 1.5m tall. Above right: Isopogon latifolius graft, near my suckering Quandongs



I haven't managed to do any isopet grafting this season. (I've been working on Verticordias!) Though I have done cuttings of I. formosus and dawsonii and I germinated some I. dawsonii from seed. I haven't grown I. petiolaris and Petrophile linearis 'Pixie Mops' is difficult to keep alive here. Hopefully someone will share grafting tips for it.

I needed to send you my Petrophile biloba flowering this year (right). I posted it on my @marilynswildflowers site and it created a storm. Isn't it amazing!!



**Ralph Cartwright
Australian Plants Society, NSW**

I posted this to our FB page asking what it might have been to cause this. Any ideas? Some people posted pictures of Waratahs and Banksias with similar multiple heads all squashed together, but no info on to how or why. Hi Ralph, interesting photo! It doesn't look like there is any malformation so we think it is just a case of multiple flowers occurring at the end of that stem. Many species do that but it's not common in I. anemonifolius. We have heard of and seen waratahs doing this, in that case we suspect the thinking is that may be a malformation as waratahs rarely ever have multiple heads.

Ros and Ben Walcott, Red Hill ACT

By far the best performing Isopogon in our Canberra garden is Isopogon formosus and its cultivar 'Cherry', which is very similar to the species. We have tried a dozen different Isopogons in our garden over the last 20 years, but most are not compatible with our clay soil and frosty winters. We do have the following Isopogon species growing at present, anethifolius, cuneatus and mnoraifolius, but none of them could be said to be

thriving. Gratifyingly, *Isopogon formosus* is the one enthusiastic grower of the group and it has grown well, flowers generously each year and stands up to the vagaries of our climate and soil. We have a group of four of the species planted from 2004-2013 and three of the cultivar 'Cherry' planted in 2018, all about 1m high, with finely divided, somewhat prickly green foliage and many deep pink flower heads each spring. This plant is native to coastal southwestern Western Australia.



Above, *I. formosus* in the garden. Top right, *I. formosus*, bottom right, *I. formosus* 'Cherry', left, *I. cuneatus*.

A pedunculata paradise

What a flowering we had in the bush here last spring of *Petrophile pedunculata*! After a few years of drought leading into the Black Summer fires of 2019-20, we have had two years of very high rainfall. This area, Milton/Ulladulla on the NSW south coast, is the furthest south that this species is found. The same is true for a further five eastern isopogon and petrophile species, all quite common and widely distributed, which have this area as their furthest southern reach. Of the 14 eastern species of isopogon and petrophile, five occur much further north and only *I. prostratus*, *I. ceratopyllus* and *P. multisecta* can be found further south (in NSW, Victoria and South Australia).

Petrophile pedunculata has long been one of our favourite petrophiles. We love its graceful long smooth foliage. It took a rain-soaked camping trip to Bundanoon many years ago for me to notice the beauty of its leaves, their delicate tracery enhanced by the sparkle of trembling raindrops. That and the sopping wet cold jeans suffered all the way home in the car are an enduring memory. The leaves are very long (up to 18cm), partly divided, the undivided part shorter than the divided part. Widely spaced along the stem, the leaves spread out almost at right angles from the stem. They are distinctively structured on a rather flat two-dimensional plane compared to the



strongly three-dimensional structure of the other three local petrophile species. Basically round in cross-section, the upper leaf surface has a narrow groove.



It is only more recently that I have begun to appreciate the flowers. The buds are so short and plump, mostly all limb (the enlarged end). They start off with a startling bright lime green colour developing into a yellow which can be so bright as to be fluorescent. Full of character, each flower tube has what looks like a couple of teeth at the tip. These are small extensions of the tip of each tepal; two appear to protrude beyond the flower while the other two are usually shorter; the four tepals later separate right to the base and curl backwards like peel from a banana. After opening, the flowers blend into the background in a creamy white backdrop but in an impressive finale this species retains its erect styles and colourful pollen presenters for a long time giving the flower head a punk look, even when the flowers themselves have dropped. The species name refers to the conspicuous peduncle or stalk which supports each flower head. There may be anything from 2-3 heads in the cluster and up to ten heads.

There are two forms of *P. pedunculata* growing in our area. Most common is the tall shrub but there is also a low form. Growing up to 2.5 m high, this species is found in dry sclerophyll forest, often on sandstone or in gravelly clays, or in wet or dry heath on sand or ridges. Beyond the town area it has generally recovered well from the Black Summer fires, as it resprouts from a lignotuber after fire, displaying dramatic red new leaves.

Closer to town in the Wildflower Reserve in west Ulladulla, destroyed by an earlier fire in August 2018, this species is currently one of the most common understorey plants. These young plants are already tall (up to 1.5 m) with just one or two long stems and displaying clusters of flower heads ranging from two to twelve. In spring 2021 there was excellent flowering – in early October there were only a few green buds forming but by November there was an explosion of colour which was relatively



short-lived, beginning to wane by late November. These plants were making the most of dappled sunlight, reduced competition and good rainfall. The understorey is experiencing higher light levels than usual due to the fire opening up the tree canopy. This small area of remnant wet sclerophyll forest or southern turpentine forest has relatively damp, rich soils over Wandrawandian siltstones and sandstones.



In the South Pacific Heathland Reserve on the coast in south Ulladulla, a grove of *P. pedunculata* plants in a wet heath area also put on a spectacular display last spring. The corner in which they grow was partly burned in a fire in August 2015 and partly again in 2016.

These plants are the low or dwarf form of *P. pedunculata*. The official literature notes that stunted forms of the species may be found in swampy areas like this but there is nothing about the plants that could be described as stunted in terms of being underdeveloped or poor. Growing to less than 1 m, these handsome



plants are particularly floriferous and leafy. There are many specimens scattered in wet heathland on clay/sandy clay soil. They are adjacent to a small grove of very old *Banksia serrata* plants with massive lignotubers which are also dwarfed in form. It is well known that coastal winds can produce stunted growth and this is very evident in this reserve, but this particular section is several hundred metres inland from the sea and protected from winds. Here there may be environmental factors limiting growth such as wet swampy conditions, heavier soils, or a rock shelf below the shallow soil, but there is a genetic component.

The spring display of 2021 was the best we have ever seen in this reserve. These low forms of *P. pedunculata* are more compact and wider, more leafy and less rangy than the common form, and have multiple stems. They have lush foliage with lovely pink/red new leaf growth. There were many flower clusters, with 10-12 flower heads in each. In late afternoon westerly sunlight they were almost luminescent. Here the flowering began in late September, peaking in October and continuing into November. Used to damp conditions, the wet combined with extra light and less competition post-fire has caused these plants to flourish. Prior to the fire, tall allocasuarina species dominated and were reducing diversity.



There was a respite from constant La Nina rains coming into spring but in November the rainfall was relentless. We would expect the flowers to suffer given November was a peak flowering month. The low heathland plants with tighter flowers on shorter heads showed no evidence of any rain damage. The taller forest plants with longer inflorescences were partly affected – the delicate tepals of opened flowers had been swept away in the rain, leaving only the pollen presenters to keep the plant looking attractive.

As well as providing a good case study of the differences between the two forms of *P. pedunculata*, this local spring display has highlighted the suitability of lower dwarf forms of *P. pedunculata* for modern gardens. We are now looking forward to exploring *P. pedunculata* locations burned more recently in the Black Summer fires where in future we might find more excellent spring displays.

Did Georgiana Molloy discover an isopogon?

The hidden history of *Isopogon dubius*

An interesting footnote in the otherwise male-dominated nineteenth century history of the discovery, naming and cultivation of isopogons and petrophiles is the involvement of Georgiana Molloy (born Georgiana Kennedy), an early settler at Augusta and later Vasse River, WA. Although not extensive, her contribution to botany was extraordinary in an era when a woman's presence in the scientific world was rarely countenanced. Georgiana Molloy is one of the best known early plant collectors, Alex George suggests, because we have such a detailed picture of her life through her diaries and correspondence and other records. She collected under constraints unknown to male contemporaries – collectors who were either full-time professionals or those able to use the location, influence and spare time attached to their jobs to explore new regions. Her collections were known for their quality and beauty.

Until now there has been no clear link between Georgiana Molloy and the discovery or collection of any isopogons or petrophiles. Historically, women's achievements have been poorly documented and this is the case with regard to her collections. There is no comprehensive list and of an estimated 400 collections only 50 species have been linked to her. In our Newsletter No. 7, Tony Cavanagh suggested the possible involvement of Georgiana Molloy via James Mangles in his research on the cultivation of isopogons in Britain in the nineteenth century.

Georgiana Molloy collected exclusively for Mangles, an English importer of seeds, plants, and herbarium specimens. He was the source of the seed for an exciting new species of isopogon published in Edwards'



Isopogon dubius Curtis' Botanical Magazine 4037, 1843

Botanical Register in 1842 called *Isopogon roseus*. This is the only isopogon we know Mangles was associated with. At that time plants from it were 'not uncommon in collections' but as yet it had only flowered at the property of Robert Mangles (James Mangles' brother). While the grower and importer were credited, the collector of the seed in Western Australia was not. According to Alex George this was typical of the botanist who documented the new species, John Lindley. Lindley was obviously most impressed when he saw the flower head, using the Latin for rose, rosy or pink for its species name. The species seems to have created a stir in English horticultural circles in the 1840s.

The *I. roseus* seed was imported in 1840 (according to *Paxton's Magazine of Botany* 1848). Mangles had two local Australian collectors in the late 1830s, James Drummond and Georgiana Molloy. According to the JSTOR *Global Plants* database, Drummond's relationship with Mangles ended in 1839 when Drummond devoted himself to collecting for William Hooker, Mangles preferring to keep using Molloy.

Georgiana Molloy's letters to Mangles discuss her attempts to collect isopogon seeds in early 1840. She had moved north to the Vasse near Busselton in May 1839 just in time for the flowering of this isopogon (July to October). The impending departure of a whaling ship from Geographe Bay in February 1840 was too good an opportunity to miss to get her latest collection to England and she hurried to collect the last few items. One of these was an isopogon she had been discussing with Mangles; it is likely that someone had brought her a specimen in flower. Her description had obviously impressed him as he had specifically asked for seed.

The isopogon was probably growing some distance away; this explains why she had not already collected it. Existing herbarium specimens are from 80-90 km away from Vasse but the species is widespread although scattered and, given the impact of subsequent settling and land clearing, there were probably specimens

growing closer than this 180 years ago. On 2 February she organised a trip on horseback but came home empty-handed when the horses bolted necessitating a lengthy search for them. On 4 February the ship departed for London without the isopogon (but with 106 of her specimens, about 40 of them possibly new species). Nevertheless on 12 February she went out for a second time and successfully collected a full bag of isopogon seed for dispatch on the next ship. Such expeditions were unusual. Her (part-time) collecting was more commonly facilitated by others bringing specimens to her (her husband, her older children, other settlers, travelling soldiers and local Nyungar people).

Although the elapsed time between the arrival of the seed in England and its first flowering was short at two years or less, it is not unusual for this species. Seed germinates very readily and plants have been known to flower within six months of being planted. Noting the obvious viability of the *Isopogon roseus* seed on arrival in England, it is relevant to mention that Molloy's seeds were known for their freshness and careful packing while Drummond's fame relied not so much on quality but rather on the sheer number and spectacular nature of his finds. He was a prolific collector who covered long distances, always in the saddle collecting rather than arranging his specimens. Although Molloy usually accompanied her seed collections with a precise description and pressed specimen, in this case it is lacking; she only mentions collecting seed in her letter and so perhaps that is all she sent (the plant was not in flower when she collected it in February and specimens usually require the inclusion of a flower). *I. roseus* was formally described on the basis of a hothouse plant.

Mangles routinely forwarded Georgiana Molloy's collections to Lindley and to Joseph Paxton, head gardener at the grand estate Chatsworth in Derbyshire. Assuming these seeds travelled the same route, it is very likely the famous vast glasshouse at Chatsworth was one of the collections which had plants of *Isopogon roseus*. The species was certainly included in Paxton's own *Magazine of Botany* in 1848 described as 'very handsome'.

Georgina Molloy's botanical career came to a sudden end when she died in childbirth in 1843. After proteaceae dropped out of horticultural fashion in the 1850s, it is unclear whether her isopogon was cultivated again in Britain. After more than 70 years, botanist George Druce doomed the name *roseus* to obscurity in just three scant lines in 1917. He believed the species was the same as one published earlier (by Robert Brown in 1830) and gave it the name *Isopogon dubius*.



But that was not the end of the handsome *Isopogon roseus*. This name continued to be used well into the twentieth century and was featured in botanist C. A. Gardner's publication *Wildflowers of Western Australia*. The 1935 version contained a lovely colour illustration by artist Edgar Dell (left) published as *I. roseus*. However Gardner was apparently not quite as enthusiastic about the species as the early English horticulturalists. In later editions of his 1959 version, he described it under the name of *Isopogon dubius* as having harsh, prickly foliage, and did not bother with any illustration. In fact, the foliage is stiff rather than particularly harsh or prickly and is very attractive.

Botanical names do not have to be meaningful but they do influence thinking; in the modern world we call it the power of branding. In practice, considerations of suitability and meaning are important for publicly recognised names (an example is the 2017 outcry over the name 'Ferry McFerryface' for a new Sydney

ferry¹). The species name *dubia* or *dubius* meaning doubtful in Latin referred to Robert Brown's uncertainty about the correct genus classification of what is now *I. dubius* (he originally categorized it as a petrophile under the name *Petrophila dubia*). Possibly Brown thought the matter would be resolved with new material, giving the specimen a temporary name as a place marker, or as a flag to later botanists. It was a long wait – Druce did not resolve the doubt until almost nine decades later. Instead of using the existing isopogon species name (*roseus*), he created an entirely new name combination (*Isopogon dubius*). So Brown's species name has a permanence that was probably unintended. The name, although Latin, has a clear English meaning which has a pejorative connotation.

When it comes to species names modern botanists insist on the rule of priority (the earliest name) in line with the Rules of the International Code of Botanical Nomenclature², the only requirement being uniqueness for each species name within a genus. The fact that this earlier name applied to an entirely different genus is overridden by the rule that: 'The specific epithet remains the same on transfer of a species from one genus to another unless the specific epithet has been previously used in the name of another species or subspecies in the genus to which the species is to be transferred.'

Isopogon dubius is the Jekyll and Hyde of isopogons/petrophiles. It has been both loved and scorned – on the one hand, a poor specimen of 'dubious' value with harsh, prickly foliage, little-known (*P. dubia*), on the other, a handsome specimen well-known in cultivation (*I. roseus*). Despite the newer name being in use for decades, *Isopogon dubius* still lacks the cachet attached to the plant known as *Isopogon roseus*. It has 'dubious' status. Perhaps the name should be changed back to *Isopogon roseus* but botanists are notoriously reluctant to deviate from the rules and, such is the difficulty, only a handful of attempts have ever been successful.

Isopogon dubius is quite variable in the wild, some specimens much more attractive than others. The beautiful form originally cultivated known as *I. roseus* appears to have been lost. Georgiana Molloy introduced an outstanding form of *I. dubius* to cultivation and we need to follow her example to select new and better forms to grow to restore this species to its old *I. roseus* glory.

Bernice Barry, 2016. *Georgiana Molloy: The Mind that Shines*, Picador Pan Macmillan Australia, Sydney

Bernice Barry, 2015. Georgiana Molloy (1805-1843) Botanist, Western Australia. *Biodiversity Heritage Library* blog <https://blog.biodiversitylibrary.org/2015/09/georgiana-molloy-1805-1843-botanist-western-australia.html>

Alex George, 2016. Standing on shoulders, *Australasian Systematic Botany Society Newsletter* 167. <https://asbs.org.au/newsletter/pdf/16-june-167.pdf>

Alexandra Hasluck, 1967. Molloy, Georgiana (1805–1843), *Australian Dictionary of Biography* <https://adb.anu.edu.au/biography/molloy-georgiana-2467>

Drummond, James (1784-1863), *JSTOR Global Plants* <https://plants.jstor.org/stable/10.5555/al.ap.person.bm000151087>

Tony Cavanagh, 2005. Cultivation of Isopogon and Petrophile in Great Britain in the 19th Century, *Isopogon & Petrophile Study Group Newsletter No. 7*.

Isopogon roseus Lindl., *Edwards's Bot. Reg.* 28: misc. p. 39, no. 37 (1842)

Paxtons Magazine of Botany v.14 1848 pp.259-260.

¹ Ultimately dropped in favour of a more appropriate name 'May Gibbs', in line with the other new ferries named for Catherine Hamlin, Fred Hollows, Victor Chang, Pemulwuy and Bungaree.

² Since 2011 known as *International Code of Nomenclature for algae, fungi, and plants*.

Dryandra Woodland declared a national park

In January 2022, Dryandra Woodland near Narrogin in Western Australia, a former state forest and the largest remnant of original vegetation in the western wheatbelt, became WA's newest national park. It is home to the state's animal emblem, the numbat.

A complex of 17 distinct blocks spread over approximately 50 kilometres separated by areas of agricultural land, the woodland was made a state forest in 1903 to protect water catchments and grow wandoo and mallet forests. From the 1960s and 1970s it began to be managed by the Forests Department as though it were a fauna and flora reserve. To this end, a formal management plan was put together in 1995 by the now Department of Environment and Conservation. With national park status now, this will ensure formal and permanent protection through laws aimed at the conservation of nature, biodiversity, natural ecosystems, landforms of significance and geological processes.

This semi-arid area less than two hours' drive from Perth is a rare remnant of the open eucalypt woodlands which covered much of the wheatbelt prior to land clearing from the 1890s. Dryandra's flora is transitional between that of the moister jarrah forest to the south and the semi-arid wheatbelt further east. It is known particularly for its extensive stands of wandoo (*Eucalyptus wandoo*), powderbark wandoo (*E. accedens*) and salmon white gum (*E. lane-poolei*) and provides a haven for native flora and fauna while much of the surrounding country is badly affected by salinity.

Over 800 native flora have been identified in Dryandra Woodland, including 15 that have been declared priority species. It includes extensive areas of dryandras after which the woodland is named. The greatest floristic diversity can be found in Lateritic Plateau Woodlands, Dryandra/ Petrophile Shrublands, Low Kwongan, Marri Woodlands and Lithic Complexes. These communities make up only a small proportion of the total area of Dryandra.

The Dryandra/Petrophile Shrublands at Dryandra Woodland are lateritic uplands which cover only a small area and are considered to be uncommon. While their weed invasion hazard is rated as low, the incidence of priority plants is rated as medium. The fungal invasion hazard is rated high meaning its species are highly susceptible to Phytophthora.

Dryandra Woodland is a great place to see and learn about isopogons and petrophiles and you will find numerous excellent specimens. As the name of one of the vegetation communities implies, petrophiles are common. Of the over one dozen species of isopogon and petrophile found (listed, right) there, none are declared priority species requiring special protection or monitoring. However the woodland is significant because it has several lesser-known species which are quite common in the area. Among these are:

ISOPOGON	PETROPHILE
<i>crithmifolius</i>	<i>brevifolia</i>
<i>dubius</i> (less common)	<i>circinata</i>
<i>teretifolius</i>	<i>divaricata</i>
<i>villosus</i>	<i>filifolia</i> ssp. <i>filifolia</i>
	<i>heterophylla</i>
	<i>imbricata</i>
	<i>serruriae</i>
	<i>squamata</i> (less common)
	<i>striata</i>



Isopogon crithmifolius (left) could be described as a cross between *Isopogon formosus* and *Isopogon dubius* (although it is a separate species). The flower head is more like *I. formosus* but the leaves are like *I. dubius* except smaller and narrower with more open foliage and longer stems. Note that *I. formosus* does not occur nearby while *I. dubius* is present but is less common.

Petrophile imbricata (right) is similar to *Petrophile ericifolia*. However it has a very hairy flower head with prominent overlapping (imbricate) involucral bracts. Although locally common, this species is not widespread and is scarce outside Dryandra Woodland or nearby Boyagin Nature Reserve. Bee and clerid beetle attracting.



Isopogon villosus (left) is a small mounding shrub with thick hairy stems and large flower heads clustered near the base of the plant. It has numerous very neat, hairy flowers which separate only a small way down the floral tube and long smooth divided cylindrical leaves. Limited to certain areas of Dryandra Woodland such as Candy Block.

Petrophile circinata is another small mounding shrub limited to certain areas of Dryandra Woodland such as Candy Block. It has lovely foliage like a carrot – very long leaves have a long stalk and divided upper section. The stems are short and the flowers are hairy, separating all the way to the base. Broad reddish involucral bracts overlap to form a basket around the flower head which occurs at the base of leaves.



For more on *Isopogon villosus* and *Petrophile circinata* at Dryandra Woodland, see Doug Sawkins' article in our Isopogon & Petrophile Study Group [Newsletter No.22](#), April 2018, pp. 13-15.

Cricket as pollinators

Isopogons and petrophiles are mostly pollinated by insects. It appears that bees, particularly native bees, are the main pollinator. However, crickets and katydids have been photographed on isopogons and petrophiles. Could they help in pollination?

Leaping insects like crickets and grasshoppers are not known to be good pollinators of plants. Instead, they are well known for eating and killing plants, agricultural pests. But scientists have now discovered that

orthopterans (the order of insects that includes grasshoppers, crickets and katydids) can pollinate plants just like bees. They are also essential to ecosystems as prey for other animals, like birds and bats. Insects all over the world are experiencing dramatic population declines, caused by a variety of factors including climate change, habitat loss and pesticide use.

The discovery of their role in pollination was made in 2010 by researchers looking for the mysterious pollinator of *Angraecum cadetii* (an epiphytic, or tree-growing, orchid from a genus mainly specialised for moth pollination) on the island of Reunion, in the Indian Ocean close to Mauritius. They filmed a raspy cricket, a species of the genus *Glomeremus* previously unknown to science, emerging with pollen on its head after visiting an orchid to feed on its nectar. The scientists theorised that bird and cricket pollinators may have evolved because of a lack of specific pollinators when the orchids colonised the island. In addition, raspy crickets are opportunist foragers and may have developed a taste for nectar to compensate for a lack of other food resources. The orchid may also be emitting a scent attractive to the cricket.

In 2018 another study discovered that orthopterans, such as grasshoppers and crickets, visit flowers more frequently than previously known, and they pollinate the flowers they visit. Surveys in five Southeast Asian countries using photographs and videos recorded 140 incidences of orthopterans visiting flowers, among which 41 orthopteran species were recorded to visit flowers of 35 plant species. Out of the 41 orthopteran species, 19 were katydids, 13 were grasshoppers, and nine were crickets. The researchers also discovered two main types of flower-visiting orthopterans – firstly, katydids that are floriphilic, preferring flowers over other plant parts as their diet; and opportunistic folivores, such as cone-headed katydids (*Conocephalus* species) and Bukit Timah's cricket (*Tremellia timah*) which typically consume leaves but consume flower matter when available.

Close observation of video recordings of the feeding behaviour of the flower-visiting sickle-bearing katydid *Phaneroptera brevis* on flowers of the Hairy Beggarticks *Bidens pilosa* showed that the katydid fed on the flowers without damaging the parts of the flowers by gently collecting the pollen grains. Pollen grains attached to the antennae and legs of the katydid facilitated pollination. When the flowers were exposed to the katydids and allowed to develop into seeds, the chance of these flowers producing seeds was about three times higher.

Orthopterans are not often observed on isopogons and petrophiles. Although they offer pollen protein, these genera lack rewards such as nectar or strategies to attract pollinators such as a scent. There are a few species known to have a scent – *Petrophile megalostegia*, *P. drummondii* and *P. aspera* – however little is known about the role of scent. They do however, usually have large amounts of pollen and provide convenient landing spots such as the top of the inflorescence, and finial-shaped pollen presenters which provide convenient holding points for pollinators. It may be that it is the smaller or immature orthopterans which visit isopogons and petrophiles.

Member Lisa Godden lives next door to the Royal National Park, Sydney and has a resident tiny grasshopper living in one of the flowers of her potted *Isopogon formosus* plant. Lisa says he seems to love these flowers as much as she does!



Grasshopper on *Isopogon formosus* in cultivation.
Photo: Lisa Godden.



Fred Hort photographed this katydid nymph (left) eating pollen from the pollen presenter of a *Petrophile brevifolia* flower. Grains of pollen dot the



head and limbs of this polyphagous katydid just like those in the 2018 study. When infused in hot water, flowers of *Petrophile brevifolia* are said to give off a brilliant yellow colour so perhaps tannins help attract pollinators.

‘Mr Cool’ the katydid on *Petrophile brevifolia*. Photo: Fred Hort.

For references, see [p. 29](#) in this issue.

Conservation news from Western Australia

Bushfires hit southern WA and wheatbelt

Multiple serious bushfires broke out in wildflower hotspots in southern WA in early 2022. In January a bushfire at Cape Naturaliste north of Margaret River cut a swathe from Curtis Bay right over to the Cape Naturaliste Road north of Burton Road at Meelup. Kevin Collins reports that Boranup State Forest near Margaret River was scorched and powdery ash inches deep. Richard Clark from Geographe Community Landcare Nursery said it must have been a very hot fire and the Meelup Mallee has been completely burnt out – just cinders. ‘Some of my seed collecting areas are devastated, and I won't be collecting anything in this area for years to come.’ (WA Wildflower Society Facebook page 14 January 2022). Species of interest in this area include isopogons *formosus* and *sphaerocephalus* and petrophiles *linearis* and *striata*.

From 4 February, fires threatened Denmark near Albany, and Bridgetown, burning through 2,200 hectares. According to Kevin Collins, coastal heath was burned at Denmark and would have had some I & Ps, Bridgetown was Jarrah/Marri forest so maybe some isopogon/petrophile species. Kevin adds that ‘another fire was near Bremer Bay, Swamp Rd. area I believe. Certainly some proteaceous heath in that area.’ All were pretty intense hot fires. Hopefully the area from Bridgetown over toward Meelup was unaffected because this is where *Isopogon formosus ssp. dasylepis* (priority 3 conservation status i.e. poorly known) is found.

Then the wheatbelt, a massive inland agricultural area, broke into flames in what the press described as horrendous fires which tore through around 60,000 hectares of bush and farmland. The wheatbelt is full of key isopogon and petrophile locations. The shires affected include Narrogin, Quairading, Bruce Rock, and Corrigin, Kondinin and Kulin. As well as Dryandra Woodland National Park, the Shire of Narrogin has several important reserves including Foxes Lair and Boyagin nature reserves.

Doug Sawkins reported that Yilliminning and Yilliminning Rock reserves were badly hit: ‘I wandered out to the Narrogin fire area. In addition to the damage to farms and livestock, the environmental impact was huge. North Yilliminning reserve has been mostly burnt out and Birdwhistle Rock vegetation has been obliterated. Huge loss of nesting and animal refuge logs. There will be a great wildflower response, but native bird and fauna loss will take decades to recover if ever. Because both of these reserves were overgrown with dead branches and trees they carried a very hot fire. Local fire brigades don't have the funds to provide the occasional controlled burns that they would have had before white settlement. In [one] part of North Yilliminning reserve the fire was less intense. It scorched rather than burnt the canopy causing leaf fall after

the fire was out.’ (Foxes Lair Nature Reserve, Wildlife and Flora, Narrogin, Western Australia Facebook page, 22 February 2022.) Species at Yilliminning Rock include many petrophiles (*P. ericifolia*, *P. divaricata*, *P. glauca*, *P. squamata*, *P. circinata*, *P. heterophylla*) and some isopogons (*I. teretifolius* and probably *I. dubius*, *I. pruinosis* ssp. *pruinosis*).

Wildflower Society publishes its position on prescribed burning

There has been considerable concern in southwest western Australia about the ongoing effects on biodiversity of widespread prescribed burning aimed at mitigating bushfires. Recently, the WA Wildflower Society published a Position Paper; it believes that prescribed burning as currently used in the Southwest of Western Australia is too blunt an instrument for the management of wildfire and protection of human and environmental assets due to factors such as loss of diversity, drought, climate change, weed invasion, fire suppression as a strategy, and resources. The paper relates to the Southwest Botanical Province of Western Australia.

The Wildflower Society’s recommendations call for new, finer scale targets which take into account factors such as the protection of biodiversity and long-term seasonal weather like drought, and suggest prescribed burning be used as a secondary rather than the primary management tool for controlling wildfires. They also cover a need for urgent research into the impact of intense prescribed burns on biodiversity and the positive and negative feedbacks of fire. For the background and recommendations, see

https://www.wildflowersocietywa.org.au/wp-content/uploads/2022/03/WSWA-Position-Statement-on-prescribed-burning_final_2022-01-19-003_rev-Mar-2022.pdf

A recent draft paper from the federal Department of Agriculture, Water and the Environment about fire regimes that cause biodiversity decline could put unsustainable prescribed burning practices under the spotlight nationally. It nominates fire as a threatening process for flora and fauna, particularly those already listed as rare or threatened. See <https://www.awe.gov.au/.../fire-regimes-that-cause...>

I. sp. Canning Reservoir in Priority Flora survey program

The WA Wildflower Society is funding and running surveys of priority listed flora species in conjunction with the Department of Biodiversity, Conservation and Attractions (DBCA) which maintains lists of threatened and priority flora in WA. Many Priority 1 or 2 flora species are poorly known and surveyed. The goal of the project is to perform sufficient survey of selected Priority 1 or 2 flora species (and other priority species) to determine if they should be listed as Threatened, or the priority status changed, with the survey of known populations and location of new populations.

Isopogon sp. Canning Reservoir (Conservation Code: P1) was one of only six priority listed species surveyed last year. The species was recorded along the Brookton Highway and in the Dwellingup State Forest. The species is known from two locations in Jarrah, Marri and Sheoak open woodland. A Factsheet for *Isopogon* sp. Canning Reservoir was prepared to assist volunteers with identification in the field but the survey was not



completed due to heavy rainfall and will be continued in 2022.

Isopogon sp. Canning Reservoir. Photos: Jean and Fred Hort

Forms of species may have different DNA

Some isopogon and petrophile species have one or more recognised forms or varieties i.e. plants that are morphologically different from the others. In some cases this is because the taxonomists have not yet completed their analysis (e.g. *P. squamata*) while in others it is because the taxonomists have decided that the differences are not sufficient to warrant making it a separate species (e.g. *I. formosus*). A recent study on Parrot Bush *Banksia (Dryandra) sessilis* raises the possibility that the distinct forms (often unnamed) of many widespread species could be relatively old and distinct.

Greg Keighery reports in the WA Wildflower Society Newsletter of February 2022 that the paper looked at the chloroplast (always inherited from the mother) and nuclear DNA of *Banksia (Dryandra) sessilis*. The chloroplast DNA found two major groups were present – one on lateritic uplands and the other on coastal limestones and sands, with separation of these groups occurring approximately 3 million years ago. Nuclear DNA found 3 major groups – one on the laterites of the Darling Plateau, one southern coastal sites, and the other on northern coastal sites. Genetic data suggests that presence on tertiary laterites probably came first then spreading to sands and limestones about 3 million years ago, about the time the Swan Coastal Plain bioregion was forming. In summary the genetics suggested that two major groups could be found, correlated with geomorphologies, with more recent separation based on climate.

Taxonomic classification of species drives conservation, meaning that these dryandra varieties are currently indiscriminately lumped under a widespread species making them of “little concern” in conservation terms. These study results suggest that, as a precaution, they should be treated as distinct entities for regeneration and conservation purposes.

With regard to isopogons and petrophiles, further taxonomic research may yield new species or subspecies from existing forms which in turn will activate conservation efforts. A recent example is the recognition of a subspecies of *I. formosus*, subspecies *dasylepis*, which was then able to be allocated a priority status (3) and for which conservation action is underway as part of recovery efforts for the Busselton ironstone threatened ecological community. However, within some species there are forms which have not been considered to warrant species/subspecies status but which may also have a claim to conservation action. As far as we know, there are as yet no existing DNA analyses of isopogons or petrophiles. However, analysis of genetic data may be important to justify conservation efforts for forms which may be less widespread and more threatened than the currently recognised umbrella species.

Heidi Nistelberger, Sarah Tapper, David Coates, Shelley McArthur and Margaret Byrne. As old as the hills; Pliocene Palaeogeography processes influence patterning of genetic structure in the widespread common shrub *Banksia sessilis*. <https://onlinelibrary.wiley.com/doi/full/10.1002/ece3.7127>

Isopogon petiolaris A. Cunn. ex R. Br., *Suppl. Prodr. Fl. Nov. Holl.* 8 (1830)



Isopogon petiolaris was first formally described by Robert Brown in 1830, from a specimen collected at Moreton Bay by botanical collector Allan Cunningham. The name *petiolaris* is derived from the Latin, meaning borne on a stalk referring to the very long leaf petiole or stalk of this species. It is rare in cultivation, despite its compact, garden-suitable habit and hardiness to a range of conditions.

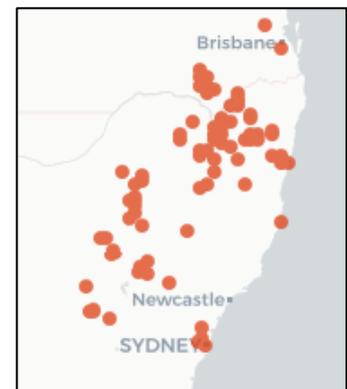
Description – *Isopogon petiolaris* is a low, spreading, sometimes mounded shrub to 1 m in height, with a lignotuber. Leaves have a flat lamina, up to 12 cm in length with the leaf petiole making up two-thirds of the leaf length. The leaf is pinnately divided into flat segments, which further divide into short, sharply pointed segments, and have prominent longitudinal veins. The inflorescence is globose, terminal, sessile and solitary, and surrounded by long leaves which slightly obscure the flower head. Appearing between July and November, the individual flowers are yellow and glabrous apart from a short tuft of white hairs at the end of each tepal. The involucral bracts are very broad, ending with a pronounced acuminate tip. The cone scales are



similarly broad and densely hairy/woolly apart from the sharp tip. The pollen presenter is constricted near the mid-point, then dilated above the constriction to a slightly swollen stigmatic cap.



Distribution – has a huge range from Moreton Bay in south-east Queensland, south along the eastern and western slopes of the Great Dividing Range as far as the ranges just east of Parkes. Convenient locations to find *I. petiolaris* are in the Pilliga Forests near Narrabri and just north of Grafton in the Fortis Creek National Park.



Cultivation – this species is rarely seen in cultivation but its bright yellow terminal flowers, attractive, distinctive foliage and low, compact habit are ideal for small gardens. It survives extremely dry conditions and can tolerate wetter soils although it prefers good drainage. Like many low isopogons, pruning is not necessary but it can be pruned to shape.



Because in nature it grows in such a wide range of conditions, from summer-wet coastal areas to dry inland areas subject to heavy frosts, provenance will be important in selecting the most adaptable forms for gardens. Trials need to be undertaken to establish the reliability in cultivation of plants from different locations.

Propagation can be from cuttings or seed. Seedlings grow fast and soon outgrow the pot, quickly beginning to ramble. For summer-wet gardens, grafting may be needed for plants originally sourced from very dry locations. *Isopogon petiolaris* is one parent of the hybrid *I.* ‘Coaldale Cracker’ and it grafts readily onto its offspring *I.* ‘Coaldale Cracker’.

Confusing species – The distinctive foliage of *I. petiolaris* means that it could only be confused with the hybrid *I.* ‘Coaldale Cracker’ which has very similar foliage and flowers. However, *I. petiolaris* can easily be distinguished by its low, sometimes mounded habit, whereas *I.*

‘Coaldale Cracker’ grows into a largish shrub. The petrophile *P. glauca* superficially resembles *I. petiolaris* having a flat leaf with long petiole and divided upper portion, but it is a western species with a much larger shrub habit, and cream rather than yellow flowers.

Above, *Isopogon petiolaris* in the garden of Anthony O’Halloran and Annabelle Greenup at Binnaway, NSW.

Petrophile linearis R. Br., *Suppl. Prodr. Fl. Nov. Holl.* 6 (1830)



Petrophile linearis was first described by Robert Brown in 1830 using a specimen collected in the Swan River district of WA in 1826. It is named for its undivided, linear, flat leaves. One of the most spectacular petrophiles, its common name 'Pixie Mops' refers to its delicate 'mop' of hairy, pink and white flowers.

Description –*Petrophile linearis* is an upright shrub to 1 m in height, with a lignotuber. The flat, thick, linear undivided leaves are up to 12 cm in length and 1 cm in width. They are glabrous (hairless) and have a pronounced curve, finishing with a short, sharp point. The inflorescence can be terminal or axillary, has no stalk, and is ovoid/globose in shape, up to 25 mm in length. Beneath the flower head are numerous smooth involucral bracts which are broad at the base,

the tip quickly tapering to a long point. Cone scales, prominent before flowering and at bud stage, are red/brown, broadly obovate with a pointed tip. Flowering occurs between August and November.



Clockwise from top left:
 1 – opened tepal with recurved anther; 2 – buds (photo Liesbeth Uijtewaal); 3 – buds emerging from cone scales (or floral bracts); 4 – involucral bracts; 5 – leaf; 6 – pollen presenter; 7 – pollen presenters at different colour stages (yellow then orange then red).

The spectacular flowers are among the longest of all petrophiles, each one up to 35 mm in length. Flower colour ranges from pale pink, almost white, to deep pink, with very prominent grey tips, and are covered with an incredibly dense mat of long, whitish hairs. The overall impact is stunning. The open flowers are an added attraction as they open (only part-way which is unusual for petrophiles which tend to split all the way) to reveal prominent recurved, typically maroon anthers and prominent pollen presenters. The pollen presenters have a pronounced bell shape in the middle, with the brush tip the only portion with hairs.

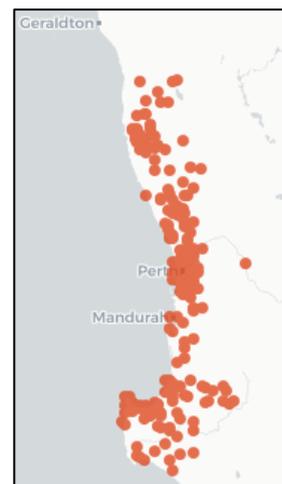
Distribution – common, scattered on the coastal plain and Darling Range of WA from Jurien Bay/Eneabba north of Perth, south to Yallingup below Bunbury. Good spots to find plants is Yandin Hill Lookout, Yanchep National Park and the Badgingarra area.

Cultivation – *P. linearis* or 'Pixie Mops' is perhaps the most spectacular and sought-



Petrophile linearis in the garden of Keith Alcock, Kalamunda, Perth.

after petrophile for gardens. Like all WA petrophiles it likes warm, dry summers and good drainage and resents east coast wet summers. It is not often found in gardens because it is unreliable on its own roots. A pot is a good option. It has been successfully grafted onto eastern species *P. sessilis*, *P. pulchella* and *P. shirleyae*, but requires an interstock of *P. teretifolia*. Grafted plants have proven to be long-term compatible. Unfortunately the requirement of an interstock will probably limit the introduction of grafted plants into the nursery trade.



Confusing species – *P. linearis* can be confused with *P. teretifolia*, which has similar hairy, pink/mauve/white flowers but they are noticeably smaller than those of *P. linearis*. Also, the terete leaves of *P. teretifolia* make it easily distinguishable from *P. linearis*, with flat, thick leaves. The two species are also found in different localities of WA, *P. linearis* found north of Yallingup near Busselton, whereas *P. teretifolia* is found in the Stirling Range west to Israelite Bay.

The amazing Dr Rye

Kevin Thiele³

In the 19th and early 20th centuries, botany was often regarded as a pursuit that was 'suitable' for women, in an era when most scientific disciplines excluded their participation. Nevertheless, even in botany women were generally permitted to dabble, but were rarely permitted to make a serious and substantial contribution. This social norm of both inclusion and exclusion was highlighted in a paper published in 2015 by Heather Lindon and colleagues from Kew Gardens. Of all the plant names published since 1753 (the starting date for the formal naming of plants), fewer than 3% have been published by female authors. In this context, we should celebrate the achievements of Dr Barbara Rye from the Western Australian Herbarium in Perth. A 2019 updated analysis of records of all published plant names (from the International Plant Names Index) shows that our Dr Rye is one of the all-time top-10 women authors of plant names in the world.

³ Kevin R. Thiele is a prominent Australian botanist. He was the curator of the Western Australian Herbarium from 2006 to 2015, then adjunct associate professor at the University of Western Australia and the director of Taxonomy Australia.

Barbara Rye grew up in Perth, at a time when there was more bushland than there is at present, and children roamed more widely. Like many children, Barbara was fascinated by creatures and the bush, and spent much time tadpoling, catching insects and marveling at the wildflowers for which Perth is famous. A wildflower-season bus trip in late teen years with her mother (during which participants were allowed to collect and press sprigs of the abundant spring wildflowers, something that would be frowned upon now), consolidated a love of nature and a fascination with Western Australia's remarkable biodiversity.

Barbara was able to pursue her interest at the University of Western Australia, with undergraduate studies in both botany and zoology followed by a PhD under the mentorship of Associate Professor Sid James, who inspired a whole generation of Western Australian biologists. As with others in the James lab, Barbara studied genetics, specifically chromosome evolution and reproductive biology in the family Myrtaceae, which is diverse and abundant in Australia (and especially so in the south-west).

Studying chromosome evolution in a biodiversity hotspot like Southwest Western Australia, it wasn't long before the (soon-to-be Dr) Rye discovered her first new species – *Darwinia capitellata*, which she segregated from the widespread *Darwinia diosmoides* based firstly on its different chromosome number, amply confirmed by morphological studies.

Her first new species was followed by many more. A position at the Western Australian Herbarium since 1981 has given her ample scope to range across the rich flora of Western Australia, a biodiversity hotspot and an area that still yields many new species every year. She was a co-author of the *Flora of the Perth Region* and *Flora of the Kimberley*, produced a *Flora of Australia* revision of the large family Thymelaeaceae, and revised and described new species in many genera in a range of families. During her career she has continued to work a rich vein in the taxonomy of the family Myrtaceae. Despite decades of work by Dr Rye and others, this family still has at least 150 undescribed species in Western Australia, including in *Darwinia*, the genus that first caught Barbara's taxonomic attention during her PhD.

Barbara Rye has clearly made the substantial contribution to the discovery and documentation of Australia's species that was once denied so many talented women. She has named, alone or with co-authors, over 230 new Australian species, and counting.

In 2019, the Australian Academy of Science released the [Women in STEM Decadal Plan](#), which sets out the steps needed to finally bring gender equity to science. It's appropriate ... that we celebrate the remarkable achievements of scientists like Dr Barbara Rye, one of the most productive women botanists in the world.

From *Taxonomy Australia*, Australian Academy of Science, 24 May 2019
<https://www.taxonomyaustralia.org.au/post/the-amazing-dr-rye>

Editor's note

With Michael Hislop, Barbara Rye has led recent taxonomic research into *Isopogon* and *Petrophile* in the 21st Century, taking over from Don Foreman. The list overleaf summarises her work so far on new species, reinstated species and new synonyms. She has been instrumental in tying up loose ends, clarifying and updating taxonomy by selecting lectotypes, more narrowly circumscribing some species and updating taxonomic keys for selected members of the genera.



Western Australia's Dr Rye is one of the all-time top-10 women authors of plant names in the world.

New taxa

2002 Hislop & Rye. *Petrophile antecedens*, *Petrophile clavata*, *Petrophile nivea*.

2005 Rye & Hislop. *Petrophile filifolia* subsp. *laxa*, *P. pilostyla*, *P. pilostyla* subsp. *austrina*, *P. pilostyla* subsp. *syntoma* and *P. prostrata*

2010 Hislop & Rye. *Isopogon panduratus*, *I. panduratus* subsp. *palustris*, *I. pruinus* and *I. pruinus* subsp. *glabellus*.

2011 Hislop & Rye. *Petrophile foremanii*; Rye & Shepherd. *P. septemfida*.

2019 Rye. *Isopogon sphaerocephalus* subsp. *lesueurensis*

2020 C.A.Gardner ex Rye & Hislop. *Isopogon nutans*

Reinstated species

2005 Rye & Hislop. *Petrophile filifolia* R. Br. and *P. juncifolia* Lindl.

2011 Rye, Hislop, Shepherd & Hollister. *Petrophile axillaris* Meisn.

2015 Rye & Hislop. *Isopogon spathulatus* R.Br.

Synonyms

2017 Rye & Hislop. *Isopogon heterophyllus* Meisn. (synonym of *I. formosus* subsp. *formosus*); *Isopogon teretifolius* subsp. *petrophiloides* (R.Br.) Foreman (synonym of *I. teretifolius* R.Br.)

2019 Rye & Macfarlane. *Isopogon drummondii* Benth. (synonym of *I. autumnalis* Rye & T.Macfarlane); *I. drummondii* Hügel ex Jacques (synonym of *I. sphaerocephalus* Lindl.)

Seed propagation tips from the Shire

Growing isopogons and petrophiles from seed has been an ongoing frustration for members ever since the beginnings of the study group. So an article in the Spring 2021 issue of *Australian Plants* 'Experimenting in the Nursery' by Emma Brame, horticulturalist at the Sutherland Shire Community Nursery in Sydney, sparked our attention. The nursery propagates over 200 different species of local native plants, including isopogons *anethifolius* and *anemonifolius*, and petrophiles *pulchella* and *sessilis*. Rhonda Daniels has previously shared some of the nursery's methods with us. Emma's article outlines some of the experimentation undertaken and the methods used to germinate some difficult plants from seed, such as persoonias, lomandra, smilax, themeda and isopogons and petrophiles. When the nursery announced an open day and sale, we decided that a visit should be on our agenda.

At the nursery we saw trays of *Isopogon anethifolius*, *Petrophile pulchella* and *Petrophile sessilis*, all in outstanding condition (as were all the plants on sale in the nursery). All of these plants were grown from seed, which we found amazing given the difficulty study group members have consistently reported in growing isopogons and petrophiles from seed. Although their scope is limited to species local to Sutherland, to our knowledge, there is no other grower in Australia producing such numbers and quality of isopogon and petrophile plants from seed. Below from left, trays of *P. sessilis*, *I. anethifolius*, *P. pulchella*.



Emma explained that they consider these genera to be easy to propagate, and that they do not treat them very differently from the other species they propagate. Here is the nursery's method of propagating isopogons and petrophiles.

- All seed cones are kept for 6 months before processing, which is a good wet day activity! Germination after 6 months has proven to be much higher than if immediate processing was undertaken. Also the seeds are easier to extract once cones have been left to open up for 6 months.
- Smoke treatment is used – the seeds are actually smoked not soaked in smoke water. A bee smoker is used with eucalyptus leaves.
- Seeds are sown into a 50/50 mix of perlite and vermiculite.
- Best germination occurs in the cooler months.
- Germinated seeds are potted into commercial native potting mix.
- Growing on treatment is no different to other plants.

So what is different about Emma's approach versus those our members have used over the years? Germinating seed six months old is the first factor. Study group experience indicates that fresh seed is important, and that viability diminishes rapidly with age so extracting seed from cones after six months is a new approach. The smoke treatment used could be important. Some of our propagators have tried smoke water or smoke discs but using actual eucalypt leaf smoke could be significant. Research papers have reported no benefit in smoke treatment for seeds of plants such as isopogons and petrophiles that hold onto their seed until fire or death. It will be interesting to test this finding out using actual smoke.

The seed raising mix (50/50 perlite/vermiculite) is also somewhat unusual. Many of us use coco-peat or potting mix with perlite so perhaps this different mix is significant. There is only one way to tell and that is by trialling Emma's mix against the one you generally use. We encourage some of our propagators to also try these tips and report back on results. We will undertake some trials ourselves and aim to have some results to report in the next newsletter.

Coaldale Cracker – was the hype premature?

To our surprise and disappointment, some of our Coaldale Cracker isopogon grafts are dying. Waterlogged ground after 1200 mm for 2022 to mid-March, including 802 mm in a two week period, has proven too much for a number of our grafted isopogons on *I. 'Coaldale Cracker'*. The deaths include two large *I. latifolius* plants, three *I. cuneatus*, and two *I. 'Silvertips'*. These range in age between four and eight years of age. While grafts on Coaldale Cracker are failing, all our six Coaldale Cracker plants are unaffected by the rain. Two of these in our wettest garden beds are totally healthy. So what is happening?

All the failing Coaldale Cracker grafts are cutting grafts, rather than grafts onto rooted rootstocks. An examination of the roots of the dead grafted plants shows a weak root system. While the scion has always shown rapid growth on these plants, it appears that the roots may not be showing growth proportionate to the scion top.

There are a few theories as to why these grafts are failing:

- Coaldale Cracker is not as tough to wet conditions as thought. If this was the case, it would be expected that the Coaldale Cracker plants would also fail, which hasn't happened.
- There is a compatibility issue between Coaldale Cracker and western isopogons. Is this causing the 'weak' root systems on cutting grafts? This seems unlikely as all plants in more favourable raised beds are unaffected from the huge rains.

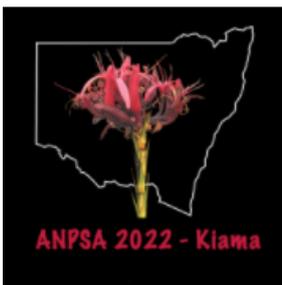
- All of the failed plants have mulch around the base, often covering the graft union which is very close to the ground, due to the graft being a cutting graft. Is this causing collar rot in super-sodden soils and mulch?

Over the last year I have been doing more traditional grafts onto rooted seedlings of Coaldale Cracker. There are a number of these now in our garden and they are so far unaffected by the wet season. These are all young plants, so time will be needed to see how hardy these will prove to be once mature. One advantage of traditional grafts is that you can make sure the stock plants have good strong roots before grafting onto them. If collar rot is the issue, then it will be important to keep mulch away from the base of the plants.

To test the viability of cutting grafts in our conditions, we need to ensure that the graft union remains above ground level and clear of soil and mulch. This will test the collar rot theory.

It is important to point out that this problem has arisen out of a freak weather event. Even the local *Banksia serrata* plants are dying in our wet soils, so the conditions are extreme. However, the frequency of such freak weather events is more than likely to become common, so it is important to try to identify the cause of the failing grafts, and see if a solution can be found. If any members have experienced a similar problem, or have a theory on what could be happening with these graft failures, any feedback would be greatly appreciated.

2022 National Conference: I&P activities



AUSTRALIAN FLORA – PAST PRESENT FUTURE

Kiama Pavilion, Saturday 10 to Friday 16 September 2022

The Australian Plants Society NSW is hosting the Australian Native Plants Society Australia (ANPSA) Biennial Conference at Kiama on the NSW south coast.

There will be a Isopogon and Petrophile Study Group display. If any members can bring along specimens for the display that would be very helpful.

We will also be discussing isopogons and petrophiles at short sessions focusing on future challenges in growing, conserving and protecting plants and their habitats.

Phil will be involved in an afternoon workshop on grafting (likely to cover a range of genera).

After the conference closes on Friday afternoon, we plan to hold an open garden for Isopogon and Petrophile Study Group members at our Little Forest property about 1 ½ hours south of Kiama, on **Saturday 17 September 2022**. This will be an opportunity to see the specimens of both genera in our garden and talk cultivation and propagation. For those interested, Phil will demonstrate grafting techniques. More information will be available closer to the time, expressions of interest welcome anytime.

Financial Report

Total 27/9/2021	\$1,526.56
Bank balance	\$1,423.12
Cash on hand	\$103.44
Donations/income	\$115.00
APS NSW	\$25.00
ANPS Canberra	\$25.00
Gerard Satherley	\$50.00
<i>Australian Plants</i>	\$15.00
Total 25/3/2022	\$1,641.56
Bank balance	\$1,538.12
Cash on hand	\$103.44

Donations are welcome

ANPSA Isopogon & Petrophile Study Gr
Bendigo Bank BSB 633-000
Acct 1568587330

Crickets as pollinators: references

- Micheneau, C., Fournel, J., Warren, B. H., Hugel, S., Gauvin-Bialecki, A., Paillet, T., Strasberg, D., & Chase, M. W. (2010). Orthoptera, a new order of pollinator. *Annals of Botany*, 105(3), 355–364.
- Tan, M. K., Artchawakom, T., Wahab, R. B. H. A., Lee, C. Y., Belabut, D. M., & Tan, H. T. W. (2017). Overlooked flower-visiting Orthoptera in Southeast Asia. *Journal of Orthoptera Research*, 26 (2), 143-153.
- Tan, M. K., Goh, F. N., & Tan, H. T. W. (2018). Consistent Between-Individual Differences in Foraging Performance in a Floriphilic Katydid in Response to Different Choices. *Environmental Entomology*, 47(4), 918-926.