



Isopogon & Petrophile *Study Group*

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STUDY GROUP LEADERS/NEWSLETTER EDITORS

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Petrophile heterophylla in cultivation (Melton Botanic Gardens, September 2022),
our feature petrophile for this issue. Photo: Barb Pye

Back issues of the *Isopogon & Petrophile Study Group Newsletter* are available at
<https://anpsa.org.au/newsletter/isopogon-and-petrophile-study-group/>

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 (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 a prepaid **EXPRESS POST** satchel from Australia Post (Small \$12.95 or Medium \$17), 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, 'Coaldale Cracker', cuneatus (shrub or dwarf coastal form), dawsonii, divergens, dubius, formosus, latifolius, linearis, mnoraifolius, nutans, panduratus ssp. palustris, spathulatus, 'Stuckeys Hybrid', trilobus

Petrophile – glauca, linearis, pedunculata, pulchella, recurva, sessilis, shirleyae, teretifolia

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.

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Dear members

It's been a challenging year for gardeners in the east of Australia. Here at Little Forest NSW all rainfall records have been smashed. We have even outdone Sydney – they recorded their highest ever rainfall in October 2022, we had 200 mm more than they did! Our rainfall for the year 2022 to date is 2550 mm. In Victoria Paul Kennedy reports the past five months have been exceptionally wet, Marilyn Sprague says the rain has hardly stopped for weeks and her gardens are saturated, and Miriam Ford has been dealing with major drainage issues (she had to take her photos for the newsletter in between showers). In Boolarra (VIC) Mike Beamish reports an average season with a winter perhaps a bit cooler and cloudier than normal, but rainfall about right for the time of year. In South Australia Ian Roberts reports an unusually grey winter and spring with a dry July then good rains since but no big rain events. In Western Australia there has been good rains in winter (as usual) but it seems to have been a cold winter like ours, and rain is persisting into spring.

Despite all this, it seems to be a lovely spring season for isopogons and petrophiles. There's no need to be glum about the weather when you can read about and see the wonderful isopogons flowering in members' gardens right now. Turn to our members section and also the Garden Shorts in this newsletter for some good news stories. And there's more to make you smile in Don Williams' report on WA wildflower country post-COVID.

There has been an invasion there of Eastern States folk, back with a vengeance. Don observes this interesting subspecies let loose in a wildflower wonderland after isolation. Don't miss our own Karlo Taliana who gets an honourable mention!

We were able to round up plenty of blooms from our garden to put on a display at the National Conference recently. It was good to see some of you there, and to welcome some new members. You can find a report on the conference in this newsletter plus links to our talks. Catriona's presentation on isopogons and petrophiles was about the future of these genera and highlighted the growing importance of the role of our Study Group. We urgently need to fill the information gaps raised. One of the conference themes was 'What can I do to make a difference?' and our best suggestion was to join this Study Group and help fill the gaps. Our job is vital so make sure you read the article based on the presentation which is included in this newsletter.

In this issue we hear from two I&P growers at different ends of the gardening journey. Tessa Barratt, our insect photographer extraordinaire, has only recently begun growing isopogons and has fallen in love with *Isopogon dawsonii*. We heartily agree with Tessa about this wonderful species. Next, we go back in time to the treasure trove that is the *Australian Plants* journal, to benefit from the advice of one of Australia's legendary pioneer native plant growers, the late Ken Stuckey. Few people have had as much experience with such a wide range of isopogon and petrophile species. You may have heard of, or grown, the isopogon we call Stuckey's Hybrid which came from his garden. In his introduction, Tony Cavanagh explains how Ken Stuckey laid the foundations for growers like us who follow in his footsteps.

This newsletter we have collected together all the latest reports from members on their propagation trials, including Phil's grafting update. David Lightfoot has tried a new method with great success – see his report on using plugs for cuttings.

Our profile species are two yellow flowering species which are little known and little grown, but well worth the effort to learn about. There are only two truly prostrate I&P species – they have almost the same name (*Isopogon prostratus* and *Petrophile prostrata*) but only the isopogon is found in eastern Australia. *Isopogon prostratus* is a species from John Knight's territory on the NSW south coast and our resident expert John gives us the benefit of his long experience with it in his article in this issue. *Petrophile heterophylla* is a complete contrast, tall and graceful, and found only in western Australia. When in flower you can't miss *Petrophile heterophylla*, but you have to look down near your feet for *Isopogon prostratus*. Many thanks to those members who assisted with information and photos on these species.

Catriona and Phil

From our members

Tim Darrington, Rhône valley south of Lyon, France

Here are photos of my youngish Isopogon Stuckey's Hybrid plant just starting to flower (It is about 18 months from when I put the cuttings in – I can get them to strike really easily). I have been in correspondence with Alex George about the parentage of Stuckey's Hybrid: some say it is *Isopogon cuneatus* x *buxifolius*: How certain is this opinion? I recently sent these photos to Alex George and this was his reply about my photos; "I wonder if this isn't a form of *Isopogon cuneatus*? I can't see anything of the small, crowded leaves of *I. buxifolius* in it. The open habit is that of *cuneatus* which has smaller, flatter flower heads than *I. latifolius*. I presume it arose at Ken Stuckey's place in South Australia, probably after the fire in the 1980s that wiped out his garden (and house, I think) but was followed by amazing regeneration of many species - I think he had to weed out *Dryandra praemorsa* because it came up so prolifically. I don't know if there was any record of what was in the garden that might give clues." *We think your plant is Stuckey's Hybrid and not I. cuneatus. The jury is still out on whether one parent is I. cuneatus or I. latifolius.*



I also grew a small cutting of *Petrophile linearis* "Pixie mops" which flowered last May. We've just had another late frost (night of 3rd to 4th April was -3°C here) so most of my Aussie plants are still tucked up in the green houses.



Isopogon formosus (photo left) has just started to flower, I have had this for maybe 15 years now – easy to take cuttings, I grow it on its own roots and have never had any problems on that front. Main problem I find is that it seems shy to flower in a pot: maybe too dry in summer, or a lack of some nutrient (K ?) - I am suspecting the latter. I think I will try planting out my biggest *Isopogon formosus* plant in the autumn (October!) to see if it survives our globally warmed winters - it might if the series continues.

I still can't successfully graft either Banksias (or Isopogons), but will continue trying (I have done one or two grevilleas onto *G. robusta*) - I think we need a video from you on the knack of doing these.

Peter Olde, Oakdale NSW

I received the following information from Messrs Justin and Phoenix Greener, Oakdale locals (Wollondilly) shire, New South Wales: We recently observed a flock of gang gang cockatoos (*Callocephalon fimbriatum*) feeding on plants of *Petrophile* (local species to be identified). They were actively engaged in chewing the young cones and were not attending any other plants growing in the area, which is within the boundary of Nattai National Park. As far as I am aware this the first observation of a *Petrophile* species being used as a source of food by this species of cockatoo (listed as vulnerable in New South Wales).

Karlo Taliana, Georges Hall NSW

Karlo had a whirlwind trip to WA just after the Kiama Conference – see Don Williams' article for some of his escapades. Below, clockwise from top left: *Petrophile biternata* - off Tootbardie Rd Warradarge, *Petrophile shuttleworthiana* at Hi-Vallee, *Isopogon formosus* - Cheynes Beach and *Petrophile prostrata* - Point Ann.



Kevin Collins, Mt Barker WA

We found a *P. squamata* in the Stirlings, a solitary very broad lobed form amongst many standard foliage ones. Looked a little more like the Point Ann form. I didn't GPS it but could find it again I think. One of our cutting grown local *P. squamata* is bursting with blooms this year. Also my two *P. brevifolia* are absolutely packed with buds. Saw a nice *P. seminuda* ? in bloom at the Stirlings on an orchid hunt with Kathy's cousin from Perth (pictured right). *Looks like it might be Petrophile crispata Kevin.*



Shelley Gage, Cooloola QLD

At White Gum Lookout Warrumbungles we saw *Isopogon dawsonii* and again one plant today at Sandstone Caves in the Pilliga while on the post-conference tour.

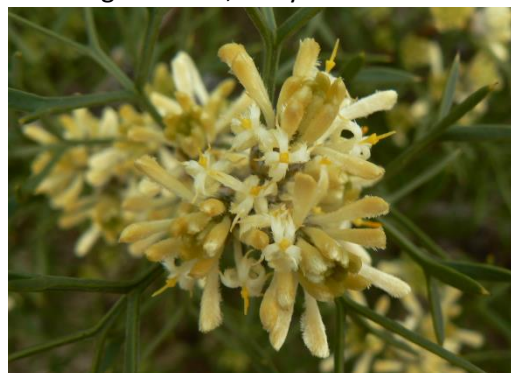
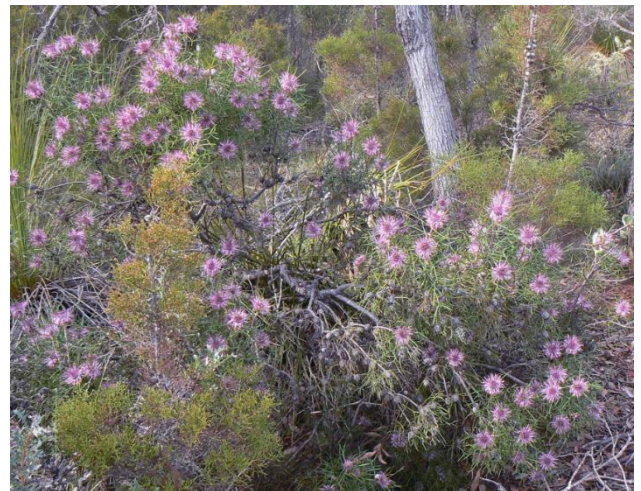
Paul Maurice, Christchurch New Zealand

Thank you for introducing me to the Isopogon and Petrophile Study Group. I am originally from the UK but have lived for the last 18 years in New Zealand. I am a retired dermatologist and a life-long keen amateur botanist. I am active in several botanical groups in New Zealand and over the last couple of years have been posting a lot of my observations on iNaturalist.

My enthusiasm to learn something about Australian flora as well was triggered by a tour led by Jim Barrow, of the Wildflower Society of West Australia, in 2006 or thereabouts. Ever since then I have spent many happy holidays flower hunting in WA and have accumulated a very large number of images on my computer, including many of Isopogons and Petrophiles, which I have done my best to identify with the resources available. Since then I have visited other areas of Australia as well, including Tasmania, south-east Queensland, Sydney and the Blue Mountains and the arid regions. I am a member of the Wildflower Society of West Australia. Over the next couple of months I will endeavour to get the images sent to you and I would be very pleased if any of them were to be of use to yourselves or other members of the group. This is probably the best way that I can contribute to the Study Group.

Margaret Pieroni, Denmark WA

I have been meaning to get in touch since our visit, in late July, to the site near Lake Poorrarecup, SE of Frankland River, in July. Kevin and I were taken to see a population of the dryandra I have been looking for for more than 30 years – *D. subpinnatifida* var. *imberbis*. There was a big population of perfect plants and none of the dryandra with which it hybridizes, *D. squarrosa*. There were lots of other Proteaceae, including 9 hakeas, 7 dryandras and several of your I's and P's.



There were quite a few plants of the isopogon which I used to think is *I*

divergens but which you said is a form of *I. formosus*.

On my way back after the visit to Ravensthorpe for the book launch, I called in to the old cemetery at Gnowangerup and found this yellow petrophile in flower. *It's Petrophile squamata Margaret, what a nice specimen.*

Tessa Barratt, Blue Mountains NSW

I have previously contributed to the group with information about the native Leioproctus bees I have photographed and [filmed pollinating](#) *I. anemonifolius*. As someone who adores our native bees, I was keen to plant several Isopogons in the garden to observe which insects pollinate them. I have 4 endemic species thus far.

On a side note, I have noticed that weevils of various species congregate on *I. anemonifolius*. They seem to gather there to find a mate. I have seen them in considerable numbers on the flower heads of the plants. Beetles may well be a pollinator of the plants. Weevils are also not the only beetles I have seen moving through the inflorescence!

Ian Roberts, Blyth SA

We've thankfully avoided the big rain events, but who knows what the rest of Spring has in store. I've had reasonable success on grey skeletal clay over dense shale at 400m above sea level with *P. heterophylla*, *P. macrostachya*, *P. ericifolia* & *P. squamata* & *I. dubius* & *trilobus*, although severe drought on these very shallow soils has killed most. Where I only have one plant I now keep in pots to then try from cuttings as growth allows.

Couple of pics of I think *P. brevifolia* – in pots (see right). A Quairading *Petrophile* or *Isopogon* not able to name (see far right). *It looks like it's P. seminuda* Ian. *I. axillaris* also flowered well in a pot this year. *P. filifolia* in pots both about to be smothered in flowers.



Eddy Wajon, Winthrop WA



We have *Petrophile diversifolia* in our garden in Winthrop, a suburb of Perth. Six plants germinated in about 2015 [see Member propagation news] [which] all flowered after about 5 years. Then mysteriously, they started to die back, getting browner and browner from the top of the plant and from the ends of the branches (pictured left).

Thinking this might be drought related, I watered them occasionally, but to no avail. Four of the 6 original plants are now dead. The two remaining plants are healthy, are 1.75m tall, and are in, but they are also developing brown edges to the leaves, a sure sign they're in trouble.

Several thoughts now come to mind regarding why some of these plants have died:

- They have succumbed to dieback *Phytophthora cinnamoni*, though because I have other susceptible species such as *Banksia*, *Hakea* and *Isopogons* in my garden, this does not sound credible
- The plants are short-lived and had reached the end of their life cycle.

I don't know whether either of these hypotheses is valid, and await to see what happens to the 2 plants still alive. I also live in hope that the cones the now dead plants developed before they died will germinate and I will have more of this unusual, commercially unavailable plant. *It's probably your second hypothesis Eddy. Member Margaret Pieroni's experience is that P. diversifolia grows fast but is short-lived.*

Mike Beamish, Boolarra VIC

We are having an average season here in Boolarra, in the foothills of the Strzelecki Ranges. Our winter was perhaps a bit cooler than normal, but only because it was cloudier than usual, keeping the maximums down but also keeping the minimums up, hardly any frosts and only light ones when they did happen. Rainfall is about right for the time of year, 800mm or so in the gauge. We've also missed out on most of the heavy stuff that is plaguing the rest of Victoria, so no major flooding around here, just nicely damp.

The little *Petrophile squamata* on the front nature strip, planted in autumn 2021, flowered in October 2021 (pictured right). Bit scary that, I expected it to cark it soon after, but it was a mild summer, autumn and winter, and although it didn't grow much, it hung in there. The *Petrophile canescens* planted at the same time in the backyard has neither grown nor flowered, but is also still alive. My only *Isopogon* is my latest attempt at *I. anemonifolius*, planted in a bottomless tub on the western side of the house and it has grown well and flowered in the last couple of days (mid-October). I've grown them to flowering before, only to have them give up the ghost soon afterward, so I hope this one breaks the trend.



Paul Kennedy, Elliminyt VIC



I am surprised the garden has stood up so well considering the soil is so moist. The Winter-Spring flowering season has been excellent with many plants flowering profusely. The Isopogons have been flowering and Isopogon latifolius perhaps the outstanding performer. (See left, Isopogon latifolius, with trilobus and Stucky's Hybrid to the left.)

A suggestion. I do not come across many Isopogon and Petrophiles for sale at native plant sales or nurseries and perhaps in due course a list could be prepared showing providers and possible species available to further help members to increase their species in the ground. Raining here again unfortunately. *Unfortunately your observation is all too true Paul. They are either never or only available sometimes, or wrongly labelled. However the Study Group could look at compiling a list for a future newsletter if other*

members are also keen.

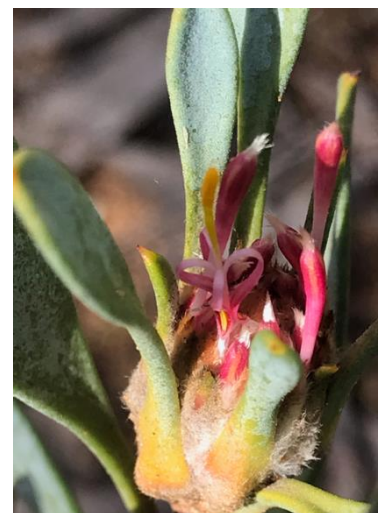
Marilyn Sprague, Mandurang, Vic



Marilyn had four isopogons flowering in June. She sent some photos for help with identification. 'I grew them from material collected at Corrigin and sent to me. These plants were watered last summer, but neglected before that...obviously hard to kill. I'm happy to propagate these plants for anybody you think might like them. They are very hardy.' *Although it's hard to tell from photos, the ones with a whitish sheen on the leaves which can be wiped*



off (pictured right) are Isopogon pruinosa – the one with pink flowers and hairy involucral bracts is I. pruinosa ssp. pruinosa. The others look like Isopogon sp. Fitzgerald River (pictured left) although could be I. panduratus (but would have to have come from further north).



These are all attractive plants for the garden, they flower in winter, and Marilyn says they are tough. Any members interested in Marilyn's offer to propagate them should contact Catriona and Phil. We may also be able to make cutting material available through our cutting exchange program.

Oct: The rain has hardly stopped here for weeks, in this Northern Victorian region, and the gardens here at Mandurang are saturated. Some garden beds have been underwater and pathways are like fast flowing creeks. 2 large Grey Box have fallen over in the sodden soils and destroyed plants. Luckily all Isopogons and Petrophiles have survived! It is raining heavily now and much more is forecast. Most isopets have luscious new growth and are flowering well (see *I. nutans*, right)....so it's been a good season for cut flowers. It will be interesting to see what happens when it starts to dry out and heat up? *Isopogon formosus*, *I dawsonii*, *I anethifolius*, *I anemonifolius* and *Petrophile biloba* and *P fastigiata* are on their own roots. *I cuneatus*, and *I latifolius* are grafted.



Miriam Ford, Hurstbridge VIC

I may be too late with this, been ... digging channels with a mattock to help drainage at the bottom of the block. We are on a steep hill down towards the base of it with two large properties above us and draining down our way as they so choose. Fortunately drainage here is mostly good except at the bottom where the amount has proven difficult.



Some are past their best but did look great and I took some cut flowers from - *I. anemonifolius*, *anethifolius* & *dawsonii* (pictured left) and these are all plants raised from your original cuttings way back several years ago. They are performing well in raised bed situations or pots. The unknown (pictured right) is one I picked up from Tony Hughes, still small and I have forgotten its title - flowering its little head off in my sandy mound covered with crushed rock. *Looks like Isopogon scabriusculus ssp. stenophyllus*.



In terms of Petrophiles I have a few going - *P. biloba* continues to perform well but was looking a bit sad from the rain. This other one

with *Dampieri rosmarinifolia* pink for company is looking splendid (pictured right), not yet in full flower but just marvellous abundance of cones. *Looks like Petrophile filifolia Miriam. It's going to look fabulous!*



Garden shorts

Lesley Vincent's smile said it all. She bowed up to us at a recent APS meeting brimming with excitement to show off her beautiful *Isopogon cuneatus* flowers before sharing them at Show & Tell. Lesley lost her native garden near Batemans Bay NSW in the Black Summer fires so we gifted her a grafted *I. cuneatus* to help repopulate her denuded garden. This is the result!



Bev Fox is a legend in Victorian native plant circles. On an APS visit to her Melbourne garden we were supposed to be looking at peas but couldn't help being distracted by her wonderful plant of *Isopogon formosus* in pride of place in the front garden. At over 2 m tall and around 10 years old, it was flourishing between two large eucalypts in a small shady native cottage-style garden filled with thomasiads, prostantheras, daisies and peas.

Photo: Nicky Zanen.

Maranoa Botanic Gardens in Balwyn, Melbourne, has diverse botanical displays of Australian plants. Currently it has a good range of isopogons (anemonifolius, anethifolius, petiolaris, formosus and cuneatus) and even some petrophiles (teretifolia and diversifolia). *Petrophile diversifolia*, rare in cultivation, is flowering now and has grown to over 1.5. m tall.



Isopogon asper in a pipe container at the Australian National Botanic Gardens. The plant is at least 4-5 years old and flowers profusely. Spotted by SG member Anthony Meyer.



Growing *Isopogon dawsonii*

Tessa Barratt

I am a relative newcomer to the world of Isopogons. I planted our first one (*Isopogon anemonifolius*) in the garden in spring of 2020 after being inspired by the Blue Mountains Council's "Bush Backyards" scheme. That plant was a tubestock and has been growing very slowly. My next Isopogon (*I. dawsonii*) fared much better. I happened across it at a local nursery that stocks the usual run-of-the mill Aussie cultivars along with exotics; it was a big surprise to see such an unusual and established shrub in a 15cm pot at a very good price! I planted it out in the garden in spring of 2021 and it has simply flourished ever since.

I live in the Blue Mountains, where this Isopogon is indigenous to the area, and have a bush block backing out onto a gully. We have some sandstone beneath the property which has proven very advantageous for growing plants local to our area. Despite the relentless La Niña rains, this plant has done very well in an open and sunny spot, about a metre from an easement that diverts rainwater away from our house and into the gully. It has companion plants around it made up of native tussock grasses, Dianellas, *Kennedia rubicunda* and a *Thelionema caespitosum*. The area has decent drainage and the plant is not far from the house which largely protects it from high winds.

A year after planting, it produced its first (and thus far only) flower. For the past 2 years I have studied the native Leioproctus bees that open the flowers of *I. anemonifolius* and I was keen to see if the same species of bee also pollinated *I. dawsonii*. Unfortunately, I never caught the bee in action (not helped by the inclement conditions!) but the flower was indeed opened. I do have Leioproctus bees nesting in the garden, so I can assume it might have been them. What I love about this plant are the vibrant styles that come in deep oranges to a lovely yellow-orange colour. They look very pretty draped below the creamy-yellow flower heads. I know Isopogons provide food for our native bees, which is rewarding in itself, but that they also provide shelter for small birds such as the Superb Blue Fairy Wrens that frequent the garden. I have even seen Eastern spinebills using it as a perch to access the Kennedias growing along the fence beside it.



I am impressed at how bushy this shrub has become, and how quickly it has grown (it is now about a metre tall). We have lost some plants to the heavy rain, including, sadly, a *Petrophile*, but this Isopogon has weathered sun, rain and hail thus far without ill effect. It has been one of the most successful plants we have put in in the past year. I have not seen it stocked in any native nursery before or since I purchased it, though I imagine they must come in from time to time. I have read the plant can be propagated via

cuttings of firm new growth, something we may consider trying should our other Isopogons fail to thrive. So far, our other two shrubs (*I. anethifolius* and *I. fletcheri*) are doing alright.

Next spring should be drier than this one and I hope to spend more time outdoors watching for this plant's as yet largely undocumented pollinators. Until then, I will continue to watch it grow bushier and taller as the seasons progress.

Learn from a legend: Ken Stuckey on isopogons & petrophiles

Foreword by Tony Cavanagh

Many people have probably not heard of Ken Stuckey, grower of Australian plants extraordinaire. Yet in the 1930s, when growing Australian plants was not fashionable, this South Australian farmer was fired with enthusiasm and began setting aside part of his property at Furner, near Millicent, to grow Australian plants. With a special interest in Proteaceae, especially *Banksia*, he made numerous trips to WA to collect seed and corresponded and had close contact with other pioneers, Alby Lindner, Dave Gordon, the Althofer brothers, Alf Grey to name just a few. In the 1970s and 1980s, the garden was known as “Stuckey’s Folly” with many acres of bush garden. I was fortunate to visit it twice and found him a generous host, generous with his time and especially his knowledge. Even with many thousands of plants in the “Folly”, it was uncanny how he could put names to the most obscure plants. And I could not believe my eyes when as an enthusiastic amateur in the mid-1970s, I saw part of his *Banksia* plantation with a row of perhaps 30 plants of *Banksia goodii*, a plant then considered so rare with seed impossible to obtain and every *Banksia* enthusiast’s “holy grail”. In the 1980s, with the help of his daughter, Ken developed a thriving business with cut flowers and pioneered the export of foliage to the Japanese market where leaves of Australian plants such as *Banksia grandis* and *Dryandra drummondii* were highly sought after. And because this is the Isopogon and Petrophile Study Group, I should mention my shock at seeing a whole paddock of many hundreds of plants of *Isopogon latifolius* in full flower.

On February 16, 1983, nature intervened in the cruellest possible way with what became known as the Ash Wednesday Fires which devastated south east South Australia and Victoria. In South Australia alone, 28 people died and over 200,000 hectares burned, with hundreds of houses and buildings destroyed. One of these was the Stuckey property which was completely burnt out, Ken and his wife only saving themselves by jumping into their swimming pool. Yet within a few months, Ken was busy planting again and keenly observing the regeneration of a whole new crop of plants where once the plantations had stood. Some regrew from lignotubers but the majority of the Proteaceae sprang up in abundance from seed scattered after the fire. And there were a few suspected hybrids, at least one *Dryandra* and the plant that we know today as *Isopogon* “Stuckey’s Hybrid”. Ken Stuckey, however, did not live to see his plant in other gardens as he was found dead in his “Banksia patch” on 21 April 1991. *Isopogon* “Stuckey’s Hybrid” is a plant to remember a great pioneer.

Ken Stuckey

To the casual observer it is often difficult to distinguish between Isopogons and Petrophiles but the common names of ‘drumsticks’ and ‘cone bushes’ are very applicable to the ripened head or cone. The bracts or scales in the flowering head of the Isopogon are deciduous and after the perianth has fallen off the round or oblong head has a greyish white velvety texture resembling the head of a drumstick. The Petrophiles have a persistent bract or scale which in many species develops into a hard, woody covering resembling a miniature pine cone. If there is still any doubt, the seed of these two genera are quite distinct. The small ovoid nut of the Isopogon is hirsute all over and has long hairs which fluff out after leaving the head reminding one of thistledown, whereas the nut of the Petrophile is always flattened with a fringe of hairs on the margins and on one face only, the other face being glabrous. In a few species the fringe of hairs is replaced by a membranous wing.

Propagation

The plants described are all grown from seed collected in the spring of 1962 in Western Australia and the seed grown in the following autumn (late March), in 3 inch deep seed boxes in the open with $\frac{2}{3}$ sand and $\frac{1}{3}$ humus mixture. Seedlings were potted up into veneer tubes 6 inches deep and 3 inches in diameter, kept in the shade for two weeks and then placed in the open again. The plants were carried through to the following autumn and planted out after the first good opening [winter]rains, and since have never had any water other than rainfall. Losses have been practically nil and these two genera have proved to be the hardiest and most persistent of any genus of plants that I have tried to grow.

If collecting seed make sure only well matured heads or cones are taken, preferably over two years old and put in paper bags (never plastic bags) and store in a warm dry place until the heads and cones have properly dried out when they will open up and release the seed more freely. Isopogons often have only a very few fertile seeds in a head but petrophiles usually have the cones full of fertile seed.

The descriptions of the following plants are how they have grown in this locality and may not correspond to their behaviour in their native habitat or in another locality. They are growing in an open but sheltered site, in poor grey sand with a pH of 6.5 and a 28 inch rainfall.

Isopogons for your garden

I. adenanthoides – an outstanding shrub of 3 feet, the compact upright branches are densely clothed in short adenanthos like leaves, light green in colour, not stiff but rough to handle. The rose pink flowers are terminal on the rounded crown of the plant, and flowers in early spring.

I. asper – a low spreading shrub which has only grown to 18" here but should grow to 3 ft in a better soil type. The arching branches are fairly densely covered with 1" divided leaves and rough to feel. The small pink flowers are densely packed on the upper ends of the branches.

I. attenuatus – a spreading shrub to 3 ft with 6" smooth flat leaves. The large ovoid flower heads are yellow and terminal, the flowers opening slowly, opening first at the apex of the head and it may be two or three weeks before the flowers at the base are out.

I. axillaris – this species likes a damp situation and does not mind being in a few inches of water during the winter. The upright branches are not numerous and have 3" flat leaves but much shorter on the ends of the branches where the small pink flowers are densely clustered. An interesting and useful plant that can be improved by pruning after flowering.

I. buxifolius – an upright shrub of 3-4 feet with a compact growth habit.

I. cuneatus – has been in cultivation for many years and has proved to be hardy and apparently not adverse to various soil types. It grows to 6 feet and is improved by pruning after flowering. The mauve/pink flowers are terminal and very good for picking.

I. divergens – there are various forms of this species, the more robust and compact form has short terete leaves and grows to 6 feet. The numerous purple/pink flowers are terminal but slightly smaller than the other forms. Another form with slender 6" terete leaves grows to 3-4 ft with a more open habit and larger flowers. Another variation can be a similar shaped shrub to the last but with light green leaves and pinkish flowers.

***I. roseus* (now *I. dubius*)** – another species that has been in cultivation for a long time and noted for its bright rose-pink flowers. A bushy but upright shrub to 3 feet with stiff, flat, deeply segmented leaves to 2 inches. The flowers are terminal and very showy. It appears to do well in sand and even better in heavier well drained soil types. (Pictured right)



I. formosus – this shrub can vary in form from being bushy to a slender upright shrub to 7 feet. The short 2 inch leaves are nearly terete but grooved above and divided several times, crowded on the bushy forms but more sparse on the slender upright forms. The bright rose pink flowers are terminal and on the bushy form many are carried on short laterals on the main branches.

I. latifolius – somewhat similar in appearance to *I. cuneatus* but *I. latifolius* grows to eight feet with larger leaves and flowers. The purple-pink flowers are terminal on the previous year's growth and very showy. Pruning will encourage new growth which will enhance the following year's flowering.



I. linearis – a spreading shrub of 2 ft, branching from the base and arching outwards. The flat 3" leaves are greyish-green and curved upwards, often to one side as well, giving the branch a spiralling effect. The flowers are terminal, either single or several in a cluster, bright pink to almost red, making a bright show in mid-spring. (Pictured right)

***I. longifolia* (now *I. longifolius*)** – a robust shrub, spreading but upright to 8 ft with 4-6 inch long linear leaves, entire or two to three linear lobes. The yellow, ovoid flowers are terminal and flower in Oct-Nov.



I. polycephalus – a spreading but upright shrub to 4 ft with pale green 3" oblanceolate leaves. The whole shrub has a soft slightly succulent appearance, it flowers in August. The small yellow flowers have a straggly appearance and not striking. (Pictured right)

I. scabriusculus – the form growing here is upright to 4 ft with 3" terete leaves, the rather small pink flowers are terminal or in the upper axils. It flowers in Oct but is not as showy as many other species.

I. sphaerocephalus – a spreading shrub of 3 ft with flat 3" leaves, the new growth in summer is a lovely soft red. The large ovoid heads of yellow flowers are terminal.

I. teretifolius – a stiff, upright, small shrub of 2-3 ft. with rigid terete leaves mostly divided two or three times. The pink flowers have a shy appearance as they turn sideways to the direction of growth and sometimes decumbent. A worthwhile small shrub for cultivation.

I. tridens – a dense upright shrub to 3 ft, the dark green 2" leaves are lobed on the widened end of the leaf and

thickly clothe the bush. The yellow ovoid flowers are terminal.

I. trilobus – somewhat similar to the previous species but the leaves are irregularly lobed and more blunt in appearance. Flowers are yellow and terminal, flowering in Oct-November.

Petrophiles for your garden

The greater proportion of species are in the small shrub range of 3 to 6 feet (1-2 m) with a tidy growth habit and wide variation in foliage. There are two W.A. species of Petrophile which are prostrate and make excellent rockery or ground cover plants.

P. anceps – a dense rounded shrub of 2 feet with 2 inch flat linear incurved leaves, dark green and thin on the edges. The yellow ovoid spikes of the flowers are usually 3-5 in a cluster on the ends of the branches and it makes an attractive show in the spring.

P. biloba – a species that has been in cultivation for a long time and better known. It usually has a straggly upright growth of 6-8 feet with short rigid leaves with three to four lobes. The soft pink and grey flowers with bright orange styles are numerous in the upper axils and very beautiful. It can be recommended for well drained open or semi shaded situations.

P. biternata – a stiff upright shrub with stiff, flat, divided, recurved leaves, the yellow flowers are terminal.

P. carduacea – a robust shrub to 4 ft and spreading 6-8 ft, the flat undulate leaves are deeply toothed and prickly, flowers are pale yellow in the upper axils and the fruit develops into an elongated cone 1-1½ inches long. (Pictured right)

P. circinata – the prostrate form (near Lake Varley, W. A.), has terete divaricate leaves with a long slender petiole from the prostrate branches. The yellow flowers are almost sessile on the branches and not as showy as *P. longifolia* but the foliage is very attractive and there to see all year!

P. conifera – a dense low shrub of about 2 ft, the rigid terete leaves are divided and divaricate. It makes a neat small shrub and is interesting even though the flowers are pale yellow and not very prolific.

P. divaricata – as the name suggests the terete divided leaves are very divaricate and it makes an attractive foliage shrub to 4 ft. the lovely soft yellow flowers are numerous in the upper axils and makes it worthy of a place in any garden.

P. diversifolia – again the name is partly explanatory of the foliage, the juvenile foliage is soft and fern-like but the mature leaves are stiff, flat and lobed. It has an upright habit and rather spindly growth to 6-8 ft. flowers are whitish in the upper axils. It is an easy species to propagate and we have seedlings coming up some distance from the original plants.

P. drummondii – an upright small shrub of 2 ft, leaves terete and divaricate with yellow flowers.

P. ericifolia – an erect shrub to 3 ft with terete leaves ¼ to ½ inch leaves with yellow flowers, terminal and prominent on the previous year's growth. The young flower buds are very glutinous and the numerous long pointed brown bracts remain glutinous long after the completion of flowering. New growth is made from below the cone but within the bracts. It has numerous flowers in mid spring.

P. ericifolia* var. *scabriuscula (now *P. scabriuscula*) - a lightly more spreading shrub with dark green ½ inch terete leaves. The yellow flowers are terminal, but not so prominent, as many are produced on short lateral branches. Bracts are few and insignificant.

P. ericifolia* var. *glabrifolia (refers to *P. ericifolia*?) - a spreading shrub to 3 ft, the weaker branches are more virgate, making a denser shrub. The ½ inch light green leaves appear almost succulent. The yellow flowers are not particularly prominent as many are borne on short lateral branches. Flowers late spring.

P. fastigiata – a very attractive foliage shrub of 3 ft and spreading to 4-5 ft. the terete leaves have a long petiole and are then divided several times, are upright and soft to handle and rather dense, making a soft, attractive bush. The conical 2 inch buds are terminal on the branches and often 3 to 5 in a cluster, lime green at the base and yellow at the apex and very attractive at this stage. The flowers open up yellow.

P. linearis – has lovely soft pink flowers of similar colouring to *P. biloba* only larger flowers and not so numerous. A straggly upright shrub of 2 ft with flat, rather thick leaves. The species does not thrive in local conditions and should do better in a heavier type soil.

P. longifolia (refers to *P. prostrata*) – a prostrate species with terete 6-8 inch leaves growing upright from the prostrate branches. It forms a fairly dense cover with most of the yellow flowers borne on the outside fringe of the shrub at ground level and is very attractive. It would be good for rockeries as a ground cover plant and does best in an open situation.



P. macrostachya – an open upright shrub with leaves on a long flattened petiole and divided into linear segments which are again divided. The yellow flowers are in the upper axils or terminal but not numerous, the fruiting cones are long and prominent. (Pictured right)

P. media (refers to *P. brevifolia*) – one of the best yellow flowering species with the flowers terminal on upright, stiff branches, the 3" leaves are terete, stiff and pointed

P. megalostegia – a small shrub of 18 inches with short terete leaves. Flowers are yellow and rather sparse.

P. propinqua (now *P. squamata*) – a very upright habit of growth to 6 ft, the slender branches have short flat divided leaves. The small bright yellow flowers are numerous in the upper axils and very showy.

P. seminuda – a small upright shrub of 2 ft, short terete leaves divided into 2 or 3 segments. Flowers are yellow.

P. serruriae – there are two forms of *P. serruriae*, one has yellow open flowers and the other pink. The yellow flowering form being more open in habit with short divided, rather dense leaves. The numerous small soft yellow flowers in the upper axils make an attractive showing on the arching branches. The pink flowering form (now *P. axillaris*) has a much more compact habit of growth and flowers a month later.

P. striata – a small stiff shrub of 2 ft with stiff divided short leaves. It has pale yellow flowers in the upper axils. (Pictured right)

P. teretifolia – this is a late flowering species, Dec-Jan, and has very attractive soft pink flowers sessile on the spreading branches, the 3 inch terete leaves are rather sparse and do not hide the flowers which are carried on the old wood as well as on the previous year's growth. A shrub of 3 ft and rather spreading.



Australian Plants Journal, Vol. 5, September 1970 and Australian Plants Journal, Vol. 6, March 1971

Isopogon prostratus D. McGillivray, *Telopea* 1: 32 (1975)



the flowers.

Description – *Isopogon prostratus* is a prostrate shrub, each branch spreading around 0.5 m, and has a lignotuber. The slightly scabrous (rough) upright leaves up to 12 cm in length comprise a petiole making up half the length of the leaf and a lamina dividing 2 to 3 times into slender, linear segments.

Isopogon prostratus (common name Prostrate Conebush) was first collected by Victorian Government botanist Ferdinand von Mueller in 1860 at Twofold Bay on the NSW South Coast. He named the species *I. anemonifolius* var. *tenuifolius*, observing a similarity to *I. anemonifolius* but *tenuifolius* or with slender leaves. In 1975 Don McGillivray, in his work as botanist at the National Herbarium of NSW, renamed the species *I. prostratus*. This recognised important differences with *I. anemonifolius* – a prostrate habit, more slender leaf segments and a more conspicuous tuft of hairs at the tip of



The leaves are soft to touch. All leaf segments have a noticeable groove on the upper surface. The flower heads are held sideways at ground level, the numerous, broad involucral bracts having a light felty coating of short hairs. Short, bright yellow flowers emerge from broad, densely hairy floral bracts which have a thick coating of woolly hairs and a glabrous, sharply acuminate tip. Each flower is up to 12 mm long and glabrous apart from a noticeable tuft of white hairs on the tip. Flowering occurs between late October and early December. The pollen presenter (right) has a noticeable constriction at the mid-point. The basal part has a few short hairs and is slightly swollen, while the portion above the constriction dilates into a globose part, finishing with a scarcely swollen, glabrous apical portion obscured immediately after anthesis by heavy loads of pollen.



Distribution – *Isopogon prostratus* grows in dry sclerophyll forest and heath. In NSW it can be found on the tablelands from Newnes Plateau northwest of Sydney, south to the Tuross River, and in coastal heath between Eden and Green Cape headland. There is also a small population in Victoria at Fernbank in East Gippsland.

Confusing species – *I. prostratus* may be confused with *I. anemonifolius* which has similar yellow flowers and divided leaves. However, it can easily be distinguished from *I. anemonifolius* by its prostrate habit and more slender leaf segments.

Cultivation – *Isopogon prostratus* strikes readily from cuttings and can also be grown from seed though germination rates can be low. It has also been successfully grafted onto *I. 'Coaldale Cracker'*, and appears very compatible on this stock. It tolerates heavy frosts and extended dry periods, but is vulnerable in heavy soils through wet periods. It performs best in well-drained soils (even poor, dry soils). It can be long-lived and will respond well to heavy pruning which helps to keep it vigorous. It is well-suited to rockeries and pots, especially where it can grow along the edge or down a pot, rock or wall. It is a worthwhile addition to any garden, numerous bright yellow flowers emerging late in spring after many other natives have finished flowering.

Member notes – Anthony Meyer has been observing a plant of *Isopogon prostratus* at Clarence near Lithgow since the 1980s including after the 2019-20 fires, showing how long-lived this species can be. Mike Beamish has propagated this species from seed and from cuttings but has found them difficult to grow on. John Knight warns it can be out-competed by other plants and prefers well-drained, dry, tough conditions. John wonders if a lack of viable seed in his cultivated plants could be because they were sourced from high elevations and lack suitable pollinators in his coastal garden. This raises an interesting question about potential differences between coastal and mountain forms in terms of propagation and cultivation, or even habit. Phil Trickett reports it is easy to graft, grafted plants having grown strongly for three years and successfully flowered.

Isopogon prostratus – observations from the southeast

John Knight

In September 1860, Ferdinand von Mueller collected a specimen from Twofold Bay, in south east N.S.W., which was sent to George Bentham. In his *Flora Australiensis*, Vol V. published in 1870, Bentham ascribed Mueller's collection as *Isopogon anemonifolius* var *tenuifolius*, noting Mueller as the author and collector. The description noted that the leaf segments were narrow-linear, short and channelled above like those of *Isopogon formosus*, which occurs in south-west Western Australia. Mueller's specimen included only foliage and fruit, as no flowers were found at that time.

In *Telopea* Vol 1, p32 (1975) Botanist Don McGillivray discussed 2 species previously included with *I. anemonifolius*. One was the NSW north coast plant *I. mnoraifolius* which has affinities with *I. dawsonii*, but is a much smaller shrub, to 1m. or so, and with *I. petiolaris* which also grows around the Coaldale area. It is the specific shape of the leaves, which is reminiscent of the menorah, the Jewish candelabra for which this species is known.

His second change raised to species level *I. prostratus*, which he noted differs from *I. anemonifolius* in several respects, these being its consistently prostrate habit, more slender leaf segments and slightly more conspicuous

terminal tuft of hairs on the perianth limb. No doubt its prostrate habit would have been sufficient morphologically to warrant raising to species level, as although coastal forms of *I. anemonifolius* might be stunted by environmental conditions, it is none the less never prostrate, with even the lowest forms developing as tight, rounded shrubs. Whether the morphology stands up against DNA sequencing is another matter.

Isopogon prostratus occurs naturally on the Central NSW Tablelands, south from Clarence/Lithgow area and Newnes Plateau, on the Southern NSW Tablelands including the Braidwood district, Tallaganda State Forest, Morton N.P., Budawang Range (e.g. Mt. Budawang summit) Kybean and Kydra Ra., Deua N.P., and the Wadbilliga Wilderness. Further south collections have been made south of Mt. Imlay, but it soon becomes a coastal species, found south from Eden (Twofold Bay, where Mueller collected the first recorded specimens) Nadgee, Womboyn, Green Cape and into Victoria at Cape Howe at the very tip of that state. Plants are mostly found on shallow sandy soils derived from sandstone, granite or conglomerates, and are often associated with *Allocasuarina nana* heathy woodland.

Maffra Victoria nurseryman and beekeeper Bill Cane was a prolific collector of unusual plants and had a prodigious knowledge of the plants to be found in the mountainous area of East Gippsland. It is recalled that when he was in the forest placing his hives, any new plant was quickly spied and recorded. In the Red-Gum forests around Fernbank, a tiny settlement between Bairnsdale and Maffra, he recorded a population of around 4000 plants of *I. prostratus* growing along the railway line, protected behind a fence from logging and clearing by forest workers. He notified Victoria's chief botanist Jim Willis, who subsequently visited the site with Bill. To their dismay much clearing was also being undertaken along the railway reserve, and many of the plants were already gone.

Not far from this site, another smaller population is recorded, at Providence Ponds Flora Reserve south of the main highway in heathy woodland of *Eucalyptus tereticornis*, *Kunzea ericoides* and thick *Lomandra longifolia*. In January 2013 Melbourne Royal Botanic Gardens arranged for botanist Jeff Jeanes to survey this population and he subsequently collected seed from around 20 plants, to be added to the Victorian Conservation Seedbank, a project to store seed of threatened flora. It seems this population is safe, although plants are threatened by fire in this fire-sensitive area. Testing of this seed proved that it was viable.

My experiences with *Isopogon prostratus*

When I began working at the Eurobodalla Regional Botanic Gardens (ERBG) in 1992, this fledgling project held a lofty plan to collect and grow as many of the 2000 or so species known to occur naturally in their collecting region. The bare rugged ranges to the west of Moruya were a magnet, as I had no experience of that type of forest.

Many weekends were spent exploring. Camping in November 1993 on Kydra Fire Trail south of Two River Plain in Wadbilliga N.P. among the nana heath was an experience one wouldn't forget. Why would one camp on the road? Well if you have walked in nana heath country you will know that there is never a clear area to set up, even under the open woodland trees. Who would expect a car, in the middle of the night on this lonely stretch of track, for that is what the road was (is), but luckily we had set up in front of our vehicle, and the late arriving car was travelling the same direction we had, and picked up the reflection of our taillights before running over the tent. It took a little time

to pack up, and move further down the road until a layby could be found. Thankfully these Canberra folk were understanding, and shared a story or two of their own about walking in this forbidding country.

I am not sure that the tracks leading into Two River Plain are accessible today, but we had no issues, and after exploring the area with *Eucalyptus parvula*, *Banksia canei*, *Grevillea lanigera* etc., headed north and followed Bumberry Creek Fire Trail, where I had been told we should find *Acacia lucasii*, the Woolly Bear Wattle, so named for the thick covering of woolly hairs over all parts of the plant. This plant



occurs in only a restricted area at high altitude and was still flowering. Still early in the day, we had time to wander along the road to see what else grew here. Although the nana heath was very dense, every now and then an open patch appeared, and here grew *Isopogon prostratus*, flowering heavily on stout short branches, the flowers held enticingly outside the foliage. (Above, flowering on Bumberry FT)

The substrate appeared as pebbly sandstone, with a little sandy soil but was set hard as if cemented by the extreme weather at around 1100m. Other rare plants grow here, such as *Boronia algida*, *Dampiera fusca* and *Euromyrtus (Baeckea) denticulata*, and more common species, *Hakea dactyloides*, *Banksia canei*, *Brachyloma daphnoides*, *Dillwynia sericea*, and the ubiquitous *Lomandra longifolia*. In depressions grew *Bossiaea foliosa*, a delightfully showy pea with attractive round leaves. From here we backtracked and headed to Tuross River falls for another day of plant hunting, looking for Grevilleas, but that is a story for another time.

Having 'discovered' the Isopogon, it was on the radar over the next few years when excursions were made to the higher country. On the road from Braidwood to Cooma one comes across the Berlang carpark, which is an entrance to Deua N.P. and the widely known Big Hole, where I had been told lyrebirds would be found. The track to the big hole requires wading across the shallow Shoalhaven River, which I might add is not always shallow if rains have fallen. Safely across, the track meanders through open forest, with grassy understorey. Here again, on stony ground was *I. prostratus*, eking an existence, and not nearly as exuberant as the plants along the Bumberry track. A bonus though was that *Persoonia chamaepeuce* accompanied the Isopogon. And yes, there was a lyrebird in the big hole, hopping up along fern covered ledges for our entertainment.

Next time we come across the Isopogon is on the summit of Mt. Budawang at 1138m. After a steep walk to the summit, plant spying is pretty easy on the flat top, and in the grassy spaces under trees many small heathy plants are found, including *Isopogon prostratus*, although if it wasn't flowering you might easily overlook it. November through January would be best.

Many other collections have been made close by, including Charley's Forest, Half Moon Wildlife Refuge, Nerriga roadside, and near the carpark to Wog Wog Mountain, where other interesting Proteaceae occur, including a pure yellow form of *Banksia spinulosa*.

So instead of heading to the beach for summer, consider a plant hunt in the higher country, much more satisfying.

Cultivation

Isopogon prostratus is a happy garden plant provided the conditions suit. Good drainage is essential, so a raised garden is a good start. It does not mind competition, but to show its best give it some space. Even at low altitudes by the coast it still flowers from November on.

From my experience, it propagates readily from tip cuttings taken from early summer. In fact that is the only time I have managed to find cutting material in nature, as the plant blends so well with the nana heath that it becomes quite cryptic.

At the ERBG, plants did not like 'good' garden conditions, and were happier in poorer soils that dried readily. The best plants grew in the carpark raised garden, which had the type of soil you wouldn't wish to own, dry, powdery and ideal for those plants which appreciated your love.

When the sandstone demonstration garden was built in 2008, a number of Isopogon, and a few Petrophile, were included in the Proteaceae collection. Dwarf forms of *Isopogon anemonifolius* established quickly, and the *I. prostratus*, after initially sulking, got to like their spot as well, and by 2012 flowered heavily. Although the fruiting cones which developed looked firm and plump, no viable seed was ever recorded. As competition increased the plants became less thrifty, and were soon out-competed by more vigorous species. Fire which swept through the Gardens during the 2019/20 bushfire disaster obliterated the sandstone plantings, but many have since recovered. Of the Isopogons, the coastal forms of *I. anemonifolius* have regenerated strongly from lignotuberous stems, and one *I. prostratus* has likewise regenerated, but it is struggling. (Above, regenerating at ERBG.)



In my home garden, I planted in 2010, a lone *I. prostratus* in a new garden out the front, which got full sun and had a westerly aspect. Other plants put in at the same time included *Eucalyptus olsenii*, a small tree from the high ranges to the west, and *Grevillea patulifolia* from Milton. A couple of ring-ins included *Lechenaultia biloba* and *Conostylis candicans*. After 12 years, I can report that the Eucalypt has reached about 6m., and is maybe a little bit too happy, the Conostylis keeps coming back, the Lechenaultia finally gave up after around 9 years, but did produce plenty of cuttings, the Grevillea has suckered extensively and flowers regularly, and the Isopogon is still there, fighting for space through some Lomandra which want to own the space. (Right, developing fruit in the home garden.)



However it still produces a few flowers every year, and yields a cutting or two as well. Still, it fails to develop viable seed, so one might expect that a suitable pollinator has yet to find the flowers. Should this be unexpected, given that most populations are found at high elevations?

But, what of the plants found on the coast further south? Maybe someone could bring these into cultivation to see whether viable seed might be produced.

Petrophile heterophylla J. Lindley, *Sketch Veg. Swan R.* xxxv (1840)



Petrophile heterophylla (common name Variable-leaved Cone Bush) was first published in 1840 by English botanist John Lindley in 'Sketch of the Vegetation of the Swan River Colony'. His description of *P. heterophylla* used a specimen collected by James Drummond in the Swan River District in 1839. Drummond named the species hetero-different/phylla-leaves, due to its leaves which can be entire or deeply lobed.

Photo: Ian Roberts

Description – *Petrophile heterophylla* is an upright, often spindly shrub, growing to 2 m in height. It does not have a lignotuber. Branchlets and leaves are glabrous. Widely spaced leaves can be entire or deeply 2-3 lobed on the same plant, up to 14 cm long

and 2-6 mm wide, and are glabrous with a pungent tip. Undivided leaves can be somewhat concave with a clear midrib, divided leaves forked into two or three lobes. Egg-shaped inflorescences are axillary (sometimes terminal), sessile, with numerous glabrous involucral bracts around the base. Flowers up to 15 mm in length are cream to yellow, and covered with short hairs. Flowering occurs between August and October. The glabrous pollen presenter is clavate to turbinate. The base below the brush is noticeably 4-angled and very concave at the top. Cones are ovoid to oblong to 12 mm in diameter. Fruit (containing a single seed) are unusual in that they are winged rather than with long hairs.





Distribution – *Petrophile heterophylla* grows in gravelly/sandy soils in South Western WA, extending from north of Perth around Gillingarra down through the Stirling Range to east of Ravensthorpe. Salt River Road in the Stirling Range and Dryandra Woodland are recommended spots to find this species.

Confusing species – *P. heterophylla* can be confused with *P. squamata*, particularly the taller northern form of *P. squamata*. *P. heterophylla* has much longer leaves (6.5-16 cm compared to 1.5-6.5 cm for *P. squamata*) which are mostly flat (not three dimensional), and a deeply concave top to the pollen presenter base (rather than flat). There is also a passing

resemblance to another form of *P. squamata* which has mostly undivided leaves occurring from the Stirling Range halfway to Esperance. However this has shorter, wider leaves which may be slightly concave, and plants are generally shorter than *P. heterophylla*.

Cultivation – Plants have been grown from seed and from cuttings (may be slow to establish roots), but grafting possibilities are yet to be established. Plants are thriving in Melton Botanic Gardens in Melbourne but it is expected that grafted plants will be required for success in summer-wet eastern gardens. This species was successfully grown in England in 1840. Lindley described it as a very graceful plant. However, it may be the most underappreciated of the petrophiles, and can fade into the background when out of flower. Rarely sold in nurseries, it is reportedly hard to sell as nobody knows the plant. Yet it can be spectacular in flower, particularly after good rains, and was recommended for floriculture by horticulturalist Rob Cross of the Royal Botanic Gardens Melbourne. The flowers hold on the bush for a long time. It may require pruning to prevent it becoming too rangy. In mixed plantings it would be a useful upper layer with lower species around its base. The Study Group needs to identify the most attractive forms for cultivation, and to study its performance in a range of garden types.



P. heterophylla, Stirling Range National Park October 2022

Member notes – Ian Roberts has raised this species from seed (soaked in smoked water 24 hours) and cuttings (dipped in esiroot gel for 15 secs, then under mister in 50/50 perlite/vermiculite with bit of potting mix added...slow to get roots & a bit finicky to pot on successfully). Mike Beamish potted some cuttings on in early winter but as yet they have made little growth. Barbara and David Pye sowed seed of *Petrophile heterophylla* in 2016 for planting in the Melton Botanic garden. The seed germinated quite

well and several plants were planted out in 2017 flowering in July 2020. The plants are now well over 1 metre tall. Extra rain this year has seen them flower profusely, unlike Alex George who found it vigorous but it flowered only once in 12 years. Kevin & Kathy Collins recently planted a nice specimen bought from Kathy's sister, Erica at Bridgetown "Southern Flora". Anthony Meyer, Paul Maurice and Lyn Alcock have photographed beautiful specimens. Barbara and David Pye, Ian Roberts and David Lightfoot have all used the same word, spectacular, to describe this plant in flower. David claimed: 'This is a truly magnificent species in flower and would be a welcome addition to any medium to large garden'.

Propagation updates

Ian Roberts, SA: Sowed some isopogon & petrophile seed late August. To date only *I. dubius*, *I. ceratophyllus* & *I. trilobus* & a couple of unnamed *Petrophile* have germinated (no smoked water this year). Some *P. heterophylla* cuttings potted on early winter but have made little growth. *I. formosus* cuttings have grown vigorously over winter.

Eddy Wajon, WA: Six plants of *Petrophile diversifolia* germinated in about 2015 from a cone from excess material from samples I collected under licence during a plant photography trip which I threw into our front native bush garden. Because there were several of them, and too close together, I dug 3 of the seedlings up and translocated them to our back native bush garden. All of these and the original germinants grew for several years and reached heights of 1.5-1.75 m, with 2-3 main stems. They all flowered after about 5 years.

Mike Beamish, VIC: My *Petrophile pulchella* seedlings have survived their second winter still in their seedling tray, yes, very slack of me, excuses, excuses excuses. I will get to them soon, fingers crossed they'll survive the trauma.

Miriam Ford, VIC: I have 4 Stuckeys Hybrids going well in large supertubes and they will go into the garden or pots soon. These were the only successes from the recent batch of cuttings from you. Not such a great result but ah well. UPDATE: found 2x *I. 'Coaldale Cracker'* and 1x *I. cuneatus*. 3 more successes from the recent cutting series so better than I thought.

Kevin Collins, WA: we followed the advice from a Qld member who sowed his seed in pure vermiculite/perlite mix with good results. In the past we have had poor & erratic germination. Our results were more promising using this medium. Freshly extracted cones & seeds were terrific but some older cones stored in the shed for several years had low or no germination of seed. Good germination was had with *P. squamata* (Northern form) from Moritz Rd., *P. circinata*, *P. teretifolia* (dwarf), *I. teretifolius*, *P. helicophylla*, *I. formosus*, *P. cyathiforma* & *I. dubius*.

Successful new cuttings

- *Petrophile squamata* (northern form – Moritz Rd.), *seminuda*, *glauca* (pictured right), *circinata*, *longifolia*, *media*, *prostrata*, *phylicoides* ? & *ericifolia*.? Apart from *glauca* & *seminuda* grown in 30mm coir plugs, the others were struck in native seed raising mix with 50% perlite added, grown in 4cm square tubes 10cms deep.
- *Isopogon longifolius* (both entire & divided leaf forms), *dubius*, *polycephalus*, *pruinosis* -both ssp's, & sp. Fitzgerald River.

These cuttings were stored for 3 weeks moistened in zip lock bags prior to potting up. We typically do a few of each species with clonex purple, honey, rooteX & no treatment. Some species can't handle rooting hormones. I hope to send further details on best treatment for various species for a future newsletter.



My field trip cutting collections with you guys [from May 2022] despite 3 weeks in the fridge due to a postal stuffup with the plugs I ordered are still looking surprisingly good. I hold out hope for many. *P. cyathiforma* which has been dismal in the past & died quickly is looking great with some with buds continuing to open. We reckon with some spring warmth roots should develop soon. Fingers crossed.

Liesbeth Uijtewaal, The Netherlands: I've compiled lists of I's and P's that I have propagated or tried to propagate over the years...[for your reference including where] propagation failed, plants failed later on or I gave the plant away. There's the full name of the species with the date the first cutting has struck or when seeds have germinated, including the number of seeds that germinated of the number of seeds sown. Mind you, all seeds were sown on



paper so, when sown in the ground it would have taken at least another 7 days to show germination. Whether or not smoke was applied is not in these spreadsheets but I could track the info down if you'd like to know. I seem to recall I, in general, did apply smoke.

What I did find, in general, is that I's and P's germinated after some 3 weeks from sowing over a fairly short period of time, one week maybe. After that no more germinating seeds were found.

I've included a photo of the seedlings of *P. shirleyae*, taken today (left), 3.5 months from germination. Only two remained of the four that germinated initially.

Phil Trickett, Grafting update

This year I decided to switch to grafting isopogons onto rooted seedlings. This has two advantages – raising the graft union higher above ground level will hopefully markedly reduce the incidence of collar-rot in waterlogged soils, and the rooted seedling rootstocks of *I. 'Coaldale Cracker'* appear overall to have consistently stronger root systems than those resulting from cutting grafts. The reason for the stronger root systems in the cutting grown rootstocks is probably due to the younger, softer material used to initially produce the rooted stock plants. Often, cutting grafts require semi-hard, thick stock material which can produce sub-standard root systems.

Isopogon 'Coaldale Cracker' does not produce viable seed, so rooted stock plants must be produced from cuttings. This has proven to be very easy, with close to 100% strike rates using Clonex purple. And when you graft onto a *I. 'Coaldale Cracker'* seedling, the piece you chop off the top of this seedling results in another couple of cuttings to produce future rootstocks.

Unfortunately, petrophile rootstocks such as *P. pulchella* and *P. sessilis* cannot be produced from cuttings, as they strike roots very slowly if at all. These stocks must be grown from seed. I am about to sow seed of both these species, for use as rootstocks next year. By next newsletter I should have some results of these germination trials. In the meantime, I have acquired some plants of both *P. pulchella* and *P. sessilis* to try some petrophile grafting on a range of species we collected on our recent WA trip. I'll report back on the result of these grafts next newsletter. I still recommend cutting grafts for isopogons, where time to graft is limited, and where rooted stock plants are unavailable or difficult to source.

Given the losses earlier in the year, it has been pleasing that no grafted plants have been lost over the last 6 months. This is despite garden beds become more waterlogged over this period. This indicates that the reason for these losses was probably collar-rot, caused by mulch piled around the graft union which was often buried under the mulch and soil. I think this could be called poor gardening!

A notable spring graft success in garden trials has been a couple of *I. 'Candy Cones'* which both flowered for the first time, producing a brilliant display through spring. This hybrid has been called 'the ultimate drop-dead plant' by one of our most famous native plant nurserymen. It requires an interstock of *I. cuneatus* when grafted onto *I. 'Coaldale Cracker'* but it's worth the effort when you see the plant in flower. Another success was a couple of grafted plants of *I. panduratus ssp. palustris* (pictured right). These have grown vigorously for a couple of years before flowering this year for the first time. This species has a restricted distribution in WA southeast of Jurien Bay.



The pluses of plugs for cuttings

David Lightfoot

In a number of recent newsletters (Issues 18, 20,21,24,27 and 29) Phil and Catriona, as well as a number of study group members have described using coir peat plugs for *Isopogon* and *Petrophile* seed raising, as well as cuttings and even cutting grafts. I have tried various seeds and cuttings using this system.

The plugs come in 20 and 30mm sizes. I have used the 20mm size of the *Jiffy preforma* brand. As mentioned in these earlier newsletter issues, these are distributed by *Garden City Plastics* (GCP) in foam trays of 240. One can also purchase a box of around 2400 loose plugs- enough for many years, if not a lifetime. Unfortunately, GCP no longer sell directly to the public, so you have to find a local retailer. I couldn't find any sellers near to me using internet searching, but I was given the names of a couple of retailers in Melbourne when I called the local GCP branch. They are not cheap though, with a set of 5 trays with plugs costing about \$215, and the box of loose plugs around \$200. Given their usefulness, I would like to see some local APS groups buying the sets and then onselling smaller quantities to members.

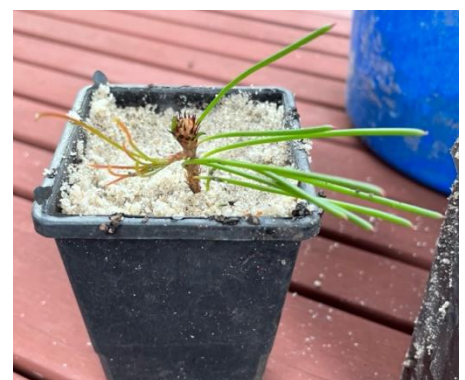


Coir plugs showing roots emerging from *Petrophile ericifolia* and *Isopogon dubius*

The plugs I have used have a central pre-drilled hole (rather than the ones with a slit) and are perfect for inserting a smaller seed or cutting. I have not had great success with seed, mainly due to a lack of diligence in water management on my part. I have an automatic spray system in my shade house and even though I get good seed germination, I invariably let them get too wet and they succumb to collar rot. Cuttings however are a different story! In the past I have put cuttings into small pots containing an open mix of variable proportions of perlite, commercial potting mix and sand. The variability (due to me just mixing ingredients together in approximate volumes) has meant some batches were more successful than others. In addition, when a batch of cuttings was successful, and it came time to pot on, I would always have a number of deaths. The newly grown roots are particularly friable and often significantly entangled between individual cuttings and so a number do not survive the transplant shock. This is never an issue with the coir plugs.

A single cutting of semi- hard to hard growth is placed into each plug (after a dip into clonex gel) and then into the shade house with them. I don't start the cuttings in really hot weather and so with this system I don't need to cover with plastic or keep it too humid. When roots have appeared growing out from the plug, (see photos) the whole thing, plug and all are placed into a pot containing a well-drained potting mix and sand mixture. Even if distal roots are damaged in this process, there are enough left within the plug to maintain the plant. These "plantlings" are pretty hardy at this stage and some say you can plant them directly into the garden. I have not done this and would only do so when there was no risk of frost or hot/dry weather. I let them grow in the small pots until roots start to be visible at the base. Then into the garden they go. In my opinion, this system is much faster and easier than conventional cuttings at the initial stage, and orders of magnitude faster at the potting up stage. I still get some deaths prior to root formation but it is easy to pop out the plug with the dead cutting and replace it in the tray with something else.

So far, I have had success with the following species. *Isopogons dubius*, *formosus*, *mnoraifolius*, and *Petrophiles squamata*, *fastigiata*, *ericifolia*, *teretifolia*, *linearis*, and *prostrata*.



Petrophile prostrata potted up coir plug cutting

Phil and Catriona had a wonderful display of Isopogons and Petrophiles at the Kiama ANPS conference recently and generously allowed me to take some to try as cuttings. The species are *Isopogon dubius* (low grey leaf from) and *inconspicuus*, and *Petrophile recurva*. I also grabbed some *Isopogon* “candy cones” from Peter Olde’s *Silky Oaks* garden (with his permission of course). Finally, I have just returned from a memorable 2 weeks in WA where I was able to catch up with Phil and Catriona in a random gravel pit off Tootbardie Rd in Badgingarra (Please note this was not an actually organised meeting just a random encounter- the people you run in to in WA in spring!!) From this trip I have put in cuttings of *Isopogon linearis*, and *inconspicuus*, as well as *Petrophiles nivea*, *linearis*, *axillaris* and *brevifolia* subsp *rosea*- the excellent pink version of *Petrophile brevifolia*. I’ll let you know how they all go.



Coir plug showing roots emerging from *Petrophile fastigiata*

I would highly recommend this system for Isopogon and Petrophile cuttings.

Post Covid Wildflowers: a local report not by a government appointed think tank

Don Williams

We are now into the post Covid era. This is blamed for all sorts of things from shortages of new motor cars, trades people and wait staff in the hospitality industry. It is also perhaps responsible for the increase in bank rates and confusion in the airline industry. It has been suggested that it has also created burn out in the medical industry. So how is the Post Covid era affecting the West Australian Wildflower tourist industry. Simple the Eastern States folk are back with a vengeance. Having been deprived of the privilege / pleasure, trust me they are here in numbers having driven or flown in now that our Emperor has opened our borders. There have not yet been any signs of an overseas invasion yet, good, English is easier than most foreign languages for us.

We at “Hi Vallee” have a busy season (our harvest) from July to late October. The Bus groups are back creating some work for the local CWA, we are extremely grateful for this assistance. Can you imagine yours truly making a suitable lunch for a bus load of older folk. So, for the first time since 2017 we had our friends by coach all the way from Brisbane “All Australia Adventures”. We traditionally do Billy Tea and Damper this is one of “yours truly” party tricks. This was great except for the fact that we had a lot of rain in August. Guess was the rain would clear and all would be well so start a very wet fire with copious quantities of Diesel make the damper put it on as the rain persisted. The billies went on, more diesel and swearing, (just a bit). So, the pleasant wildflower walk was off, too wet. So, a rushed visit to the field to collect a large range of species. Believe it or not the rain did not stop, the damper cooked to perfection and a large amount of tea was made and consumed with pleasure. The wildflower walk was done on the veranda. The Coach captain was able to edge his behemoth nearly in [to the carport] where the Prado goes. He loved our drive in as it was not as slippery as Tootbardie Road.

So how about poor Karlo a dentist and avid wildflower enthusiast and pre 2017 a regular visitor from Sydney. Karlo being a time and motion man shut his two-man dental practice so he could visit the West and have two new (Dental) chairs installed at the same time. He arrived as predicted at Perth Airport precisely 9.45 A.M. He was at the hire car desk at precisely 10.00 A M then asked for the keys to his previously ordered and paid for Toyota RAV 4. He was told that unfortunately the supply of RAV 4s was zero. He was asked to be patient and they might be able to find an alternative. By 2.00 PM they had located a Kia Sportage yes it was all wheel drive, but please do not use it off road. He arrived at Hi Vallee at 4.30 by 5.00 PM we were out in the field until the light failed. A nice evening meal and some suitable wine finished the day. Next morning, we were on site by 6.30 AM so that Karlo could be in Kojonup by the next evening. Mostly tour guiding is not quite this full on. Next day at 7.30 Karlo rang us to thank us. He was in Albany. No wildflower touring does not have to be a relaxed process if you are very keen and from Sydney.

So, what are the most commonly asked questions when the folk from the East are planning their trip. Probably is can we see the Queen of Sheba orchid; black kangaroo paws; some everlastings and Wreath Lechenaultia on our way from Perth to Kalbarri? Are the pinnacles worth seeing? Why do we have to pay to visit Lesueur National Park? Along with comments that the place is spectacular with wonderful walks, the toilets stink; you would think that they would have better toilets like ours. The other very common question is which is the very best week to see

wildflowers, snappy answer “all”. The other question that is common is this a family farm? When replying no it was part of Western Australia’s big C.P. scheme. This needs an explanation that is appreciated.

Don Williams still convincing the Easterners that this is where it is all at wildflower wise. No one pays me to do this!!!

This article first appeared in the Badgingarra local newspaper *The Sandpaper*.

National Conference report

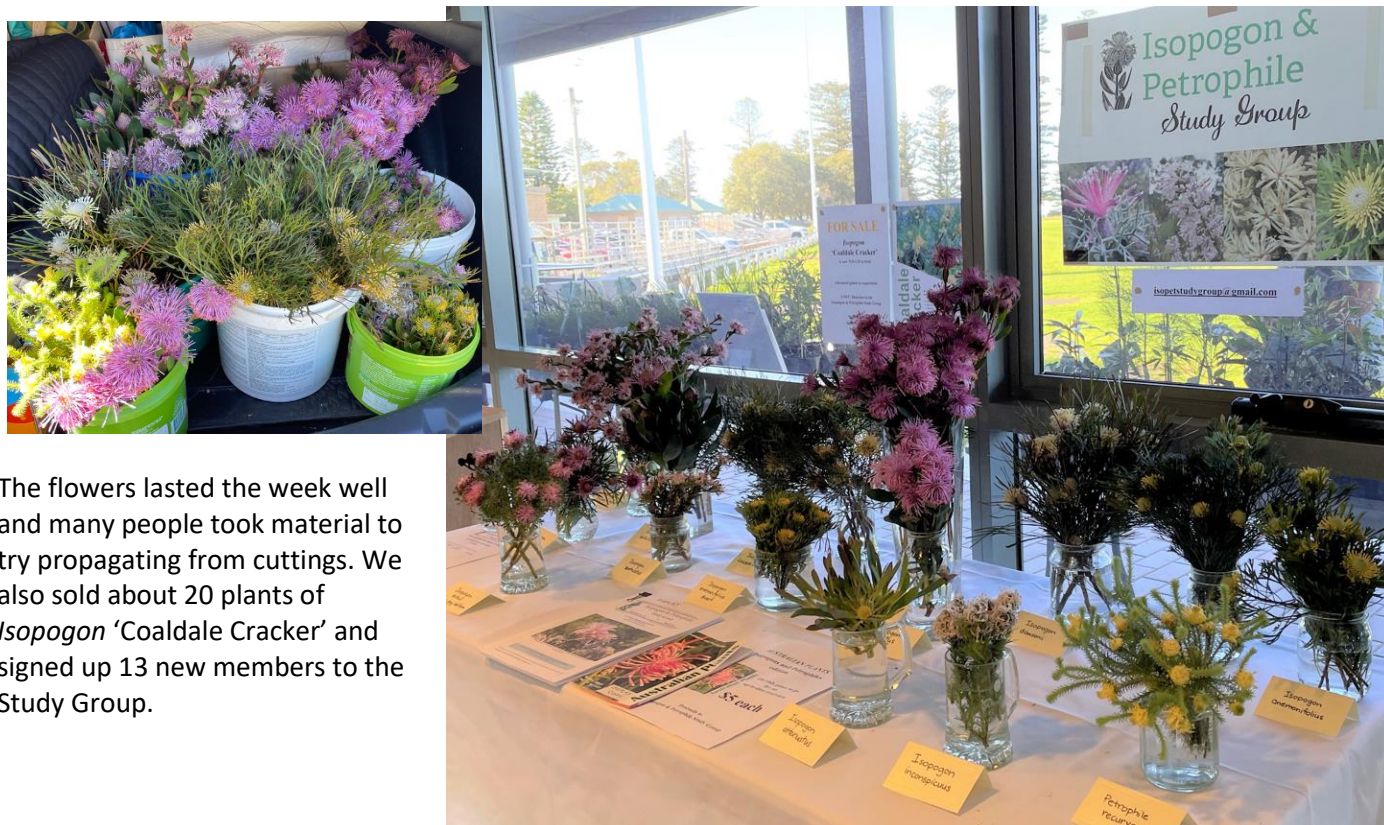


AUSTRALIAN FLORA – PAST PRESENT FUTURE

The Australian Native Plants Society Australia (ANPSA) Biennial Conference was held on 12-16 September 2022 at Kiama on the NSW south coast.

Isopogon & Petrophile Study Group display

14 different types of isopogon and one petrophile happened to be flowering well in our garden on the weekend before the conference and it was a challenge to fit them all in the boot of our car (below left). They created a good display which generated a lot of interest, especially after the main conference session with Catriona’s presentation on isopogons and petrophiles.



The flowers lasted the week well and many people took material to try propagating from cuttings. We also sold about 20 plants of *Isopogon* ‘Coaldale Cracker’ and signed up 13 new members to the Study Group.

Chat Room: How to get grafted natives into gardens

Phil presented several short informal discussions on grafting. Beginning with the startling proposition that WA plants sold in our nurseries are doomed to inevitable deaths in eastern gardens, he turned to the solution, grafting – and why progress on getting access to grafted natives for our gardens over the last few decades has been so slow or non-existent. There are no easy or obvious solutions but documentation on all aspects of grafting is crucial so there is no more reinventing the wheel. Next, we need to get more people involved in grafting and keep them involved, using ongoing courses rather than one-off learning sessions, mentoring, and using easier species and techniques and proven combinations. There is an important role here for local APS Groups and possibly Study Groups and social media.

To illustrate and finish, Phil gave a quick demonstration of how easy it is to do a cutting graft using *Isopogon* 'Coaldale Cracker' as the stock and *Isopogon cuneatus* as the scion. A handout was available covering how to graft and some useful tips. If you would like a copy of the handout, please email us. Another version of the same material is available in the *Isopogon & Petrophile* edition of *Australian Plants*, Winter 2021 Vol 31 No 247 pp. 93-99, and the *Isopogon & Petrophile Study Group Newsletter* 18. <https://anpsa.org.au/wp-content/uploads/iso-pet18.pdf>

A video of Phil doing one of his sessions is available here (note the sound quality is relatively poor due to the noisy room). <https://youtu.be/QRradFAsLvg>

Conference presentation: Filling the gaps – How to preserve our isopogon and petrophiles

In line with the conference themes of past, present and future, Catriona's presentation looked at the current state of knowledge and future directions for our Study Group.

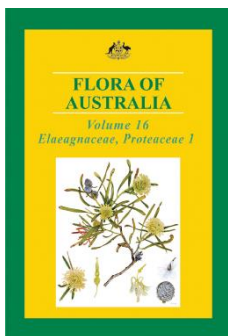
Knowledge is power they say – the more one knows the more one will be able to control events. Conservation of plant species relies on information but the state of knowledge on isopogons and petrophiles is underdeveloped and undocumented compared to iconic indigenous species. Briefly dealing with historical issues, the current key information gaps relating to taxonomy, ecology and reference material were outlined. Into the future, there is increased urgency from growing threats, and an important role of the Study Group.

For an edited version of Catriona's presentation, see the article below. A video of the presentation is also available here. <https://youtu.be/BEoCqB1BQas?list=PLr7PVqvOGX75U00DmSZSNvSgsoO5i9RE>

Filling the gaps: how to preserve our isopogon and petrophiles

This is an edited version of a presentation given by Catriona Bate at the ANPSA Conference on 13 September 2022.

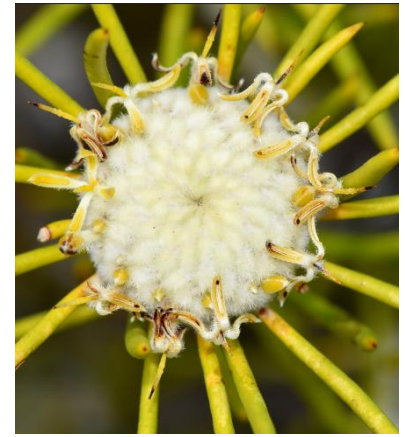
In the plant world, knowledge, beginning with taxonomy, is the driver of conservation. Every specimen serves to grow our knowledge. The deeper our understanding, the better we can protect biodiversity. However, the state of knowledge about isopogons and petrophiles is underdeveloped and undocumented compared to iconic indigenous species. Addressing this deficit is vital to the ongoing preservation of isopogons and petrophiles in all their forms.



The only comprehensive references for isopogons and petrophiles are Chapter 10 (Petrophile) and Chapter 11 (Isopogon) of *Flora of Australia* Volume 16 by Victorian botanist Don Foreman. Published in 1995, this was the first substantive update to these genera since 1870 (Bentham and Mueller). A long overdue achievement, it addressed many knowledge gaps. It contained updated keys and 20 new taxa (5 isopogons and 15 petrophiles). One of these was a well-known species which had been waiting on Herbarium shelves for over 60 years to be formally described (*Isopogon gardneri*).

Given the size of the task, however, it is hardly surprising that in 1995 many taxonomic issues were left outstanding. Yet taxonomic knowledge is essential for meaningful studies in biological diversity, ecology and biogeography, all fundamental to conservation. The complex global and Australian systems around conservation begin with formal recognition of a species and allocation of a conservation status (threatened or not threatened) for that species. Threatened species may be further classified as critically endangered, endangered or vulnerable. These species are listed under government legislation requiring conservation activities and monitoring be undertaken. Trying to manage and protect our isopogons and petrophiles without an adequate taxonomy is (to borrow a simile from the Australian Academy of Science), like trying to manage a business without an adequate inventory of stock, and with no real idea of what the products look like or do.

Since the turn of the century botanists in Western Australia have been working on the problem, resulting in over 20 new taxa and a substantial reduction in the number of known taxa waiting to be properly described and formally recognised. Among these was another common species which, by 2020 when it was published, had waited 60 years for official recognition (*Isopogon nutans*). Two others were the result of detective work which had to go back as far as the mid-nineteenth century to discover that two different plants had mistakenly been given the same name by different botanists. The record has now been corrected with the taxa formerly known as *Isopogon drummondii* now recognised as *Isopogon autumnalis* (pictured right, photo: Jean & Fred Hort) and *Isopogon sphaerocephalus* ssp. *lesueurensis*.



There are many threats to the Australian flora generally but for isopogons and petrophiles, Western Australia is key. Not only are 80% (isopogons) and 90% (petrophiles) of taxa endemic to WA, the flora of the southwestern corner of WA where they are distributed is highly susceptible to dieback (*Phytophthora cinnamomi*) as well as particularly vulnerable to development, mining and climate change. The roadside verges, another place isopogons and petrophiles are commonly found, are still being cleared, with roadsides around Esperance being cleared illegally for crops as we speak.

Current information gaps

We still have gaps in taxonomy. Four isopogon and two petrophile taxa, although known, are still waiting to be published and recognised. The good news is that much of the outstanding research on the isopogon taxa has recently been completed and all four should be resolved in print in the foreseeable future.

Even when we have a recognised species and description, it is not all cut and dried. There are known question marks around at least 9 current species groupings. Some species might need to be broken up into a number of different species, others might need to be dropped as a distinct entity. Further, DNA testing, now a standard practice changing taxonomy, has only been used recently (in relation to research on the *I. polycephalus*, *I. spathulatus*, and *P. brevifolia* groups).

Of 24 taxa currently considered to be threatened, only 5 are officially recognised as Threatened and protected under legislation. The other 19 are 'possibly threatened' species, currently placed on WA Priority Flora lists because they are considered to be data deficient, requiring further study before they can be given official threatened status. Seven isopogons and 12 petrophiles are at Priority Flora levels 1-3 indicating varying levels of perceived threat and data deficiency. One isopogon (*Isopogon latifolius*) is at the lowest priority level of 4, indicating a need for monitoring rather than further study.

Ecological aspects of isopogons and petrophiles, how they interact with their environment, have never been properly documented and isopogons and petrophiles are rarely included in scientific studies. The recent Black Summer bushfires highlighted information deficits. For some species, we don't know whether they resprout from a lignotuber or whether they are killed and must regenerate from seed. For most species, we don't know how many years it takes for populations to be replaced after fire.

There are a number of other aspects of isopogon and petrophile ecology which are largely unknown. For example:

- pollination – how it works, who are the pollinators, role of floral colour change, possible floral insect guides
- seed – attributes and effect on dispersal and germination, germination rates
- foliage – delayed greening, cold and dry weather colouration
- disease – the main threat appears to be fungal pathogens
- animal interactions – species involved and the nature of the interaction

Propagation and cultivation knowledge is important for conservation if we need to replant species into the wild or establish seed orchards, and for ex situ insurance populations. Seed is the easiest and cheapest method of propagation. For the small number of species officially recognised as threatened, seedbanks have extensively researched seed propagation. The Study Group has undertaken many years of trials across a wide range of species but the consensus is that propagation by seed is something of a lottery. Recent information indicates that less than

10% of fruit have viable seed, requiring exhaustive tests of viability before accurate statistics on germination can be compiled.

The Study Group has been turning to propagation by cuttings but has found the results a mixed bag, with some species striking easily and others not at all. More species need to be trialled. Propagation by cuttings is well tested (but not documented) for a few spectacular species (cultivars) by commercial growers.

Grafting produces plants able to be reliably grown out of a species' natural or optimum environment. The Study Group has been conducting trials on compatibilities and techniques with promising results. Isopogons are relatively easy to graft – 33 around 50 taxa have been successfully grafted so far. Many petrophiles have also been successfully grafted – about 25 of over 70. Grafting trials are continuing, as are garden trials of the resulting grafts.

A large proportion of species have never been cultivated. There are few species grown in native gardens, with WA species difficult in summer-wet conditions such as those on much of Australia's east coast. Despite this, grafted plants are not currently used in gardens. More trials are needed to learn about cultivation of all of the species.

Reference material is sometimes unreliable, difficult to find and scattered across a wide range of sources. There continues to be no authoritative, comprehensive and up-to-date reference source. Nor is there a current updated overall key for either genus (there have been 3 part revisions of *Petrophile*, and 4 part revisions of *Isopogon*, relating to WA species only). Currently information has to be sourced from:

- SG newsletters and *Australian Plants*
- State herbaria websites
- Scientific papers esp. *Nuytsia* (WA Herbarium)
- Compendiums about native plants
- Field guides (brief)
- *Flora of Australia* and other historical treatments (outdated)

Future directions

The demand for information will increase. Threatened species are likely to need more conservation, more species are likely to reach threatened status, and more species will join Priority Flora lists. The need for monitoring will increase and expand in scope across all species. We can also expect the botanical backlog at the WA Herbarium to increase with more demand and scarce professional resources, and that the work of citizen scientists will become more and more important. Whilst biodiversity continues to be severely threatened there is an urgent imperative to describe species before they become extinct.

In this context the work of the Study Group is vital. We will continue to work on identifying and filling the gaps, collating existing intelligence, and conducting research on taxonomy, ecology and cultivation. We have our own list of taxonomy issues to pursue.

There is also a need to identify and describe hybrids and different forms of species or cultivars. Examples include forms of *I. formosus*, *I. axillaris*, and *P. divaricata*. Although these forms are not currently judged to be sufficiently distinctive to be considered a separate species or subspecies, recent research on dryandras using DNA indicates that perhaps some forms should be treated as distinct entities for regeneration and conservation purposes.

We also need to facilitate, collaborate and support scientific and conservation work where possible. For example, by collecting selected plant specimens plus tissue material for herbaria, population monitoring, field surveys, and providing a supplementary source of plant and seed material or information.



Right, *Isopogon gardneri*, far right, *Isopogon nutans*.
Both took 60 years to be described.

Perhaps the most pressing need, and one often raised with us, is for up-to-date, accessible reference material. We need a comprehensive single source of current information. The plan is to publish a book but we also need to

consider whether an online version is feasible. It could be argued that, given the amount of research still in train or planned, new taxonomic keys for both genera are not appropriate at this time, however, the absence of up-to-date keys impedes wider research and could be addressed with a program of sequential updates.

Financial Report

Total 25/3/2022	\$1,641.56
Bank balance	\$1,538.12
Cash on hand	\$103.44
Donations/income	\$230.00
NPQ	\$20.00
Plant sales	\$210.00
Total 31/10/2022	\$1,871.56
Bank balance	\$1,768.12
Cash on hand	\$103.44

Donations are welcome

ANPSA Isopogon & Petrophile Study Gr
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