



Isopogon & Petrophile *Study Group*

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Out of the ashes of the largest bushfire in the recorded history of our continent: *Isopogon anemonifolius* flowering ten months after the Gospers Mountain megafire. Bell area, Blue Mountains NSW, October 2020.

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

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

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Dear members

We often call ourselves isophiles (combining the words isopogon and petrophile) and as this literally means equal + lover of, it is quite appropriate if we consider we love both genera equally. The alternative combination is petropogons (rock + beard) and Anthony O’Halloran takes this one up, suggesting we call ourselves stonebeards for a change. Why not?

What a year 2020 has been. Our gardens have been a blessed escape for many of us. We have been particularly thinking of our Victorian study group members in lockdown and hoping their gardens are giving them something positive to focus on. From their reports in this issue, it seems this is mostly the case. Recent rains across eastern states at least have eased the stress of drought and bushfire and let’s hope 2021 is better in all respects. COVID restrictions have continued to affect activities outside our own gardens and will have an influence well into next year with the next national conference in Kiama now postponed until 2022. More recently we have been able to begin to visit some gardens near us, and even venture into some of the local national parks reopening after bushfire. We hosted a visit to our garden by APS South East NSW Group recently and most of our isopogons were at their peak. However we were unable to address the quarterly APS NSW meeting in Sydney as planned so we did a presentation on isopogons and petrophiles on zoom. Unfortunately sound issues marred the presentation but if you are really keen you can view it [here](#). We had some tubestock of Coaldale Cracker ready for the Sydney meeting so instead we sold some to local APS members with proceeds going to this Study Group.

There’s lots of member news to interest you this issue which we can all learn from. It’s so encouraging to hear about propagation successes as well as success in the garden. Check out the results of trials comparing hormone treatment with no treatment by the horticultural staff at Cranbourne Botanic Gardens. Seeing the beautiful specimens in some members’ garden will cheer and inspire you. In articles master grafter Tony Henderson will surprise you with the longevity of isopogon and petrophile species in his Sydney garden, and we consider the range of flower colours across these genera plus a new idea for using them in pots.

Turning our attention to attributes common to many members of the *Proteaceae* family, we look at how proteoid roots work, and see what we can learn from the expert Australian growers of proteas and leucadendrons. These South African species are really popular with Australian gardeners and florists and there is no reason why we can’t apply their hard-won expertise to isopogons and petrophiles. Our profiles this issue

focus on two lesser-known WA species, one from north of Perth (*Petrophile megalostegia*) and one from the south (*Isopogon scabriusculus*). Both are attractive smallish shrubs which deserve a place in our gardens.

It's the 250th anniversary of the Endeavour expedition this year and amid events marking the occasion we explore the involvement of isopogons and petrophiles at the dawn of scientific study of the remarkable Australian flora. Another landmark event this year is the 50th anniversary of *Nuytsia*, the WA Herbarium's flagship taxonomic journal. Isopogons have featured in the latest taxonomic achievements being celebrated and in Herbarium publicity and educational material. In fact, one of the 'golden 50' new species described this year includes an isopogon! (*I. nutans*, see our article for more information.)

Last issue we discussed the scale of the summer bushfires in Australia and their potentially disastrous effect on key isopogon and petrophile communities. Information is still being gathered but already ecologists have concluded that the fires caused the most dramatic loss of habitat for threatened species and devastation of ecological communities in postcolonial history. Phil's article presents observations from our Study Group about how well isopogons and petrophiles are recovering as at this stage. We will continue to monitor recovery and it may take many years for I & P populations to recover.

The enormity of the scientific work required to assess fire damage and plan and implement recovery strategies is leading to a greater role for and acknowledgement of citizen scientists like us. And this is now being widely enabled by social media so many more amateurs can participate. Yet it is enthusiasts like us with special interest and knowledge who will have to do much of the legwork. Our role in field observation and learning how best to propagate and grow isopogons and petrophiles is more important than ever. With so much of our special ecological communities and their species under threat, documenting and sharing the conclusions is crucial. Curtin University botanist Kingsley Dixon recently said publicly that some of WA's most vulnerable but unique native plants could be saved by citizen botanists in their own backyards. He meant that we should be planting them in our gardens but for most isopogon and petrophile species we first need to understand how to propagate them and grow them outside their own precarious habitats. There is so little information out there and it's a call to arms we have to heed.

Catriona & Phil

Exchanging cuttings and seed

The following four step process is a way to share cuttings and seed between study group members. We need to expand the species list available by including 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.

Isopogon – anethifolius, anemonifolius (1.5m shrub, 0.3m shrub), buxifolius var buxifolius, 'Coaldale Cracker', cuneatus (shrub and dwarf coastal form), dawsonii, divergens, dubius, formosus, gardneri, gardneri*divergens, latifolius, mnoraifolius, petiolaris, spathulatus, sphaerocephalus, trilobus, 'Stuckeys Hybrid'

Petrophile – pedunculata, pulchella, sessilis, shirleyae

All States apart from Western Australia allow cuttings to be mailed from NSW. If you would like us to send cuttings or seed to you, here are the steps (may vary for seed-only requests):

1. Email us to check that material is currently available (isopetstudygroup@gmail.com).
2. Once availability is confirmed, purchase an **Express Post** satchel from Australia Post (Small \$11.95 or Medium \$15.70), self-address it, put in an envelope and send to:
Isopogon and 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!

From our members

Anthony Meyer, Ngunnawahl, ACT

An update on the cutting material you kindly sent to me. It's been 10 weeks in my greenhouse, but I've only had bottom heat for a month or so, so it's been sub-optimal. Nevertheless I have roots on all but the *I anemonifolius* and *divergens* cuttings, with a couple of losses from the latter. Likewise one loss from the *I gardneri*, but the others of that species are making new growth. Two of the three *I latifolius/cuneatus* grafts [you sent me] are well rooted, the last a bit slower. Of the three *I latifolius* without graft, all but one were lost. I have one remaining *I dawsonii* cutting doing nothing, but alive, and the "Coaldale Crackerjacks" have all struck. I'm delighted!

I have bottom heat in the small greenhouse now on 4 shelves, and I will put in a thermostat as soon as one arrives. Likewise I have been hand misting but have all the parts for a very simple system with a timer and a valve. I've just finished equipping a seed raising bench with five bottom head trays with thermostat, it rather took precedence because of the large numbers of seed punnets I have going at present.

I'm finding semi-retirement a joy, even in these awful times! I am very interested in trying my hand at grafting. Haven't done cutting grafts before, mainly due to my doubts about just getting cuttings to strike reliably. The unions on yours were hard to decipher, looked like side-grafts? They were also very close to the cut end of the stock, which is new to me. Let's face it, it's ALL new to me! I have done some approach grafting with *hakeas*, and I currently have 34 *Hakea eriantha* seedlings destined for attempts at top wedge grafts of a couple of favourite species, *H cucullata* and *ceratophylla*. Really depends on what comes up in the seed trays. I'll allow these to reach a manageable size first. I'm working on getting some stock plants of things I like which are very thin on the ground in the nursery trade, and which I think have potential.

I'd be very grateful for any technical tips, I'm heartened by the success of your cutting grafts too. The ANPS Canberra Prop Group is very vigorous and a few of us are looking at organising a grafting workshop with one of the CIT staff, with whom we share fantastic facilities at the Bruce campus. [In Newsletter 18 I presented a detailed cutting graft method for isopogons. This method works perfectly for other genera such as eremophilas on myoporum insulare or montanum, grevilleas on G. 'Carrington Cross'. We are often in Canberra and can give you a grafting workshop if you are interested.](#) Thanks so much indeed for launching my I & P career and maybe my grafting attempts as well!

Mandy Thomson, Cranbourne BG VIC

Myself and staff at Cranbourne Gardens Nursery have been propagating the following from Special Collections this year. The plants are destined for the Australian Garden, Royal Botanic Gardens Victoria.

Petrophile prostrata - cuttings in Preforma plugs and Perlite Vermiculite 2/1 with no treatment versus Yates powder treatment- plugs have struck more successfully for us this season.

Isopogon villosus – heels into Preforma plugs with no treatment, yielded great results

Petrophile squamata - Semi Hardwood cuttings in Preforma plugs with Yates and no treatment, all tubed successfully

Petrophile fastigiata – Semi hardwood cuttings in Pre forma plugs with Yates powder versus no treatment – you can see from the roots in the photo that Yates does have a positive effect, however 'no treatment' continues to yield results.

Pictured, top right, *P. squamata* and bottom, *P. prostrata* (both no treatment).



Worth noting that from the tubing stage the ‘no treatment’ often grow their canopy on more vigorously as the chemicals in the Yates powder cause the cutting to continue to grow roots instead of canopy for a few weeks longer. Looking forward to hearing everyone’s news and take care.



P. fastigiata cuttings (left, powder treatment, right, no treatment).

Liesbeth Uijtewaal, The Netherlands

I’m still thinking about your observation re difficulty in propagating petrophiles. I don’t think I ever noticed they can be more difficult than Isopogon but then again, I have to admit I haven’t been able to try many species yet. What did prove to be difficult/impossible however was growing e.g. *P. serruriae* on after successfully propagating 7 of 11 cuttings. I didn’t disturb the roots when potting up so I wonder why they all gave up? The other *P*’s I tried from cuttings were successful (*ericifolia*, *fastigiata*, *linearis*, *pedunculata* [pictured right] and *teretifolia*). *P. pulchella* was grown from seed.



For what it’s worth: I propagate my *I*’s and *P*’s in a small commercial propagator (28x38cm) with bottom heat, indoors, under fluorescent light, 12 hrs/day. Cuttings can be kept in a fridge for a couple of weeks prior to propagating. I remove a sliver of bark from the base of the 8 cm cuttings, remove the leaves from the lower half and reduce the size of remaining leaves where appropriate, dip cuttings in Clonex Purple and stick them in well-draining propagating mix, either individually in a 2 cm tube or several together in a 2-3 cm tube. I use a commercial propagating mix with 50% perlite added and some fine grit. I feel the most important factor for success is using the right cutting material i.e. not too soft, not too woody. That’s definitely a matter of experience – and some luck. Cuttings taken from healthy vigorously growing plants will be the most successful ones. And, like I said in the previous newsletter, cuttings taken from the shaded side of the plant can be more successful too.



I recently did eight cutting grafts of *I. cuneatus* on *I. formosus*. Years ago, January 2014, I received cuttings of *I. cuneatus* that sat in the propagator for 6 weeks without any obvious success. I decided to try and graft a piece of these on a cutting grown plant of *I. formosus* and it worked! The cuttings in the propagator failed whereas the combination is still going strong. Later attempts to propagate *I. cuneatus* from cuttings failed again so I recently decided I’d try some cutting grafts, fingers crossed. *I. formosus* strikes fairly readily from cuttings for me and grows well in a pot. Same story with *I. dawsonii* that refused to produce roots: grafted on *I. formosus* it’s a happy 5 years old plant now. (*I. formosus* & *I. dawsonii*, left).

May 2020: These are the two formosus plants (right) I grew from cuttings you sent in December 2015. They'll get a good prune after flowering. Here's *P. fastigiata* (pictured below) in full flower



and my large *I. formosus* (own roots 2011) as well as *I. dawsonii*, from a cutting you sent in 2016, grafted on formosus. Weird again, how you can't grow formosus and I use it as a rootstock! *I. cuneatus* is happily growing on formosus since Feb 2014....the combi needs a larger pot now though so it could be happier. *Your I & Ps are stunning. We are very, very envious of P. fastigiata. It's a great plant. We now have a number of grafted I. formosus plants in the ground all growing beautifully but not to flowering stage yet....* Oh so your fastigiata never flowered as yet? Strange. This species is very special to me since you bought the plant just before you left for Europe and then collected some material off it to give to me. It's highly appreciated. When mine puts on some more growth I'll try and propagate it again to have a back-up. I'm planning to do that with all the I's and P's I only have one plant of. Can't risk losing them..... I've added a pic of my entire plant so at least you get something out of the plant you bought in Sydney. Apparently it is very hard to come by? *Unfortunately our P. fastigiata is long gone. It only lasted a month or so in the ground.*



My *P. sessilis/pulchella* seedling, seed collected in the Little Forest (?) is budding up!!! I never expected it to do so at such an early age (germinated November 2017) so I gave it a good prune one month ago...fortunately one lateral shoot was left and I found a bud on it when potting the plant on a couple of days ago. So exciting. I need to check which species it is exactly, I seem to recall when I collected the seed head we agreed it was pulchella but later on you reckoned it's sessilis instead. It is the tall plant in the front of the second pic, the other ones in the tray are scabriusculus ssp stenophyllus (your garden), ericifolia, fletcheri (your garden) and *P. teretifolia* (Mark and Carolyns garden). *See yours look great. Your P. pulchella/sessilis is definitely P. pulchella.*



August 2020: *Isopogon* 'Candy Cones' produces these funny multiple buds, is that normal? *...the Isopogon 'Candy Cones' is intriguing. Please send some photos when the flowers emerge. This is regarded as one of WA's most touchy performers good at dropping dead early in its life so having it in a pot is obviously the way to go. I have just successfully grafted a couple for the first time. It needs an interstock of I. cuneatus or I. 'Stuckey's Hybrid' just like I. formosus and I. baxteri.* Funny about 'Candy Cones' being a drop dead plant. It's as healthy and vigorous as can be for me and I feel it's more reliable than the other I's and P's but I could be wrong. I grafted a piece onto *I. formosus* (sorry Phil) and it grew well albeit not as compact as the ones on their own roots. I gave it to a friend of mine, not sure what



it's like now. How about the plant in Mark & Carolyn's garden I took the cuttings from? It was so very healthy then. Not sure whether it was grafted. It may have gotten toasted in the fires. *We think it met its maker well before the bushfires, it wasn't grafted.*

Mike Beamish, Boolarra, VIC

Not good news on the Iso-Pet front from Boolarra Victoria. My *I. buxifolius* in a pot did its normal thing of turning red over winter, but instead of greening up with the longer and warmer days of spring, it turned brown. All but 1 of my *P. pulchella* seedlings have died, both in the ground or still in their tubes. Only 1 other unidentified Petrophile seedling is still struggling along, all the others are gone. I suspect the continuously damp and dreary weather all year is the culprit, to October 18 we've had 958mm of rain, fairly evenly spread over all 9 months. The driest month was March, still with 40mm in the gauge. Another possible culprit is fertiliser: I used to use a pinch of native Osmocote when potting up seedlings, with reasonable results, but in the last little while I've been using a pellet or two of Bush Tucker and the results seem to be less positive for some species. I've heard similar reports from other growers, but it could well be a red herring. I've obtained a nice, cutting-grown *I. anethifolius* from a friend, his plant is 2 metres tall and flowering well on a sloping site in the foothills nearby, so I've cut the bottom out of a 60cm tub, placed it on a slightly raised bed, filled it with a 50/50 blend of potting mix and garden soil, added some Bush Tucker and planted it with a Golden Grevillea and 2 Yam Daisies for company. They're all still looking healthy a month later, fingers crossed.....

Marilyn Sprague, Bendigo VIC

I took these photos to send off for the last newsletter and opened my emails to find your newsletter there in front of me!!!! Very sorry. As you can see I have planted my grafted Isopogons, I'll keep you posted on how they go. Hopefully after the devastation of the bushfire vegetation is regenerating around you and you are planting more. I've taken the opportunity generated by Corona to garden and plant. I'll bet you have too. I've also been doing lots of cutting grafts...mainly Verticordia. *Marilyn has an amazing large garden with raised beds and produces cut flowers. She is able to grow many WA species on their own roots despite frost and drought but has also become a seasoned grafter!*



From left: *I. dawsonii*, *P. fastigiata* and *I. formosus*. Top right, *P. biloba*



Grafts, from left: *Isopogon* Candy Cones on *I. dawsonii*; *I. latifolius* & *I. cuneatus*, both on *I. Coaldale Cracker*



Denise Krake, Brogo NSW

Our *I. fletcheri* has bounced back unaided except for pruning out the dead branches that Swampy [wallaby] munched on in the dry period. In a bone dry sloping decomposing granite spot facing Nth. Very tough and resilient. No moisture whatsoever, been in for at least 5 yrs. It is [growing] between *Grevillea synapheae* and *Melaleuca hypericifolia prostrata*. Garden has gone ballistic with weeds. Will need to order 10 cubic metres mulch!!



Paul Kennedy, Elliminyt, VIC

After a rather dry first half of the year the rains in August, September and early October have been quite substantial and our sandy soils are now quite wet.

Isopogon axillaris is about 18 months old and has grown up vertically rather than outwards. It flowered in late August and the pink -white flowers were quite attractive.

Isopogon cuneatus has proved to be quite outstanding and flowers for a long time from July through to mid September. The purple-pink flowers are quite large and tend to be terminal. The plant was pruned back earlier in the year as it tends to become leggy if not pruned. The thick green leaves are also a feature of this plant.

Isopogon formosus is now about six years old and still growing vigorously. We prune a meter off its growth each year to keep it under 1.3 m high, however it does not stop it from putting out over a hundred flowers in October.

Isopogon scabriusculus. A new plant in the ground since autumn and growing well.

Isopogon trilobus. I have two plants both growing slowly. About to flower now.

Isopogon fletcheri. Has flowered last season and I expect it will do the same this year. In a drier position than books indicate in the wild.

Isopogon stuckey's hybrid. This flowers very well but does not put on the growth of other *Isopogons*. In the second year of flowering the flowers appear to be larger and have more pink in them.

Isopogon species WA. Picked up from a nursery, has spatulate like leaves which could be *attenuatus*. Need it to flower to identify.

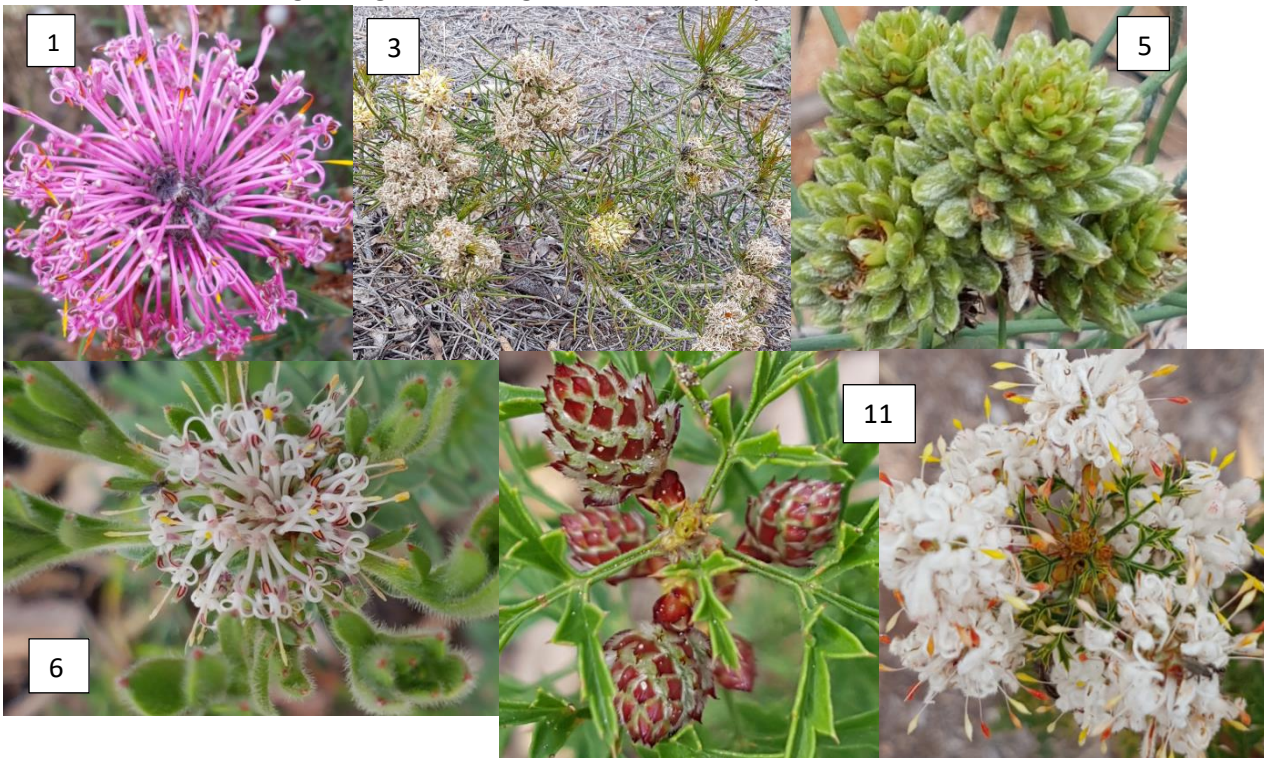
Margaret Pieroni, Denmark WA

... Fortunately, while I was away, there was plenty of rain and I didn't have to worry about plants getting watered. I've had 1,280 ml and it is raining now as I write. I believe that a wet summer is predicted so it bodes well for next year's flowering. I missed the flowering of the *I. divergens* from Frankland and *I. formosus*. At the moment there are lots of *P. diversifolia* in flower, all over the block. It is very fast growing, flowers early and is short-lived but re-seeds prolifically.

Kevin Collins, Mount Barker WA

Our current garden status

1. Coarse-leaved *I. formosus* from clay embankment near Stirlings. Three lovely flowers for first flowering in 150mm pot. Age 2.
2. *I. dubius*. From seed flowered in 70mm pot at age 2.
3. *I. ? X* [probably *P. brevifolia*] Stirlings flowered in ground.
4. *P. rigida* budding up.
5. *P. teretifolia* early buds.
6. *I. buxifolius* (three forms all flowered in pots age 2 now flowering planted out.) Var. *buxifolius*, *lineraris* & *obovatus*.
7. *I. scabriusculus*....went backwards....didn't flower this year but responding to Good Earth fertiliser. Mineral rock & encapsulated microbes. Making new growth.
8. *I. cuneatus* grown from cutting planted out this year. Growing well....yet to flower.
9. *I. formosus* (fine leaved) x3, cutting grown from an Albany nursery, planted out recently going well.
10. *P. squamata* cutting grown & planted out recently finished flowering.
11. *P. diversifolia* several cutting grown planted out, flowering & setting seed.
12. *P. diversifolia X serruriae* flowered again in 200mm pot in nursery & set seed.
13. *I. attenuatus* & *polycephalus* cuttings died after planting out. Further *attenuatus* have developed roots in coir plugs.
14. *I. trilobus*. Cutting grown, several planted out and just budding up. *I. trilobus* (dwarf coastal form with very shallow scalloped lobes) reticent to strike roots.
15. *I. latifolius* long established flowered well again this season.
16. *I. anemonifolius* currently flowering (Purchased).
17. *P. filifolia* died after growing & flowering well for around 8 years.



Barbara Pye, Melton BG

Can you help me with an id for this petrophile? All I know is that I got it as an unknown petrophile from WA from Phil Vaughan some years ago. It is very low growing - almost prostrate in our garden. It is growing in an almost impossibly rocky basalt site where nothing else wants to grow. The young growth is pubescent and only the tips are rigid and somewhat prickly. I have attached a photo showing flowers and the foliage which is sometimes forked at the tip. Hoping you can help as I want to propagate it for the Melton Botanic Garden. *What a great plant! We think it is P. squamata, and a beautiful low form at that. That would be a great addition for Melton BG if you can propagate it.*



Our garden is in Bullengarook in Victoria at an altitude of 500 metres so everything is a bit slower to come into flower here. We have quite a few Isopogons and Petrophiles which do really well unless we get a lot of summer rain which has killed a lot of WA species in the past. Our soil is rocky basalt derived and normally well drained. I have attached a couple of photos which may be of interest. The first is a Petrophile between 5 and 10 years old. It is about 0.5 m high and about 1 m wide and flowers profusely every year. Unfortunately I do not know the species. The second photo is of a young plant given to me last year as Isopogon mnoraifolius. I can't find anything about this species except for the Encyclopedia of Australian Plants which does not include a photo. Is this name current? *The first photo is Petrophile fastigiata. This is such a great plant, you are very lucky to be growing it so successfully. It comes from the Fitzgerald River National Park around Ravensthorpe WA. The second photo is an interesting one. It could be Isopogon petiolaris or Isopogon 'Coaldale Cracker'. If it was labelled as Isopogon mnoraifolius then it's likely it came from the same north coast nursery as all the other Coaldale Crackers so probably is one of them. You'll be able to tell if it grows up to about 1m or taller. You could always check the leaves against the description we included in NL25 Nov 2019. Another great plant!*



Martin Martini, Goonengerry NSW

I am a gardener in Goonengerry/northern NSW and interested in isopogons - when I moved here to my girlfriends place 5 years back I was taken aback when I saw what I believe to be anemonifolius - there was also something different growing wild up in the hills here I have managed to propagate. But basically I am at the beginning - every time I find a banksia I like I grow it from seed etc. But am getting in touch as I am trying to build my knowledge and collection. The purple ones from WA and the ones down south are beautiful but can't imagine it's possible get them going here. Please share with me your knowledge. And if it's possible for you to send any cuttings that would be amazing. *If you would like some cutting material please follow the procedure outlined in the newsletter [See [Exchanging cuttings and seed](#) above.] Species we would recommend highly include I. anemonifolius (dwarf), I. 'Coaldale Cracker', I. dawsonii, and I. mnoraifolius.*

...Had a quick breeze through last years newsletter this morning. Very interested in petros also now. Wondering where you think I should start. I have what I believe to have three separate isopogons in the garden now. One I grabbed from a cutting I saw up in the mountains just out of Mullumbimby and two others with yellow flowers. Would love to get more mothers in the garden to then try propagation with.

See photos of three different isos. The first one was already here in the garden when I arrived. The second I found in Koonyun range. The third I bought the other day with no label. *The first photo is I. anemonifolius which looks very healthy. The second one from Koonyun Range looks to be Petrophile canescens, a very similar looking species to P. pulchella. Both may grow in this area. It also looks very healthy. Did you grow this from cuttings or seed? The third plant seems very yellow indicating that it needs a feed of native fertiliser. It can be tricky without flowers or fruit, but we think it is Petrophile pulchella.*



Walter Stanish

Dilettante Sydneysider who grew up next to the bush, but spent much of life overseas forgetting Latin and learning Chinese. Recently began a COVID-induced return after an interesting career, much in botanical hotspots (notably Yunnan), most recently as a robotics entrepreneur. Curious to learn more about native flora of all kinds, and Isopogons/Petrophiles are clearly hot tips! Apologies I am not formally trained in botany, but what I lack in knowledge I make up for in curiosity, enthusiasm and persistence!"

[I would like to get into propagation...] just as soon as I get a spare moment and my gross garden arboriculture and building renovations are complete: I am afraid they will damage seedlings. I have taken to horticulture like a child to fairy floss but unfortunately already have a few trays of cuttings out and fear that adding more is untenable right now. All in good time...



Attached are photographs which would be interesting to ID, taken in Ku-ring-gai Chase National Park. Current running guess (not mine) is Isopogon anethifolius. (photo, right)



Here's one I am totally stuck on (photo, left). Smarter minds than me say it may be in one of the domains of group interest. Found in a wet area on the upper Elvina track at Ku-ring-gai Chase National Park. Certainly beautiful. *Eds: ...there are only two possibilities - Isopogon anethifolius or Petrophile pulchella. Both grow in similar habitat and have similar leaf structures. Our guess would be I. anethifolius.* ...No idea about that red fellow, I have received an outside opinion maybe its some sort of protea. Such an amazing hue! [According to the] Botanical Information Service, National Herbarium of New South Wales: *"Our suggestion is a seedling of Petrophile pulchella, in full sun, maybe a bit water stressed."* *Could still be I. anethifolius which we said was the only other*

possibility apart from *Petrophile pulchella*. The red colour is common in cold weather and in new growth. It will go green later on. If you check out the area again look for any plants with flowers or cones. *I. anethifolius* should be starting to flower now whereas *P. pulchella* won't flower until late Summer. I received a tip from a grizzled veteran on an ANPS walk recently that one of the trails there is the best place in the entire northern Sydney region for wildflowers and the peak time is in about a week or two. I will be checking that one out and anticipate some images coming your way!

250 years of botanical study

Catriona Bate

We all know that banksias were among the first plants found by Banks and Solander when they arrived on the Endeavour at Botany Bay in 1770, but few of us realise that they also spotted isopogons and petrophiles. They visited in April, not the best flowering time of the year. However, some isopogon and petrophile plants can still be in flower then. This may have made them stand out amongst the cornucopia of flora which so excited the botanists. The illustrations of collected specimens which exist do actually show a flower on each of the two isopogon species.

Over eight days, Banks and Solander visited a variety of habitats around the bay, to the north, south and east. Although most specimens were simply labelled Botany Bay, they appear to have collected widely and not just near the landing site at Kurnell. According to Benson (2020), they collected and processed methodically, collecting sufficient material for duplicates, changing drying and pressing papers continually. Solander kept track in the field with labels and back on board used the specimens to prepare preliminary Latin descriptions while artist Sydney Parkinson prepared preliminary sketches with natural colours (or annotated with colour chart symbols). These are the first scientific observations on the flora of eastern Australia.

In 1772, plant collections and drawings made by Banks' party created great interest among scientists and gardeners. Novelty and rarity made these new plants highly sought after and a sign of status. Seed was given to Kew and the Chelsea Physic Gardens and some also went to nurserymen and keen amateurs. After such a long voyage some of the seed proved to be non-viable and plants raised from viable seed were considered tender and would be grown in greenhouses. In 1775 a London nursery became the first to offer Australian plants for sale although isopogons and petrophiles are not recorded among them. Yet, fewer than 1% of the species of Australian plants and seeds taken back to England aboard the Endeavour were ever grown. It wasn't until the First Fleet arrived to establish the new colony of New South Wales that further plant material was sent back to England in the form of seed, including *Isopogon anemonifolius*, by Port Jackson settlers.

You would assume the Endeavour expedition laid the foundation for all subsequent scientific work on Australia's flora. However, the specimens collected by Banks and Solander in 1770 did not play a major role in the subsequent systematic description of the Australian flora, and do not include the large number of taxonomic type specimens that might be expected for a major scientific expedition into new territory. The collections were looked after initially by Solander, then the botanist-librarian Jonas Dryander and finally botanist Robert Brown. After inheriting the collection on Banks' death in 1820, Brown transferred the collections to the British Museum.

In the meantime Sydney plants were being described by other botanists using specimens and plants grown from seed sent back by the First Fleet, or Spanish and French expeditions. In the 1790s, later material was used by English botanists Salisbury and Knight (*Isopogon anemonifolius* and *Isopogon anethifolius*) and German botanists Schrader & Wendland (*Petrophile pulchella*) to formally describe the first species of what became the *Isopogon* and *Petrophile* genera.

Banks' plans for formal publication using the immense amount of material he and Solander collected on the Endeavour expedition ultimately came to nothing. Descriptive tickets were arranged in systematic order and transcribed. Large amounts were spent on artwork including watercolours and engravings involving five artists and 18 engravers. As time passed however, the importance of this project was overtaken by other collectors, later collections and publications. A number of factors are thought to have contributed to the failure of the work to be completed, including Solander's early death in 1782, Banks' duties as President of the Royal Society and his involvement with the King's Garden at Kew, and economic recession and wars with France. The first complete full-colour edition of Banks' Florilegium was published between 1980 and 1990, over 200 years later.

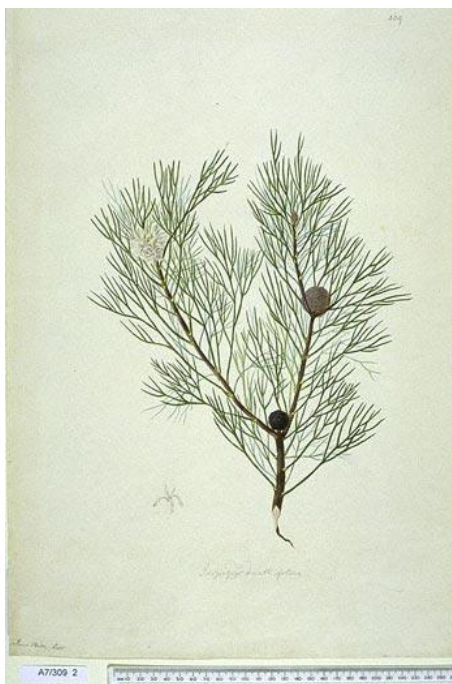
Possibly Banks' most important botanical contribution was to send out a series of naturalists and horticulturalists to the new colony near Botany Bay. Among these was Robert Brown, who amassed a vast collection of Australian specimens. Brown's descriptions, based mainly upon his own field observations and specimens, provided the first systematic account of the Australian flora. He formally described both *Isopogon* and *Petrophile* genera in 1810. Botany Bay 1770 collections did provide the type specimen for the iconic genus *Banksia* (*Banksia serrata*), described not by Solander but by the younger Linnaeus in 1781 in honour of Banks. German botanist Joseph Gaertner's visit to Banks in 1778 led to the material, or the illustrations based on it, being cited as types for a number of species (e.g. *corymbia*, *leptospermum*, *melaleuca* and *syzygium* species).

So what happened to the *isopogon* and *petrophile* specimens from 1770? The Banks and Solander collection is held in the British Museum (now the Natural History Museum London), but in the late 19th century some duplicate material was donated to other institutions including the National Herbarium of NSW. However it was not until 2007 that a definitive list of species either collected or noted by Banks and Solander at Botany Bay in 1770 was compiled. By this time the NSW Herbarium material had been reorganised so it could be readily identified. Benson & Eldershaw's comprehensive list combined NSW Herbarium records with two different lists of British Museum specimens and references to plants in Banks' and Cook's journals. The grand total was 132 different species including *Isopogon anemonifolius*, *Isopogon anethifolius* and *Petrophile pulchella*. The record source for *I. anemonifolius* and *I. anethifolius* is both British Museum lists and the source for *P. pulchella* is the National Herbarium of NSW.

You can find some illustrations made from the 1770 Botany Bay specimens online on the [Natural History Museum website](#). Here you can see the finished drawing and a coloured engraving (by William Tringham) of *Isopogon anemonifolius* (anemonifolius) – the spelling used reminds us that this species was named for its



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resemblance to the anemone plant. There is also a finished drawing (by James Miller) and coloured engraving (by William Smith) of *Isopogon anethifolius*. The flower included on the latter is white not cream/yellow, showing the perils of 18th Century botany which relied on dried specimens. These illustrations hardly do these species justice, so perhaps it is just as well that they were not widely accessible.

Left, engraving of *Isopogon anemonifolius*. Middle, drawing of *Isopogon anethifolius*. Natural History Museum, London.

Isopogons and petrophiles were of course already known to the locals in Botany Bay, who must have wondered and worried what the strange European men were doing among the bushes. Except for the actual landing place which is now unrecognisable, some of the surviving areas of heath and other vegetation types in Kamay Botany Bay National Park remain much as Banks and Solander saw them. Despite suburban encroachment which has contributed to the spread of exotic weed species and fragmentation of the bush, you can still find the descendants of the plants they observed, including *Isopogon anemonifolius*, *Isopogon anethifolius* and *Petrophile pulchella*.

Benson, D. & Eldershaw, G. (2007) Backdrop to encounter: the 1770 landscape of Botany Bay, the plants collected by Banks and Solander and rehabilitation of natural vegetation at Kurnell. *Cunninghamia* 10 (1): 113-137.

Benson, Doug. (2020) Joseph Banks and Daniel Solander at Botany Bay: How serious was the science in 1770; where did they actually go? *Australian Plants* Vol 30 No 243, pp. 258-273

Halliwell, B. (2003) Some Australian plants in cultivation in England by 1800. *Australian Plants Online*
<http://anpsa.org.au/APOL29/mar03-4.html>

McAlister, E.J. (1997) Hidden Treasures...A Personal View. A.J. Swaby Memorial Address. *Australian Plants Online*.
<http://anpsa.org.au/APOL15/sep99-5.html>

In touch with their (proteoid) roots

Gregory Moore, Doctor of Botany, University of Melbourne

Proteoid roots are a special type of root possessed by members of the protea family. They are perhaps one of the more important, but less obvious, attributes. The roots form a dense, branched cluster, a bit like the head of a toothbrush, that can be 2-5cm across. They greatly increase the absorbing surface area of the roots, as each root possesses thousands of very fine root hairs.

Proteoid roots can be very handy in sandy and other poor soils, where water drains quickly and nutrients are scarce. These roots, also described as cluster roots, are often visible in a garden bed just at the interface of the soil with the humus or mulch layer above it. They're very light brown, almost white, in colour.

Such plants also have the ability to take in nitrogen and enrich the soil, which can be very handy in soils low in nitrogen. It's like a natural living and decorative fertiliser.

Proteoid roots are unfortunately very well suited to the presence of *Phytophthora cinnamomi* (the cinnamon fungus). It causes dieback in many native plant species, but can be particularly virulent for [some species]. But [other species] are more resistant to the fungus. Promising experiments have been done on grafting susceptible species onto the roots of [more resistant species] to improve their rates of survival. This could be important, as [proteaceae] have a role in bushfire regeneration in many parts of Australia, so the occurrence of the fungus can compromise fire recovery.

This text is taken from an article on *Banksia integrifolia* which appeared in *The Conversation* on June 12, 2020. <https://theconversation.com/the-coastal-banksia-has-its-roots-in-ancient-gondwana-138434>



Cluster roots in *Isopogon formosus*. Photo: Liesbeth Uijtewaal, March 2017. You can see why Angus Stewart describes proteoid roots as being like fine balls of cotton.

What we can learn from protea & leucadendron growers

Catriona Bate

Did anyone catch ***Gardening Australia*** on 19 June? The story on how to grow South African proteas and leucadendrons caught our attention, as isopogons and petrophiles are closely related to this genus in evolutionary terms, part of the Gondwanan link.

And there are similarities. These genera all have symmetrical, cone-shaped heads of tubular flowers and leathery leaves. Isopogons are often referred to as mini-proteas or described as protea-like. Leucadendrons are called conebushes, petrophiles are called conesticks, conebushes, and cone-flowers, and certain isopogons are called cone-flowers (although the genus is generally called drumsticks because of its rounded seed heads). However, isopogons and petrophiles lack the prominent bracts (a modified or specialized leaf) which present such a spectacular effect around flower heads in the South African species.

A little-known fact is that isopogons and petrophiles are more closely related to South African proteas and leucadendrons than they are to familiar Aussie proteaceae like banksias and grevilleas. They belong to the same *Proteoideae* subfamily of *Proteaceae* whereas banksias etc. are grouped in a different subfamily, *Grevilleoideae*. And, isopogons are now considered to be more closely related to *Leucadendron* and *Leucospermum* (all grouped in tribe *Leucadendreae*) than to *Petrophile* (tribe *Petrophileae*).

Over the years ***Gardening Australia*** has talked to commercial protea growers and experts and it has aired many tips on growing proteas and leucadendrons, both widely grown in Australia. This cultivation advice should apply to Australian isopogons and petrophiles – particularly isopogons – given their close relationship. And in our experience, it generally does!

Here is a synopsis of the tips from different episodes of Gardening Australia we think are useful for growing isopogons and petrophiles, particularly WA species.

They love an open, sunny position. They do well in poor soils, they don't mind salty, coastal areas and they are drought tolerant. If you are north of Brisbane it will be difficult. But they'll do really well anywhere else, as long as it's not too frosty. *Note: humidity is often cited as a problem but it is really summer rain and the resultant wet, warm soils that causes WA species in particular to fail.*

Good drainage The key to growing plants from the *Proteaceae* family is the soil conditions. They prefer free-draining soil. They need very good drainage because they can be prone to root rot. It's critical that plants don't have wet feet, because sitting in soggy, wet ground will mean instant death. If your soil's not naturally well-drained, you can create those conditions by growing the plants on a slope, or creating a mounded or raised bed. Try planting on a mound, about 30 centimetres high, so any water drains away.

Planting When planting tickle the roots, but not too much because they don't like root disturbance. Don't fertilise when planting. Add a good bucket of water, but after that these plants are drought tolerant, so don't water them too much. Commercial growers irrigate for the first three years and then they are left to themselves.

Fertilising A really important point is nutrition. Most of these plants have evolved on very poor soils which are particularly low in phosphorus. To cope with this, many members of the *Proteaceae* have evolved a special type of root system called 'proteoid roots.' The roots are able to very efficiently absorb nutrients, especially phosphorus. Adding even normal levels of phosphorus as fertiliser can be far too much because they're so good at taking it up. So, to grow *Proteaceae* plants, always use a low phosphorus fertiliser.

Mulching is important, but don't put it too close to the main stem because the plants are prone to collar rot. The mulch suppresses weed growth which is important because *Proteaceae* don't like it when weeds are pulled out near the surface roots.

Pruning When establishing a plant, pruning is a marvellous idea. Pruning creates a compact, bushy form.

- Begin pruning in the first year of planting when the terminals of the new growth are pinched out. This should be repeated in the second year.

- It's important to prune the main flowering stems every year, otherwise the bush can get leggy. Pruning this way you'll get a lot of new growth which will give you heaps of flowers the following year. From every cut there'll be three or four new stems which will give a good display in twelve months' time. *Note: this mainly applies to fast-growing species like *I. cuneatus* and *I. anethifolius*.*
- The best time to prune is during – or immediately after – flowering. It can be hard to cut off beautiful flowers, but pruning is a must!
 - This is best done by cutting flowers for indoors (flower harvesting). The time to prune flows perfectly with the flowering season so you can kill two birds with one stone – keep your plants compact as well as have a beautiful bunch of flowers.
- Don't put off pruning too long after flowering, as you'll be cutting off next year's flowers which form very quickly after the flowering season. Plus, if you don't prune them at the right time the flower heads will dry on the plant and can look rather unattractive. If you still wish to prune very late, don't cut every single stem on the bush so as to have at least some flowers in the next year. If you've let yours go a bit, simply carry out a bit of 'renovation pruning' to get it back into shape.
- Cut stems as if to put them in a vase. Prune back to new growth for a neat, compact bush. Go down the stem of flowers and cut where there are nice green leaves. Or using your secateur handle as a guide, measure one handle length above last years' growth point and make the cut here.
- As soon as they finish flowering give the plants an all over trim to maintenance prune them.

Cut flowers They make sensational cut flowers. They'll last a good two to three weeks in a vase. Simply cut 20-30cm below the flowers (depending on stem length), strip off the bottom leaves so they don't rot in the water, and they're ready for the vase.

Pests and disease Generally pest free but you do need to watch out for scale insect which can be fairly easily controlled with white oil. As far as diseases go, apart from root rot, plants can be prone to leaf-spotting fungi, particularly in more humid climates. If you see evidence of damage remove the affected leaves and dispose of them appropriately.

Pots If you don't have room for a large plant, or well-drained conditions, consider growing in pots. They can grow very well using native plant potting mix. Pot them on once a year. Spring is a good time to do this, pruning at the same time. Low or dwarf forms (e.g. cultivars like 'Little Drumsticks') can work well in pots for courtyard and balcony gardens.

There are a few general observations which emerge from this survey of Gardening Australia's protea and leucadendron content. One is that the expert growers tend to be in South Australia and Victoria, reflecting similar latitudes to South Africa as well as climate parallels, and nutrient-poor, acidic soils. This is also the case with growers of Australia's spectacular WA genera whose success is assisted by sandy, well-draining soils, and a summer-dry/winter-wet Mediterranean climate.

A recurring theme is the extent to which Australians love these South African genera, particularly their long straight stems, pops of colour, dramatic flower impact and beautiful buds. They are considered hardy, long-flowering (up to six months a year) and able to flower in the cooler months. So beloved are they that they have been adopted in terms of being regularly described as 'natives' and are often preferred over actual Australian natives. Also, the number and variety of cultivars is huge, reflecting many years of breeding. The best and toughest forms have been carefully selected. This has resulted in wide availability of these genera (and other similar South African genera such as serrurias and leucospermums) as well as wide choice. There is a cultivar to suit every situation. This is what we are missing in the world of isopogons and petrophiles.

Pruning is an area where we can all do more work. It might be worth experimenting, especially with fast-growing species such as *I. anethifolius* and *I. cuneatus*. It would be interesting to see whether these methods work just as well with petrophiles such as *P. pulchella* and with species like *P. biloba* which bear their flower heads along the stem in leaf axils.

It's a myth that all proteas and leucadendrons are easy to grow and all isopogons and petrophiles are difficult. In our experience it is common for gardeners of all stripes to grow proteas and leucadendrons but they wouldn't dream of trying to grow an isopogon or a petrophile. Not even native plant lovers tend to grow isopogons and petrophiles! This is what we need to change.

Celebrating recent progress on taxonomy

A new species, new subspecies, one new name, and clarification of synonymy

Catriona Bate

We are pleased to note recent achievements in *Isopogon*, with WA botanists formally resolving longstanding taxonomical tangles. They have followed a trail across a number of taxa including *Isopogon sphaerocephalus*, *Isopogon teretifolius* and *Isopogon drummondii*. The outcomes are one new species, one new subspecies, one new name, and much clarification of synonymy (different names for the same thing). Two of the taxa involved are conservation-listed. For details, see our articles in this and coming newsletters.

This is welcome progress on a botanical backlog in *Isopogon*, Foreman's 1995 revision of the genus having left many unresolved issues. In following years some of these began to be addressed but progress was slow. We have taxonomists Barbara Rye, Michael Hislop and Terry Macfarlane to thank for sorting out this particular web of conundrums – misapplications, illegitimate names, informal names, synonyms, mislabelling and confusion. Rye and Hislop published answers to a part of the puzzle in 2017 but two recent papers bring all the related issues to a conclusion. Rye and Hislop have also led the way on 21st Century *Petrophile* taxonomy.

Such a taxonomic backlog is not unique to *Isopogon*, although the delay for better-known or iconic species such as banksia or grevillea is significantly less. However, the backlog across all WA genera is substantial. Exceptional diversity in Western Australia makes it a huge task to document all of the plants—a challenge exacerbated by factors like the State's extensive spatial scale, the regular discovery of novel species, herbarium collection gaps (including the relative dearth of historic type material), and a relatively small number of taxonomists working on the flora compared to the magnitude of the task. Fifty years of collective taxonomic effort and downstream conservation benefits has not been enough to significantly reduce the number of undescribed (informally-named) vascular plant taxa recognised on Western Australia's vascular plant census. Despite sustained research, the number has remained at over a thousand over the last 15 years.

Further, while targeted efforts to reduce the number of undescribed Threatened (Critically Endangered, Endangered or Vulnerable) taxa have been successful, the total number of undescribed, conservation-listed taxa has increased. This reflects the high rate of species discovery in Western Australia, and the fact that newly discovered taxa are more likely to be uncommon and 'Data Deficient' (Priority One to Priority Three under Conservation Codes for Western Australian Flora). The enormous challenge is only heightened by the escalating impacts of a broad range of threatening processes. Population growth, development, mining, and climate change are ones that come immediately to mind.

The fresh achievements in *Isopogon* are dwarfed by a larger taxonomy effort which has recently tackled the overall backlog. The wider context is golden anniversary celebrations for 50 years of the Western Australian Herbarium's flagship taxonomic journal *Nuytsia* in 2020. At the centre of festivities is a special jubilee project to publish 50 new Western Australian species from 50 genera in a 2020 golden anniversary edition of *Nuytsia* (pictured, right). The 50 species are found in a range of habitats – from the Kimberley to the south coast, including the Perth region and some of the State's most iconic National Parks – and are being gradually published each week.



To find 50 suitable candidates, the Herbarium turned to its backlog and considered:

- 'known unknowns', i.e. the list of >1,150 putative new species recognised on *FloraBase* under informal phrase names

- taxa available for study by Herbarium staff and able to be progressed to publication within a short time frame, with limited budget, and in parallel with other research commitments
- rare, threatened or poorly known species to maximise conservation outcomes
- species with noteworthy stories of discovery for a broader science communication strategy to entertain, educate and inspire our audience

It is a coup for us to have a new isopogon make it into the ‘golden 50’. One of the thousand-plus known-unknowns was *Isopogon* sp. Newdegate, or as is now current, *Isopogon nutans*. It was certainly a suitable candidate – ready to be published in a short time frame despite having languished in the Herbarium archives for six decades. See our article on this new species [below](#).

However it should be noted that there are still isopogons and petrophiles regarded as ‘known unknowns’, and of course, gaps that are known as well as those not yet known. There are several putative new species with current phrase names with longstanding listings remaining on *FloraBase* (the WA plant census). They are: *Isopogon* sp. Canning Reservoir, *Isopogon* sp. Darling Range, *Isopogon* sp. Fitzgerald River, *Isopogon* sp. Ravensthorpe and *Petrophile squamata* subsp. northern. There are other species or species groups known to require further research, such as *I. buxifolius*, *I. longifolius* and *I. attenuatus*. While only one petrophile is included in this list, other areas flagged as needing closer attention include variants of *P. crispata*, *P. seminuda*, *P. brevifolia* and *P. serruriae*.

On top of this, there are twenty taxa needing more work before they can be moved up from priority status (1, 2 or 3) to threatened, endangered or vulnerable e.g. *Isopogon* sp. Canning Reservoir (Priority 1), a ‘known unknown’. The Herbarium is correct in linking taxonomy to downstream conservation benefits. Providing scientific names and descriptions stimulates surveys and herbarium vouchering and could lead to the discovery of new populations. And comprehensive research enables, informs and directs conservation efforts.

Wege, J. A. & Shepherd, K. A. (2020). 50 years of botanical discovery: a golden anniversary edition of *Nuytsia*, the journal of the Western Australian Herbarium. *Nuytsia* 31: 1-7.

Wege, J. A. & Shepherd, K. A. (2020). A golden year for *Nuytsia*, the journal of the Western Australian Herbarium. *Research Matters Newsletter of the Australian Flora Foundation* No. 32, July 2020.

Celebrating online

In its golden anniversary year the WA Herbarium is using social media to promote the importance of taxonomy and herbaria and showcase Western Australia’s remarkable flora to a wide audience. The ‘golden 50’ new species are being showcased through the year as they are published, with *Isopogon nutans* as number 17 on 5 May 2020. Describing it as a newly described and striking species, the Herbarium Facebook post briefly discusses a discovery story sixty years in the making. See

<https://www.facebook.com/WesternAustralianHerbarium/posts/3087949474582236>

In August another isopogon featured as part of celebrations under the banner of National Science Week, highlighting some great botanical discoveries. On 15 August, *Isopogon panduratus* subsp. *palustris* was featured:

On this day in 2008, the type specimen of Isopogon panduratus subsp. palustris (Proteaceae) was collected [PERTH 07978057]. This charismatic subspecies has a Priority 3 conservation status in Western Australia, meaning that while it is not under imminent threat it is poorly-known and requires further survey. Currently, the Western Australian Herbarium has 28 specimens all gathered from a small region south of Cervantes, with the most recent collection having been made in August 2016. Western Australia has 981 Priority 3-listed plant taxa – all needing further scientific study.

<https://www.facebook.com/WesternAustralianHerbarium/posts/3365070406870140>

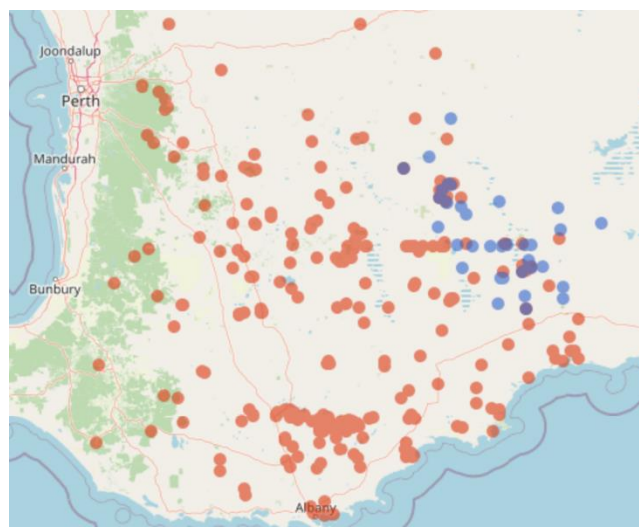
By showing the herbarium specimen (see below, top left) this post draws attention to the behind-the-scenes efforts of taxonomists and the staff who care for, curate, share and preserve precious botanical specimens and their associated data. But it does obscure the real-life attractions of this interesting species! We have added some photos from the field for you to enjoy.



Nutans gets the nod

A new isopogon was officially unveiled as *Isopogon nutans* by the Western Australian Herbarium in May 2020. By no means a new discovery, this species with nodding or pendulous flower heads has been in the WA Herbarium archives waiting for its taxonomy to be officially established for sixty years. Many Study Group members are already familiar with this species having seen it in flower in spring around Newdegate or Lake King.

The choice of name is highly appropriate, *nutans* meaning nodding or facing downwards in Latin. However this is not the only isopogon with nodding flower heads. The species we know for its hanging flower heads, *I. teretifolius*, was one of the earliest to be described and has the common name Nodding Coneflower. Robert Brown, who collected it in 1801, named it for its terete leaves. At that time he would have had no idea that such needle-like leaves would turn out to be a common characteristic of the genus. *I. teretifolius* usually has large, pale yellow nodding flower heads but can be pale pink. It can easily be found in the Albany area west to Fitzgerald National Park spreading north as far as Eneabba. *I. nutans*, on the other hand, has a narrower distribution centred on the Mallee bioregion where it is reasonably widespread. It can be found from north of Hyden southeast to near Ravensthorpe.



Distribution of *I. teretifolius* (in orange) and *I. nutans* (in blue).



Isopogon nutans is a highly attractive species with bright pink smooth flowers, each with a distinctive tuft of hairs at the end. Its smooth, undivided, needle-like leaves are up to 10cm long and held erect. Its common name Simple-leaved Coneflower points to the key difference from its fellow nodding isopogon, *I. teretifolius*, which has deeply divided leaves (it also has hairy flowers). Very few *Isopogon* species have consistently simple or undivided leaves (the best known is the rare eastern species *I. fletcheri*).

Why did it take so long to describe? It's the usual story of too much work and not enough resources, a perennial problem in a region as botanically rich as WA. As the Herbarium explained on Facebook, a lag between the discovery of a species and its formal publication is not uncommon. Delays can be caused by a need for additional collections and data. For example, of 50 species being published for *Nuytsia's* golden anniversary this year, a third (17) have had a lag of more than 50 years. However, there will be few to beat *I. nutans'*

record of 60 years. With a scholarly witticism the Herbarium does concede that 'scientific reason, like Homer (and *Isopogon nutans*), sometimes nods'. This refers to a proverb based on a historical incident that means even the best person sometimes lets something slip by.

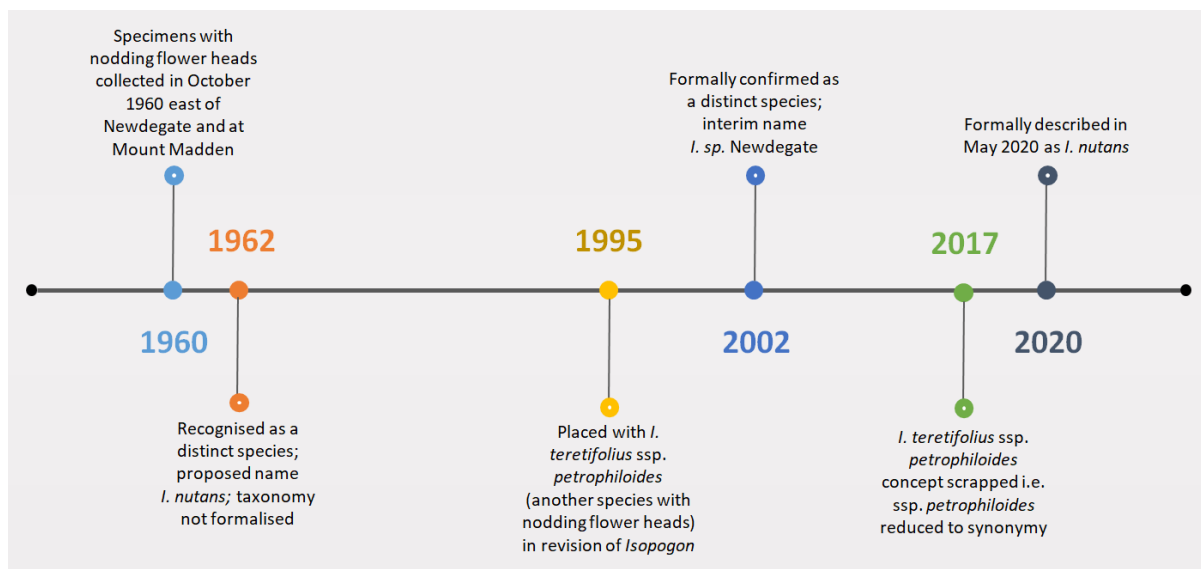
It was a promising start way back in 1960. The very first collections of *I. nutans* were deposited in the Herbarium around the same time that year by two botanical legends. Alex George was at the beginning of his long botanical career having only just joined the Herbarium. In contrast Charles Gardner had just retired after over thirty years as government botanist. Gardner worked on the new specimens, recognising a distinct, new species and proposing the name *I. nutans*. However he never wrote up his findings, and in fact, muddied the waters by later adding a different name, *I. cernuus* (meaning bowed forward, face down, or head foremost in Latin) to the specimen he had already labelled as *I. nutans*.

Gardner, a perfectionist, had closely studied the whole *Proteaceae* family for his proposed second volume of *Flora of Western Australia*. However, according to the Australian Dictionary of Biography, most of his knowledge died with him in 1970. Therefore his legacy rests now on his huge collection of plant specimens. Among these was *I. nutans* but over the years Gardner collected many other *Isopogon* specimens now in the Herbarium collection. His name still regularly appears as the collector of specimens used for key taxonomic outcomes. One species he originally collected was later given the name *I. gardneri* in his honour.

The next botanist to tackle *I. nutans* was Don Foreman, a proteaceae expert who had previously concentrated on other genera, in the 1980s and 1990s. A revision of the entire genus was long overdue and Foreman's treatment was published in 1995 in Vol. 16 of *Flora of Australia*. However, Foreman placed what is now *I. nutans* within a broad concept of *I. teretifolius* subsp. *petrophiloides* (a simple-leaved variant of *I. teretifolius*). It has since been acknowledged that Foreman's *Isopogon* work had limitations and that his analysis was curtailed by ill health.

In the decades since the 1995 revision, among several botanists involved Barbara Rye and Michael Hislop have tended to take a lead on *Isopogon* taxonomy. *I. nutans* claimed their attention early, but progress has turned out to be in several gradual steps. They soon reversed Foreman's treatment, confirming this species' distinctness as Gardner had done. In 2002 they gave it an interim phrase name of *I. sp* Newdegate reflecting the location it was found by Alex George. In due course this is how it was listed on *FloraBase*, the WA Herbarium's authoritative online database of the flora of Western Australia.

Later research on *I. teretifolius* allowed Rye and Hislop to resolve the taxonomy of a form of that species with undivided (simple) leaves similar to *I. sp* Newdegate (*I. teretifolius* subsp. *petrophiloides*) – concluding in 2017 that it was insufficiently distinctive to remain a subspecies and should simply be treated as a rare form of *I. teretifolius*. This cleared the way for *I. sp* Newdegate to finally be officially described as a new species, Rye and Hislop reverting to Gardner's original name of *I. nutans*.



Isopogon nutans is not considered to be currently threatened as several populations occur in nature reserves. Although many growers of spectacular WA species have admired this species in the wild, it is not known in cultivation at all. However the allure of the new with the announcement of a new species may help to change this. The species is not so common or widespread that it could not easily become threatened by future development and climate change. But the main reason to grow this species is its attractiveness and suitability as an ornamental for the garden.

Plants grow up to 1.5 high. Numerous flower heads are relatively large and prominently displayed in leaf axils, the leaves being held clear above flower heads. Like other popular pink flowering species, its deep pink colour would be highly sought after. The leaves are not prickly. So far, propagation is looking promising. This new species has recently been grafted successfully and young plants are growing well in the ground. Further propagation trials are needed with cuttings or seed. While we can assume its growing requirements are similar to other southeast WA species, trials are required to ascertain its performance in cultivation.

Rye, B. L. & Hislop, M. (2020). Sixty years in the making: *Isopogon nutans* (Proteaceae), a new species with pendulous flower heads. *Nuytsia* 31: 95-99. <https://florabase.dpaw.wa.gov.au/science/nuytsia/953.pdf>

Rye, B. L. & Hislop, M. (2017). Two new synonyms in Western Australian Proteaceae: *Isopogon heterophyllus* and *I. teretifolius* subsp. *petrophiloides*. *Nuytsia* 28: 169–172.

Marchant, N. G. (1996). Gardner, Charles Austin (1896–1970) *Australian Dictionary of Biography* 17/50 — Simple-leaved Coneflower | *Isopogon nutans* <https://www.facebook.com/WesternAustralianHerbarium/posts/3087949474582236>

Grafting update

Phil Trickett with input from Tony Henderson

Isopogons

I continue to use I. 'Coaldale Cracker' as rootstock for cuttings grafts of isopogons and the results are proving totally reliable in our garden. The toughness of this stock was demonstrated when we recently visited John and Barbara Nevin's garden in Armidale. While their garden was devastated by the recent drought, a number of Coaldale Crackers survived in great shape. Severe frosts over many years at the Nevin garden have troubled many plants but not Coaldale Cracker!

A number of new species from our last trip to WA have been successfully grafted onto Coaldale Cracker and are now in our garden. These include *I. tridens*, *I. inconspicuus*, *I. linearis* (with an interstock of *I. cuneatus* or *I. 'Stuckey's Hybrid'*), *I. panduratus* ssp. *palustris* and *I. teretifolius*. *I. prostratus*, despite being a local species, has always been short-lived in our rich, damp soils, so I have now grafted it onto Coaldale Cracker and it is shooting well so far.

I was unable to graft the Lesueur form of *I. sphaerocephalus* (recently renamed *I. sphaerocephalus* subsp. *lesueurensis*), but Tony Henderson has successfully grafted it onto *I. anemonifolius*. I hope to retry this form on Coaldale Cracker soon to ascertain whether it is incompatible or just bad grafting on my part! Tony has also recently grafted *I. panduratus* ssp. *palustris*, *I. pruinosis* ssp. *glabellus*, and *I. tridens* onto *I. anemonifolius*.



Tony has been unable to graft *I. inconspicuus* onto *I. anemonifolius* so Coaldale Cracker looks to be the solution for this species. In contrast Tony has been able to easily graft *I. gardneri* and *I. asper* onto *I. anemonifolius* whereas I have been unable to graft these onto Coaldale Cracker. As a result I have tried these on Coaldale Cracker with *I. anemonifolius* as an interstock and the results look promising with both scions shooting on this combination (*I. asper* graft pictured, left). Using *I. anemonifolius* for these species is also an option as long as a tough form is used (some *I. anemonifolius* forms can be short-lived down here on the NSW South Coast).

Finally, after a number of attempts, I have managed to graft I. 'Candy Cones'. I. 'Candy Cones' is supposedly a hybrid between *I. formosus* and *I. latifolius*. This lovely plant unfortunately is the ultimate 'drop dead' plant, but I now have it grafted onto Coaldale Cracker using *I. cuneatus* as an interstock.

Petrophiles

Tony Henderson is the king of petrophile grafting and his patience in growing stocks from seed has been richly rewarded. He has made some great progress in ascertaining the compatibility of WA species with eastern rootstocks. Rootstocks Tony uses are *P. pulchella* and *P. sessilis*. Pictured right, successful grafts in Tony Henderson's nursery.



Here is a summary of Tony's petrophile grafts over the last 12 months.

SPECIES	GRAFTING TRIALS
acicularis	Compatible. Two in garden and growing.
arcuata	Compatible
anceps	Not happy with some grafts. Just planted one with <i>P. teretifolia</i> as interstock
axillaris	Grafts shooting, not certain on compatibility. Time will tell.
biloba	Tried to graft on and off since 1984 with no success. Have just grafted to <i>P. diversifolia</i> successfully. I have <i>P. diversifolia</i> grafts that are 11 years old so have just grafted <i>P. biloba</i> with <i>P. diversifolia</i> as interstock.
biternata	Grafts well. Could not strike material from WA but material off graft struck easily.
brevifolia and pilostyla	Grafts not happy. Just did some using <i>P. teretifolia</i> & <i>P. arcuata</i> as interstocks. They have split tape and are growing.
clavata	Seems very compatible.
ericifolia ssp. subpubescens	So far compatible.
incurvata	3 grafts shooting and one flowered.
linearis	Very good grafts using <i>P. teretifolia</i> as interstock. Growing and flowering at last.
macrostachya	Growing but needs more work.
megalostegia	Just tried with <i>P. teretifolia</i> as interstock. Growing better.
nivea	One graft showing one shoot.
rigida	Seems compatible
semifurcata	3 grafts, only one took and shooting
seminuda	Seems compatible
striata	9 grafts, none took
trifurcata	6 grafts split tape but not shooting
wonganensis and foremanii	Grafted, shooting. Will find out in about 3 months' time.



In contrast to Tony's successes, my continuing attempts at cutting grafts are consistently failing due to my inability to strike roots on various stocks (*shirleyae*, *pulchella*, *sessilis*). So, inspired by Tony's successes on seed grown stocks, I have sown seed of *P. pulchella* and *P. sessilis*, as grafting onto rooted seedlings does look the way to go for petrophiles!

My experiment of grafting petrophiles onto *Isopogon Coaldale Cracker* with an *I. cuneatus* interstock is continuing though my only success so far is *P. drummondii* which is shooting well (see photo, left). This combination shows some promise with *P. filifolia* but the next few months will tell if this is viable.

Isopogon scabriusculus Meisn., A.L.P.P. de Candolle, *Prodr.* 14: 276 (1856)



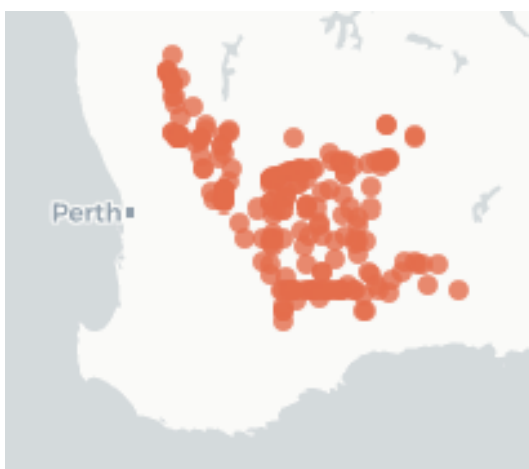
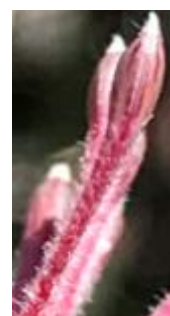
Isopogon scabriusculus was first formally described by Swiss botanist Carl Meisner in 1856. The name *scabriusculus* refers to scabrous, rough-textured leaves. All three subspecies are spectacular in flower. Flower heads are predominantly terminal with leaves held above, and provide an eye-popping spectacle as the flowers open, revealing the pink/red inner floral tube contrasting against yellow/orange pollen presenters and the soft tuft of hairs at the end of the perianth. Leaves are long, held upright and terete with a defined point.

Description – *Isopogon scabriusculus* is a compact, bushy shrub to 2m in height, but more commonly less than 1.5m. Flowers are pink and up to 15mm long, and generally appear from July to October.



Pollen presenters have a distinct constriction and globose part in the middle, up to 5mm long. The species is extremely variable and has been split into three subspecies:

1. *subsp. scabriusculus* – grows up to 2m in height, has flat leaves in contrast to the terete leaves of the other two subspecies. The leaves are up to 18cm in length, can be undivided or divided with 1-3 lobes and are distinctly scabrous. Flowers (perianth tube) are glabrous. A great spot to find this subspecies is Elphin Nature Reserve at Wongan Hills but it extends south to Newdegate.
2. *subsp. stenophyllus* – grows to 1.5m in height, with simple (never divided), terete leaves to 16cm in length. Flowers are pink or red to 15mm long, and the perianth tube is glabrous. Grows from north of Wubin above Perth south to Lake Grace and Newdegate.
3. *subsp. pubifloris* – differs from the other subspecies in having a pubescent (hairy) rather than glabrous (smooth) perianth. Its leaves are slightly shorter, up to 13 cm, and it only grows to 1.2m in height. Like subspecies *stenophyllus*, the leaves are terete and undivided. It flowers in September-November and grows further east than the other subspecies, between Southern Cross and Coolgardie, south to Lake King and Frank Hann NP.



Distribution – widespread in inland southwest WA, stretching from near Mullewa to the north down to near Newdegate in the south.

Cultivation – this is a very desirable species not seen in cultivation as often as it should be. Its compact habit and showy pink or red flowers make for a spectacular plant in pots and well-drained gardens. Regular pruning after flowering is recommended to maximise flower display the following year. Like most WA isopogons, grafted forms are required for reliable results in east coast gardens. It grafts readily onto eastern species *I. anethifolius*, *I. anemonifolius* and *I. 'Coaldale Cracker'*.



Right, superb compact plant of *Isopogon scabriusculus*, Cascade Road near Ravensthorpe, WA. Photo: Neil Marriott

Confusing species – *I. scabriusculus* can be confused with *I. nutans* which is found in a similar area because of similar, long, terete leaves. It is easily distinguished from *I. nutans* as it does not have nodding inflorescences.



Petrophile megalostegia F. Muell., *Fragm.* 10: 61 (1876)



Petrophile megalostegia was formally described by Victorian Government botanist Ferdinand von Mueller in 1876. The words megalos meaning abnormally large and stegia from the Greek word stegos (roof or cover), refer to the numerous large involucral bracts that completely surround the inflorescence.

Description – *Petrophile megalostegia* is a small, upright shrub to 1m in height, but generally much lower. The leaf structure varies greatly from simple terete to flattened leaves which can be straight and erect, or curved into an S-shape. Flower colour also varies from bright yellow to cream or white. Flowerheads are terminal and quite large with flower perianths to

30mm in length. Flowering occurs between August and October. The distinctive broad involucral bracts which surround the inflorescence are glabrous, pale brown, and ovate to elliptic with irregular margins. Pollen presenters are covered with short, erect hairs and have the distinctive turbinate (funnel) shape below the brush of the *Arthrostigma* group of petrophiles (see image far right).





Distribution – *Petrophile megalostegia* is relatively common north of Perth from Mullewa south to Eneabba and Watheroo. Excellent places to find this species are Alexander Morrison National Park and Tathra National Park and the roadside verges around Badgingarra.

Cultivation – yet another petrophile rarely seen in cultivation, yet its large flowers and small size make it worthy of a place in any garden. A blue, flat leaved form with bright yellow flowers is a particularly striking plant. It tolerates moderate frosts and extended dry periods. Well-drained soils in raised beds or pots are recommended unless grafted onto eastern rootstocks. Grafting trials are underway.

Confusing species – *P. megalostegia* is easily confused with *P. brevifolia* which grows alongside it. However, the large, brown involucral bracts of *P. megalostegia* are very different from those of *P. brevifolia* which are very narrow. The flowers of *P. megalostegia* are also much larger than those of *P. brevifolia*.

P. megalostegia shrub, Hydraulic Road, Arrino WA, 6 October 2017



Going potty with Coaldale Cracker

Catriona Bate



How's this for an idea? These large rocket pots of Isopogon 'Coaldale Cracker' took my eye recently. Kept low by regularly taking cuttings for grafting purposes, these plants were branching sideways and beginning to cascade down over the edges of the pots. This incidental pruning gives a wonderful effect. Pair that with the toughness of this hybrid once established and you have a great combination.

Isopogons work really well in pots. We restrict the number of display pots we maintain near our house because frequent travel means they don't get watered and so most plants in these pots eventually die. However I do have a large terracotta pot looking for a new occupant (previous tenants having died from complete neglect), so

I'm going to try Coaldale Cracker in it. Once established, I shouldn't have to water it much at all. I'll keep it low with judicious pruning (it won't require much) to see if I can create a similar effect. I'll keep you posted on how it turns out. If you decide to try this too, let me know how you go.



*Don't forget we can send you cuttings of Coaldale Cracker and it's easy to propagate. See how to do this [here](#). We've even been known to post pots of this one. Note: you won't be able to find this plant anywhere else (except for one or two growers). If you missed our articles about this hybrid, see Newsletter 25.

An isopogon-petrophile colour wheel

Here is a snapshot of the isopogons and petrophiles flowering in our garden on the NSW south coast as at 4 October 2020. We managed to get the last of the winter flowering species e.g. *I. dawsonii*, *I. cuneatus*, Coaldale Cracker, as well as the spring flowerers. What a great way to appreciate the eye-popping colours of these wonderful genera! It's a good overview of the colour range of the genus. A wheel is quite appropriate as it echoes the globular shape of flower heads as well as the starburst effect of the open flowers with pollen presenters around the edges. You might notice there is only one petrophile represented here – this is because ours tend to flower later in the year, plus they are harder to source and propagate so there are fewer in our garden. All the pink flowered species have WA origins and are grafted. Of the others, only *I. fletcheri*, a rare species from the Blue Mountains, is grafted.

Clockwise from 12 o'clock:

1. *I. formosus*
2. *I. cuneatus*
3. Isopogon 'Candy Cones' (*formosus* x *latifolius*)
4. *I. dubius*
5. *I. nutans*
6. Corrigin hybrid (*I. divergens* x *I. gardneri*)
7. Stuckey's Hybrid (*I. buxifolius* x *I. cuneatus*)
8. *Petrophile linearis*
9. *I. anemonifolius* dwarf
10. *I. anemonifolius* 'Sunshine'
11. *I. anemonifolius*
12. *I. anethifolius*
13. Isopogon 'Coaldale Cracker' (*I. petiolaris* x *I. mnoraifolius*)
14. *I. mnoraifolius*
15. *I. dawsonii*
16. *I. fletcheri*



Long-lived species in my garden – Tony Henderson

These may be of interest. Still alive in my garden bar two. *Editor's note: These plants were all grafted by Tony, and demonstrate the longevity of WA I & Ps when grafted. Tony says he cannot grow ungrafted WA species.*

ISOPOGON

asper	10 ½ years
attenuatus	9 years
axillaris	10 years
Candy Cones	10 years
divergens	12 years
dubius	11 years

PETROPHILE

acicularis	6 years
divaricata	10 years
prostrata	Died after 14 years

latifolius	16 years
pruinus ssp pruinus	11 ½ years
polycephalus	Died after 29 years
teretifolius	15 years
trilobus	12 years



I. asper: beautiful spent flowers attest to past floral bounty.



I. trilobus (left), *I. dawsonii* (background centre), *I. anemonifolius* (right). Henderson garden, Engadine, NSW.

Bushfire aftermath: one year on

Phil Trickett

It is now a year since the beginning of the most devastating fires ever along the eastern coast and ranges. The scale of the destruction of our bushland was staggering, commencing in South East Qld in September 2019, and escalating over time through NSW south all the way to East Gippsland in Victoria, not fully extinguished until February 2020.

Western Australia also suffered severe fire late last year which devastated the Stirling Ranges National Park, truly a biodiversity disaster. Study Group members Kevin and Kathy Collins recently visited the park to check on recovery. 'The Stirlings was disappointing as we could not find some species previously located such as *I. latifolius* although found 2 resprouters in different locations that look like juvenile *I. attenuatus*. The fire was so hot in places that there was no parent plant with burnt cones left for ID. We found some roadside singed [plants, probably *Petrophile divaricata*, pictured right] on South Formby Rd with promising seedling recruitment.'

On a brighter note, Kevin and Kathy report: 'On the way to the Stirlings we took a trip via North Woogenilup flora drive [which was not burnt] and were pleasantly surprised to find seven different roadside species in the flora drive section of the road. (approx. 12kms).' *P. filifolia*, *I. teretifolius*, *P. divaricata*, *P. ericifolia*, *I. longifolius*, *I. trilobus*, and *P. seminuda*.



P. divaricata, October 2020, South Formby Rd, Stirling NP. Photo: Kevin Collins

Over here in the east, the relatively small number of endemic I & P species makes assessing fire recovery by different species much easier than for Kevin and Kathy in the west, where most species occur.

In our own region, the whole of the huge Morton National Park was burnt in the Currowan fire in December/January. This included one of our favourite I & P hotspots, Little Forest Plateau up behind our property. While we knew this area had been devastated, we had to wait until October for this sector to re-open to the public so we could check the recovery process. Other areas of Morton National Park have been accessible, along major sealed roads such as Nerriga Road between Nowra and Braidwood. This road provided access to another I & P hotspot, Tianjara Falls where *I. anethifolius*, *I. anemonifolius*, *P. sessilis*, *P. pulchella* and *P. pedunculata* can be found. Recently we visited the Bell area of the Blue Mountains to check out the recovery of a population of *P. canescens*. Other species in this area are *P. pulchella* and *I. anemonifolius*. This area was totally burnt in the Gaspers Mountain megafire.

We are pleased to report that the isopogons and petrophiles are bouncing back strongly with *I. anemonifolius* the most advanced. Much of NSW has had excellent rains since February, providing the perfect conditions for seedlings to emerge from the species killed by fire, and for our lignotuberous species to resprout. For example, in our area adjacent to Little Forest Plateau we have received over 1700mm this year, well above our annual average of 1200mm. And the outlook for spring and summer is very positive with regular rain forecast due to the La Niña influence. This will provide the right conditions for a large number of seedlings to survive and hopefully grow to maturity.

Here are our observations for the species growing in burnt areas around Sydney and south. We are yet to observe recovery of the endangered species *I. fletcheri* and will report next issue.

Isopogon anemonifolius

This species is lignotuberous and is resprouting the quickest of all the eastern species, with some plants reaching 0.5m already. As you can see in our cover photo, some have grown to the extent that they are flowering only nine months after being incinerated. Good regrowth in this species has been observed in all the sites investigated. The proportion of plants resprouting appears to be very high in this species.



Right: *I. anemonifolius* resprouting, August 2020, Mt Banks, Blue Mountains. Photo: Ian Cox



Isopogon anethifolius

I. anethifolius is killed by fire and so relies on seed germinating post-fire and seedlings surviving to maturity before another fire. Germination of this species appears patchy though it was great to see mass germination underneath the huge old plant on Little Forest Plateau (pictured left and below). Nine months on, these seedlings are still tiny, so regular rain through summer will be vital to them surviving in significant numbers. In contrast there was no evidence of new seedlings around dead plants in the Ettrema Gorge portion of Morton National Park in early October. We will revisit this area in coming months to check on further emergence of seedlings. At another site in Morton National Park just north of Nerriga, there was also no sign of seedlings so far.



Above, new seedlings under the ancient old *I. anethifolius*, now deceased, at Little Forest Plateau, Morton National Park NSW.

Isopogon prostratus

We have only observed the recovery of one population of this species, at Wog Wog in Morton National Park (right). This region appears to have suffered an extremely hot burn, with recovery of other lignotuberous species such as *Banksia spinulosa* and *I. anemonifolius* still only at the early stages of resprouting. This was the case for *I. prostratus* which in mid-September (nine months after the fire) was just starting to resprout. The forecast for a cooler, wetter spring and summer should ensure a high proportion of these plants surviving. As with many resprouters their seed bank is a fraction of the reseeder, and we could not find any sign of seedlings. We intend to check on whether seedlings of lignotuberous species emerge over the coming months.

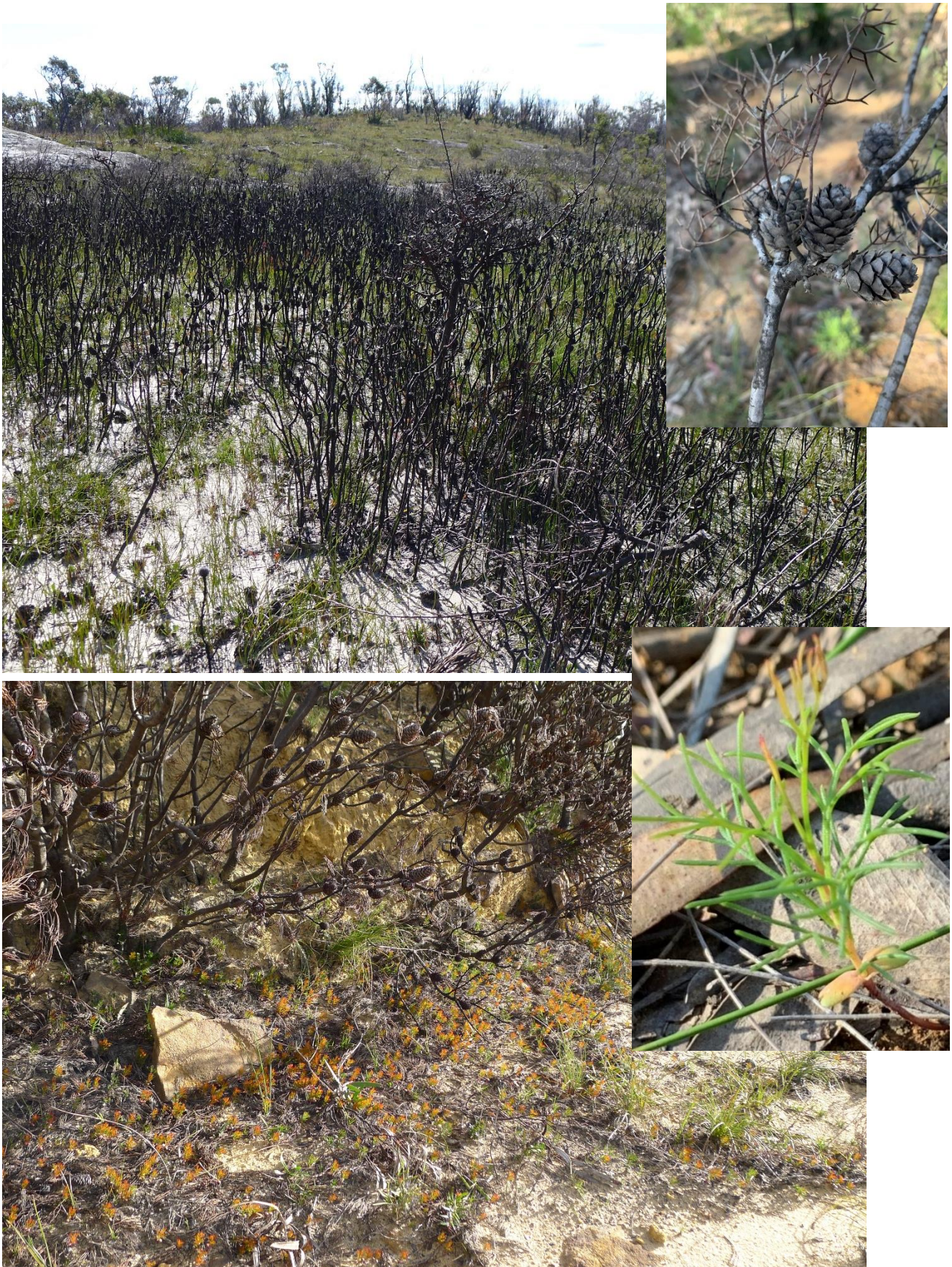


Study Group member Anthony Meyer has monitored a small plant of *I. prostratus* on a fire trail at Bald Trig on the Clarence Plateau over 15 years. This site is near the Bells area of the Blue Mountains we recently visited so was likely burned. The health of this plant will probably determine its survival from lignotuber.

Petrophile pulchella

This non-lignotuberous species is the most common eastern petrophile, often growing en masse reflecting prolific reseeding after a fire. Seedlings are emerging in good quantities in the Little Forest Plateau populations, though all are very small at present. Regular rainfall over the coming months will be needed to ensure they survive the summer in good numbers. Other sites near Nowra and in the Bells area of the Blue Mountains show only very low numbers of seedling emergence by early October.

Member Ian Cox reports finding *P. pulchella* recovering near the walking track to the summit of Mount Banks in the Blue Mountains in August 2020, about eight months after the massive Gaspers Mountain fire swept through this area. The vegetation here is very stunted because of the harsh conditions. Even the *Banksia serratas* are dwarfed. His photo shows a large stand of *P. pulchella* which has been killed, but he also photographed good germination underneath.



Above: *P. pulchella*, Mount Banks, Blue Mountains August 2020. Photos: Ian Cox.

Insets: *P. pulchella* cones and new seedling, Parma Creek Nature Reserve near Nowra, October 2020.

Petrophile sessilis

Like *P. pulchella* this is non-lignotuberous, relying on seed germination after fire to reproduce the population. At a site on the Mt Bushwalker section of Little Forest Plateau, one burnt plant has been replaced by scores of emerging seedlings (pictured below). With the wet-cool summer forecast, many of these seedlings could be expected to survive, resulting in a healthy expansion of the population of one plant at this site.



The carpark at Tianjara Falls in Morton National Park is another good place to find *P. sessilis*. In August (nine months afterwards), lots of seedlings could be found under the burnt plants. However, nearer the town of Nerriga and in rocky poor soils, there was no sign of any seedlings under burnt plants at the end of September.

Petrophile pedunculata

This is a lignotuberous species and resprouting is well advanced in all populations (pictured below at Tianjara Falls, August 2020). It will be interesting to check if they can match the performance of *I. anemonifolius* by flowering in the first season after fire. This species starts flowering in October/November so we will know soon.



Petrophile canescens

Part of our interest in checking out this species was to confirm that it has a lignotuber. And sure enough it has. The one population we have checked so far is in the Bell area of the Blue Mountains, where we had seen a population back in 2015. The resprouting in this population is really only just beginning with plants showing the first shoots of recovery (pictured right). Only around 50 per cent of the plants had resprouted by mid-October, perhaps reflecting the severity of the Gospers Mountain fire in this area. Even the co-existing *Isopogon anemonifolius* are far less advanced in their resprouting here than in other areas. We intend to return to this population over the next few months to check if the current non-sprouting plants eventually resprout.



Financial Report

Total 24/4/2020	\$1,714.06
Bank balance	\$1,610.62
Cash on hand	\$103.44
Donations	\$90.00
ANPSA	\$20
Native Plants Qld	\$20
Plant sales	\$50
Total 26/10/2020	\$1,804.06
Bank balance	\$1,700.62
Cash on hand	\$103.44