



Isopogon & Petrophile *Study Group*

Newsletter No. 25

November 2019

ISSN 1445-9493

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

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Isopogon 'Coaldale Cracker' in cultivation, Little Forest NSW. See our articles in this issue.

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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Financial report

Hi fellow Isophiles,

Firstly, we wish to thank everyone for their generous feedback on THE PETROPHILE ISSUE, focusing on the poor relation of I & Ps, the petrophiles. We feel they are very under-appreciated and that once we learn to propagate and successfully grow some of the many spectacular species, that will all change.

We had a number of 'new' isopogons flowering for the first time for us in our garden this spring, all grafted onto the new hybrid we report on in this issue. *I. adenanthoides*, *I. gardneri* and the *I. gardneri***I. divergens* hybrid all flowered well at two years of age. One 'new' petrophile species also flowered for us for the first time – *P. filifolia* ssp. *filifolia*. This was grafted onto *P. shirleyae*.

With Spring now coming to an end we hope that your isopogons and petrophiles have given you plenty of Spring joy. Though we have only had 40% of our annual rain here, we have had just enough regular showers to keep the I & Ps ticking over. The petrophiles are just starting to come into their own now. A group of *P. sessilis* bud flower head clusters is looking good in a vase (pictured, right). However, we know just how dry so many regions of Australia are, notably our members in Armidale and Uralla suffering incredibly from the relentless drought. And now with our bush burning in many states of Australia, urgent action to address our runaway climate change is needed if our beautiful plants are to survive. This message is coming through from multiple sources and we cover them and



conservation issues generally in three articles this newsletter. Two species, *I. uncinatus* and *P. latericola*, are current conservation flag-bearers.

Our feature species this issue include two of the lesser-known western pink species – *P. axillaris* and *I. linearis*. They were two of the many species collected by Drummond and examined by Meisner, and both were described in the same year, 1855. Both are highly attractive but little cultivated species from north of Perth towards the coast. Their specific names are confusing, because the same name is used in both genera, and it is the other ones (*I. axillaris* and *P. linearis*) which are better-known. Our profiles will set you straight.

After much investigation we can report on a new isopogon hybrid and the story of its discovery. We have named it ‘Coaldale Cracker’ in reference to the road near Grafton where it grows alongside its two parents *I. mnoraifolius* and *I. petiolaris*. This hybrid has the potential to be very popular. It ticks all the boxes – on the smaller side, lots of brilliant yellow flowers, highly attractive foliage, and very adaptable.

Phil’s grafting update explains interstock grafting which is required to successfully graft two of our spectacular isopogons – *I. formosus* and *I. baxteri*. Though it adds one more step to the grafting process, Phil explains why success rates are high for this method once compatibility is resolved.

It wasn’t the greatest year for wildflowers in the west but there’s always some of the 90 plus WA species to admire. We have an overview of the 2019 spring season for your enjoyment thanks to some of our members. We also look at some interesting aspects of isopogon and petrophile growth habits (aspect, mounding habit) and get a taste of what isopogons look like to pollinators (isopogons in ultraviolet light).

We all try to learn and retain species names but it’s not easy, especially when they occur across genera. Catriona looks at isopogons and petrophiles named for people and who those people were. A very special example is *P. shirleyae*. There has been something of a mystery over exactly who it was named for which has now been solved. Peter Olde documents its etymology properly for the first time and Allan Carr gives us an overview of this excellent species.

We understand that it’s a difficult time to keep plants growing, but why not propagate a few species for when the rains come, hopefully early next year. New species are in the process of being added to the list of species that members can access from our garden. A priority for you all must be our new hybrid *I. ‘Coaldale Cracker’* which is incredibly easy to strike from cuttings and will make a wonderful garden plant. Why not check out the guidelines for exchanging cuttings and seed and give it a go? If you’re already growing it, send us your feedback.

Catriona and Phil

From our members

Margaret Pieroni, Denmark WA

[April 2019] Thank you for your wonderful Petrophile newsletter. I was interested to know that *P. filifolia* is so popular. My plant of *P. filifolia* only lived for 5 years and died suddenly. It would be interesting to learn whether other members had plants for longer. [It could behave like] ...*Dryandra nivea* [which has a similar mounding habit and in the wild] tends to become top-heavy and collapse in the centre.

[November 2019] ...I spent most of the conference week at the exhibition which was very successful.

[Margaret was one of five artists featured in the exhibition ‘True to Nature: A Celebration of Western Australia’s Wildflowers’ in Albany. She had twenty watercolours on display, including Rose coneflower *Isopogon formosus*.]

...Peter Walmsley’s nursery has closed recently. That is a pity because I was looking forward to taking you there and maybe picking his brains about the Bluff Creek form of *I formosus*.

Karlo Taliana, Georges Hall, south-western Sydney

Attached are a couple of pics of my *Petrophile teretifolia* in my home garden. It was grafted by Tony Henderson several years ago. This year it produced over 20 heads. It is probably one of my most valued plants due to the amazing colours.



Liesbeth Uijtewaal, The Netherlands

Just a short note to send you a pic I took this afternoon, not sure whether I've sent you a photo of the bud (scales) of *I. divergens* before. It's a very interesting one with the tuft of bracts(?) on top! Last year you said you were interested in pics of the bud scales, not sure that you've a complete collection yet.

BTW lovely surprise in the propagator today: roots on *P. ericifolia*, propagated 23 Sep which isn't bad is it. There's 7 cuttings, I feel that 2 have struck already since it looked like the 2nd rootlet came from a different direction. Time will tell.



...I'm so pleased with the *P. ericifolia* cuttings! Since I've only got the one plant I thought I'd better try and get back-up plants. There's three cuttings in the one little pot, it seems like two of them have struck roots. I'm not sure what to do: check them and separate if there's two indeed or just keep them in the one pot? Now that I'm writing this I think I'd go for the safe solution and keep the lot together, no harm in having two plants in the one pot. It might be nice to have a surplus one to give to someone else but at the moment I'd rather make sure I'm not losing any of this precious species! I took 7 cuttings in total, planted them into two pots so chances are the other cuttings might strike roots too so then I might have my give-away plant.



P. diversifolia spent cones

Kevin Collins, Mount Barker WA

I & Ps cutting grown that have flowered this season, most for the first time:

Isopogons attenuatus, scabriusculus, polycephalus, trilobus, buxifolius (linearis), buxifolius (obovatus), spathulatus; *Petrophiles rigida, brevifolia, diversifolia* (see photo, left), *diversifolia X serruriae, squamata*.

New cuttings that have struck: *Isopogons cuneatus, formosus*, fine lobed *trilobus* variant; *P. teretifolia* and *P. helicophylla* grown from underground stem piece.

Patrick Laher, Uralla NSW

On the Northern Tablelands of NSW during the winter of 2018, we only had a week of heavy frosts, but a -10°C polished off all of my WA petrophiles and left me with one *Isopogon formosus* and one *I. Stuckeys Hybrid*. This year, we have experienced a severe drought which commenced two years ago. I still have the two interstate Isopogons, but it's been the Eastern States plants that have continued to survive these awful conditions with little protection and water. Local forms of *Isopogon petiolaris* and *Petrophile canescens* together with the North Coast *Isopogon mnoraifolius* have been wonderful. *Isopogon anethifolius* and *I. anemonifolius* are both going well although they need protection from severe frost. All plants flowered although *Isopogon mnoraifolius* seemed to have flowered as well as in other years, whilst the others had reduced flowering. In recent years, I have invested in additional overhead protection in the form of planting small or mallee Eucs. for both frost and intense sunlight protection. Once established, I will once again try planting some of the wonderful WA species.

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.

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!

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

Petrophile – canescens, pedunculata, pulchella, sessilis, shirleyae

Isopogon uncinatus makes Top 100

Catriona Bate

Earlier this year the Threatened Species Recovery Hub released the results of its research identifying the top 100 Australian plant species at risk of extinction. The species in the list of particular interest to this Study Group is *Isopogon uncinatus* (several other proteaceae species are also included).

I. uncinatus is the rarest isopogon and was thought to be extinct until it was rediscovered in the 1980s near Albany on the WA south coast. It is known from only nine populations. *I. uncinatus* was declared as Rare Flora in 1990 and ranked as Critically Endangered (CR) in 1997. It currently meets World Conservation Union (IUCN) Red List Category 'CR' due to the severe fragmentation of populations and continuing decline in the area and quality of habitat, the number of locations and individuals. The main threats are disease, inappropriate fire

regimes, drought, recreational activities and grazing. The new list of Australia's top 100 imperilled plants lists *I. uncinatus* in a group of species for which the key threat is considered to be Phytophthora (dieback fungus).

This really is a significant inclusion. To be considered, species had to meet IUCN criteria for listing as Endangered or Critically Endangered AND be experiencing ongoing declines due to explicitly identified threatening processes that could be mitigated through targeted recovery actions. The resulting short-list of 420 species meeting these criteria was whittled down to a 'Hottest 100' of Australia's most endangered plants.



Isopogon uncinatus Photo: Margaret Pieroni

One of the reasons for compiling the list was to help conservation managers prioritise where to direct efforts to prevent extinctions. A National Action Plan for Australia's most imperilled plants will provide more detail on conservation actions, and can guide future investment, policy, community engagement and regional conservation efforts to improve the trajectories of our most imperilled flora. In relation to *I. uncinatus*, a recovery plan was published way back in 2001 to operate up until 2003 but remain in force until withdrawn or replaced. The main actions were to spray with phosphite, limit visitation, and monitoring. Hopefully, inclusion on this Top 100 list will prompt more attention and resources for the recovery of this species into the future. As noted by the report, a bonus will be that actions required to save *I. uncinatus* will also benefit many other vulnerable plant species.

<http://www.nespthreatenedspecies.edu.au/news/new-research-the-aussie-plants-facing-extinction>
[Red Hot Plants Science for Policy Factsheet web2.pdf](#)

Update on current threats to isopogons and petrophiles

Catriona Bate

The Threatened Species Recovery Hub study of the top 100 Australian plant species at risk of extinction identified major threats driving species to extinction, including urbanisation, inappropriate fire regimes, climate change and introduced plant diseases like phytophthora and myrtle rust. It also refers to historic and ongoing habitat loss, grazing and trampling by livestock, native and feral animals like rabbits, weedy grasses and mining.

Another threat raised by this research for the Top 100 is a lack of information about other species also at risk which impedes conservation assessments and action. Its National Action Plan will identify a priority 'Amber' list of poorly known species considered at risk of extinction as well as the actions needed to determine their conservation status. This is certainly an issue for isopogons and petrophiles. Among 11 isopogon species identified as requiring possible conservation action, eight still await further work to comprehensively evaluate their conservation status. Among 14 petrophile species currently considered to be threatened or possibly threatened, 12 still need further evaluation. The fact that the species at the highest threat levels tend to have been named relatively recently reflects the importance of up to date taxonomy – a real issue for isopogons and petrophiles which are considered 'underdone' in taxonomic terms.

Another important report was released late last year. The fifth biennial State of the Climate report was published by CSIRO and the Bureau of Meteorology. It found that Australia's average air temperature has warmed by just over 1°C since national records began in 1910. This trend has led to an increase in the

frequency of extreme heat events. For example, very high monthly maximum temperatures that used to occur around 2 per cent of the time now happen about 12 per cent of the time. Fire weather is also changing. The annual total of daily values of the Forest Fire Danger Index is increasing over large areas of Australia. Most regions also saw an increase in the most extreme 10 per cent of fire weather days, and fire seasons have lengthened. Rainfall in April-October has been steadily decreasing in Western Australia's southwest since 1970 and has decreased since the 1990s in southeast Australia.

The Threatened Species Recovery Hub's map of the location of Australia's declining flora show the highest concentrations in southwest WA and on the east coast around Sydney and Brisbane. Further, the Bureau of Meteorology's maps show rainfall as the lowest on record in much of southwest WA and a large area surrounding Sydney. As these areas coincide with the distribution of isopogons and petrophiles this is of real concern to us. At risk are entire regional distributions or in some cases, entire distributions of species with small, disjunct populations.

Increasing fire frequency could be a big issue with current fire events occurring within this footprint of never-seen-before magnitude. While isopogons and petrophiles are adapted to fire, species differ in their ability to recover and reproduce afterwards. Species with a lignotuber can resprout after most fires but their seedlings may need a decade or more to grow to maturity. Reseeders are killed outright by fire but produce many more seedlings which may need only seven years or less to grow to maturity. Therefore, if fire intervals become more frequent, reseeders may disappear and resprouters will not be able to reproduce.

[Red Hot Plants Science for Policy Factsheet_web2.pdf](#)

<http://www.bom.gov.au/state-of-the-climate/australias-changing-climate.shtml>

Petrophile latericola and the seeds of conservation

Catriona Bate

Australia Post releases special stamp issues to mark significant historical and cultural events and in October 2019, the practice of seed banking was recognised in a special stamp issue. This acknowledges that seed banking is crucial insurance policy in the conservation of native flora species and the resilience of our botanical world. Factors such as climate change, over-exploitation, salinity and landscape fragmentation all impact on the survival of both wild and cultivated plant species. Australia's state and territory seed banks collaborate under the Australian Seed Bank Partnership and have conserved seed of nearly 50 per cent of species at risk. As well as collecting and storing seeds, the seed banks undertake important research.

Damian Wrigley, National Coordinator of the Australian Seed Bank Partnership, told Australia Post "these energy rich genetic marvels have helped develop Australia's biological diversity and represent a key way that Australia's native flora have evolved in order to survive and thrive in some of the harshest conditions on the planet."

Petrophile latericola is one of only three at risk native species chosen for the stamp issue to represent regional, type and habitat diversity. The others are rare and highly localised perennial grass *Rytidosperma clelandii* from South Australia, and near-threatened alpine shrub *Epacris petrophila* or Snow Health, from high-altitude areas of the Australian Alps and Tasmania. The stamps feature close-ups of the seed of each species. The background element and typographic style used in the stamps suggest banknote design, helping to visually communicate the concepts of "value", "currency" and "banking".





It is remarkable that a petrophile, such a little-known genus, was chosen to represent all of the amazing endangered species from Western Australia. This petrophile species is little-known let alone cultivated. The photograph of the species in flower featured on a special maxicard (pictured left) to accompany this stamp issue is one of only a couple of images of the inflorescences ever published. The plant has been grown at Kings Park in Perth.

Petrophile latericola is declared Threatened, the highest level of conservation priority. This small population is confined to one area of the Whicher Scarp in the Busselton Ironstone area, the whole of which has been declared a threatened ecological community. This species is also highly susceptible to phytophthora and fire.

Described by Greg Keighery in 2010, *P. latericola* was previously regarded as a form of *Petrophile brevifolia* but differs in terms of its short leaves and lack of a lignotuber plus its disjunct location. Despite this and other recent refinements, the *P. brevifolia* complex, a large and common plant community, remains extremely variable and requires further taxonomic investigation. More splitting of this and other areas needing work may result in future new petrophile species which could be classified as endangered. For example, there is another disjunct population growing in the Whicher Scarp long flagged as requiring taxonomic work, in this case a form of *P. serruriae*.

Damian Wrigley describes the seeds of *P. latericola* as 'shuttlecock' seeds which suggest wind-dispersal. According to Australia Post, the species produces a radiating fruit that on maturity releases individual capsules with hard seed coats, which provide protection until conditions are suitable for germination. A multitude of fine hairs assists the seed to disperse over short distances. Understanding seeds and their needs is vital for seed banking, for without knowing germination requirements a seed collection is worthless. Damian observes that understanding which cues break seed dormancy in the wild will allow researchers to replicate the required conditions in the laboratory. Seed collections can then be used as a long-term conservation tool.

Germinating petrophile and isopogon seeds and growing them on is challenge that we routinely face in the Isopogon & Petrophile Study Group. Hopefully this continuing work on germination requirements will be successful and we will also be able to share the knowledge and do our part in conserving these species. In the meantime these stamps will introduce petrophiles to a whole new audience. For more information on seed banking see the article [Stamps that sow the seeds of conservation](#) where Damian Wrigley is interviewed.

Introducing a new hybrid: *Isopogon* 'Coaldale Cracker'

Catriona Bate

Isopogon 'Coaldale Cracker' is a naturally occurring hybrid between *I. petiolaris* and *I. mnoraifolius* from the north coast of New South Wales. It is a dense upright small shrub growing to around a metre tall and a metre wide. It has attractive bright green foliage which shines in bright sunlight. Its large leaves are narrow, flat and divided, and slightly curved inwards at the end. Each spring it produces a large number of very appealing round flower cones covered in a patchwork of tiny pale pink and green scales. They occur along the stems at the leaf axils and in terminal clusters. The resulting flower heads are yellow, deepening in colour over time.



This is a very attractive ornamental for the garden which delivers with year-round foliage and a beautiful flower display in spring. But the best thing about this hybrid is its performance in cultivation. This is a real toughie which is proving to be adaptable in a wide range of conditions, easy to propagate, and even suitable

as rootstocks for isopogon grafts. It copes with severe frosts, wet feet and dry conditions. If you've had trouble growing isopogons, this is the one to try.

Once planted, after a year or so it really puts on growth and soon reaches a good size. In our rich volcanic soil it seems to grow taller and wider than other specimens we have observed so far. It does not need pruning but can be trimmed as desired.



Many Study Group members have been growing this for years (purchased as *I. mnoraifolius*) and it's a proven performer. Members in Armidale recommend it for cold conditions, and it has coped extremely well with both very wet and very dry situations in our garden on the south coast of NSW. In the wild it occurs in low-lying clay which is likely to alternate between very dry and very wet conditions. Other members are testing it in their local conditions. While we would not recommend total neglect, this plant requires no more than the usual care you give your plants in the garden and seems tougher than its parents. This is consistent with hybrid vigour reported in many other genera.

This is one of only very few known hybrid isopogons. None are recorded in

the literature although we have discovered a natural hybrid of *I. divergens* and *I. gardneri* in the wild which Phil has now successfully propagated. The best-known isopogon hybrid is called 'Stuckey's hybrid' and was discovered in the remains of Ken Stuckey's Millicent garden after the 1983 Black Friday bushfires. For the story, see Tony Cavanagh's article in [Newsletter 18](#) p.12.



Finding 'Coaldale Cracker'

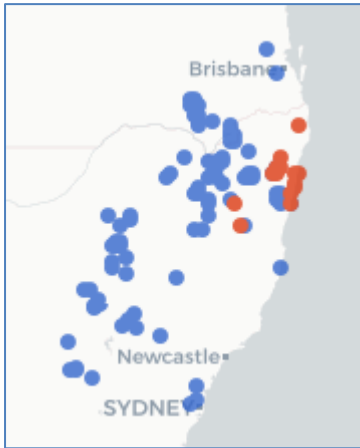
Phil Trickett and Catriona Bate

In recent years we became curious about plants growing in our garden which we purchased many years ago as *Isopogon mnoraifolius*. The plants have bright yellow flowers but the flora key states that the flower colour of *I. mnoraifolius* is creamy/yellow. Also, the key states that the leaves of *I. mnoraifolius* are always less than 8 cm. Our plants have leaf lengths up to 15 cm. A further distinguishing feature of *I. mnoraifolius* is hairy branchlets. Our plants have glabrous branchlets.

As we also have plants growing which key out to the 'true' *I. mnoraifolius* and look and behave quite differently, we suspected that our mystery plant could be a hybrid. The isopogon key supported this theory, indicating this plant had characteristics of both *I. mnoraifolius* and *I. petiolaris*. We were very keen to resolve this mystery, given that the plant in question is one of the toughest and most vigorous plants in our garden, and Phil was achieving fantastic results grafting western isopogons onto this plant. Its toughness was reinforced by reports from our Armidale NSW members that it was untouched by their regular severe frosts. They revealed their plants came from a north coast NSW native nursery. As we had also purchased plants from this nursery over the years, this was probably the source of our plants. Following up with the nursery, we still couldn't resolve the mystery. Finding ourselves with some spare days on a recent trip north, we decided to go

and see for ourselves. Our first stop was the nursery where the plant originated. Taken to the stock plant growing in the ground there, we could see it was obviously the same as the mystery plant growing in our garden.

With the information on exactly where the plant might have come from, the next step was to visit these locations, so we headed off to explore an area north of Coffs Harbour. We were keen to see both *I. petiolaris* and *I. mnoraifolius* in the wild. If we could find these two species growing together, we might be able to find a hybrid and so prove our long-held theory. If not, the mystery plant could be a new species.



Distribution of *I. petiolaris* (blue); *I. mnoraifolius* (orange).

Alas, after a day exploring all over the area, the only isopogons we saw were a prostrate form of *I. petiolaris*, and *I. anemonifolius*. We also identified a couple of populations of *P. canescens*. Despite the severe drought, we were pleased to find a good population of *I. petiolaris* doing well at Sherwood Forest and another of *I. mnoraifolius* in flower in a damp coastal site near Woolli. The plants of *I. petiolaris* were all extremely low and only one was in flower. It was interesting to observe its highly angular, long leaves and contrast them with the shorter, more rounded leaves of *I. mnoraifolius*. The latter was squashed in among dense swampy heath plants and would have been difficult to spot if not in flower.



Left, *I. petiolaris*, Burns Road Barcoongere, right *I. mnoraifolius* Woolli

The next day we travelled north to a site on Coaldale Road north of Grafton where *I. petiolaris* and *I. mnoraifolius* are supposed to grow together. The only other populations of *I. mnoraifolius* occur in coastal heath between Angourie (just south of Yamba), and Minnie Water. We had been to Coaldale Road many years ago (when our I & P knowledge was in its infancy) and noted *I. mnoraifolius*. Upon stopping on the side of the road, we immediately found up to 50 plants of *I. petiolaris* growing among a population of around 100 plants of *I. mnoraifolius*.

And there alongside these plants were three plants of our hybrid, identical to our mystery plant at home. The largest of these was around 1.5m high and 1m in width, with distinctive leaves – closer to the shape and size of *I. petiolaris* but with the slightly incurved segments of *I. mnoraifolius*. None of these plants were in flower, reflecting the poor dry conditions. All were in heavy loam on low ground which in normal times would be seasonally waterlogged.



From left: *I. petiolaris* leaf, hybrid leaf, *I. mnoraifolius* leaf (note brown colour indicating stress). Pictured on the tarmac of Coaldale Road.

These presumed hybrid plants were relatively mature and large, and their foliage was healthy and dense, unlike *I. mnoraifolius* specimens nearby which were showing clear signs of stress likely due to the drought. The latter were very upright and narrow while the *I. petiolaris* were low and quite small. The vigour of the hybrid plant seems due to not only hybrid vigour, but also having developed in an area which experiences both summer-wet and bone-dry conditions. An outstanding example of the latter is *Grevillea robusta* which shows similar adaptability and toughness in cultivation.

After checking back with the nursery it remains unclear whether the plant originally propagated actually came from this Coaldale Road location and investigation is continuing. It will be fascinating to see if they can unearth another population.

The table below compares the morphological characteristics of the presumed parents with the presumed hybrid. In summary, the hybrid's flowers are a similar colour to *I. petiolaris*, but hairy and larger like *I. mnoraifolius*. The leaves of the hybrid are closer in size and shape to *I. petiolaris* but with slightly incurved segments like *I. mnoraifolius*.

Morphological comparison of the presumed hybrid and its two parent species

Character	<i>Isopogon mnoraifolius</i>	Presumed hybrid 'Coaldale Cracker'	<i>Isopogon petiolaris</i>
LEAF			
Length	3-8cm Ultimate segment incurved, <10mm Undivided part often twice as long as divided part	13cm Slightly incurved or divaricate. Pungent tip Ult. segment <10mm Undivided part roughly equal length to divided part	>9cm Angular, divaricate, 3-7mm wide, 3-5 conspicuous veins, pungent tip Undivided part roughly equal length to divided part
FLOWERS			
Perianth length	17-20mm	15mm	About 8mm
Perianth hairs	Upper: densely hairy Lower ½-1/3 smooth	Densely hairy Lower ½-1/3 smooth	Glabrous, short tuft at apex Yellow
Colour	Cream to pale yellow	Pale to mid yellow	Sessile, terminal, globose
Inflorescence	Sessile, terminal, globose	Sessile, terminal, globose, on branchlet	
BRANCHLETS	Hairy	Glabrous	Glabrous
NUTS	15-18mm	25mm	15-20mm
Height	40-80cm, sometimes to 1.5m	1.3-1.9m	<1m
Habit	Upright	Upright; somewhat spreading	Spreading
Flowering period	Spring	Spring (Sept-Oct)	Spring & summer (Jul-Nov)
LIGNOTUBER	Unclear. Not documented but both lignotuber and single stem observed.	Unclear. Strong root system may indicate lignotuber.	Yes
DISTRIBUTION	Open heath (low, damp) or on edge of woodland. Restricted to Coaldale district NNW of Grafton and on the coast to the east of Grafton from Angourie south to Minnie Water.	Near Grafton, possibly other populations	Dry sclerophyll forest/heath, commonly stony sites, on the tablelands and west to the plains. From east of Parkes north to above Inverell east to Coaldale (Grafton).
Cultivation requirements	Little-known but considered relatively hardy. Tolerates full sun on moderately well drained soils, likely to be adaptable.	Very hardy. Appears to tolerate wet or dry conditions once established, plus frost to -10C	Little-known but considered hardy. Sun to dappled shade, free draining, tolerates dry and frost.

Isopogons through insect eyes

It has been known for many years, since the days of black and white film in fact, that many flowers have dark patterns visible under UV light but not visible to the naked eye. On the basis of scientific work on honeybee vision, the eyes of pollinating insects are known to be sensitive to UV, blue and green light and it is widely believed that such UV patterns assist pollinating insects to find the pollen on the flower. However, little work has been done on the visual systems of pollinators of Australian native plants.

APS member David Oldfield started taking photos in ultraviolet (UV) light of the native plants grown by his wife Sue about two years ago after seeing UV images of overseas wildflowers. The challenge was to find to what extent such UV markings exist on Australian native flowers. Flowering plants in Australia have been geologically isolated for more than 34 million years and it is thought that flowering plants in Australia are likely to have independently evolved spectral signals that maximise colour discrimination. Still a work in progress, David has found that for example, a typical response of an insect-pollinated *eremophila* is dark blue false-UV colouration of the inside of the corolla (bird-pollinated species tend to be dark grey or black in the same areas). The bright blue fluorescence seen on the hairs surrounding the corolla is also a common response found in many other Australian natives.

A retired chemist, he found that back in 1924 a chemist at the University of Sydney had identified the water-soluble yellow pigment in several Acacia species as a derivative of a molecule called kaempferol, a widely distributed flavonol, found in foods as varied as apples and broccoli. To cut a long story short, kaempferol is effectively a natural sunscreen which absorbs UV strongly. There are probably many other UV absorbing pigments in our native flowers, all Eucalyptus flowers behave in exactly the same way and become black in UV.

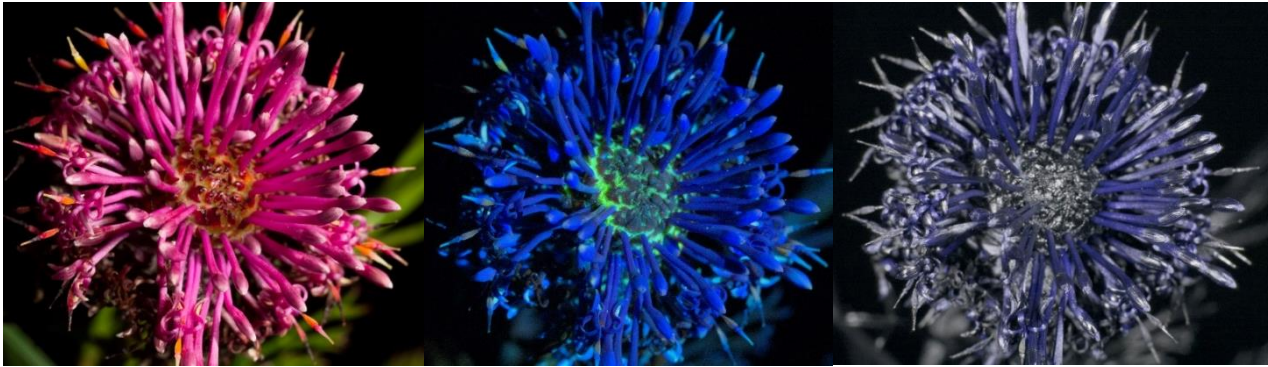
All isopogons and petrophiles are believed to be pollinated by insects. Of interest to our Study Group is this finding that yellow water-soluble pigment absorbs UV strongly, given that many species have yellow flowers. Further, pollen presenters are yellow until pollination after which they change colour to orange/red which are known to be invisible to insects. Judging by other photos of Australian plants published by David, the visible yellow so common to I&Ps may become pale yellow or grey in UV.



I. ceratophyllus inflorescence photographed under visible light (left) and the same under UV light (right)

David has so far photographed *I. formosus* and *I. ceratophyllus* in visible and ultraviolet light, which gives us an idea of what pollinators see. *I. ceratophyllus* (pictured above) appears grey under ultraviolet light, with pollen presenters possibly a lighter grey.

In the case of *I. formosus*, the results are a little more spectacular (see overleaf). David has also photographed this species under the effect of UV Induced Visible Fluorescence. He notes that pink flowers become dark blue or black in UV light which may be due to UV absorbing pigments serving to protect genetic material from damage by UV radiation. Looking closely, the pollen presenters seem two-toned blue-green under UV and grey under UVIF.



I. formosus under 1) visible light, 2) UV light, 3) UV induced visible fluorescence

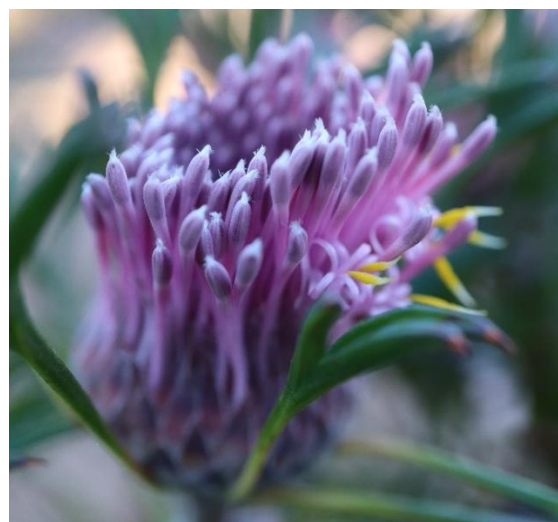
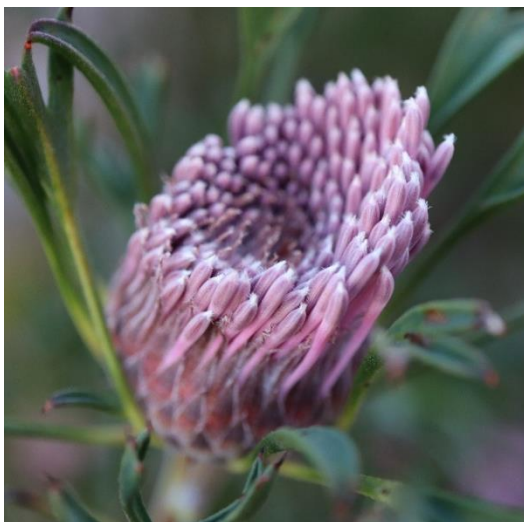
Far from finding all the answers, David reflects: 'the more I look the more questions are raised'. David Oldfield's input to this article is much appreciated.

Northern exposure

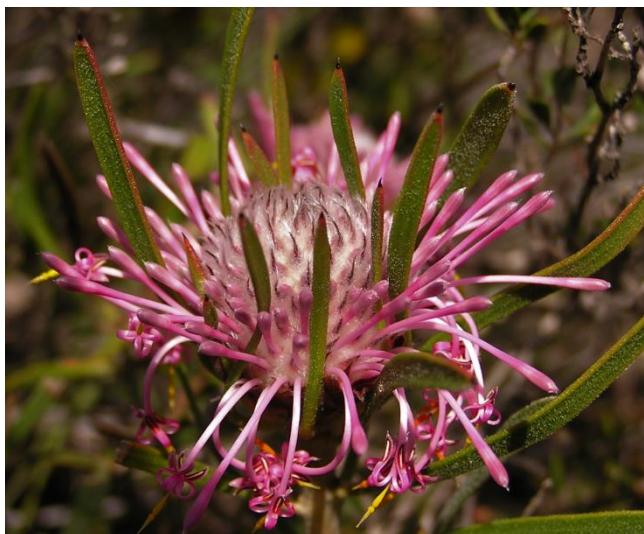
You may have heard of banksia compasses – you know which way is north because the flowers on the north side of the cone open first – but did you know isopogons do the same thing? When the flowers begin to emerge on the globular cone, those on the northern side open first. It's a pretty obvious phenomenon if you catch the flower head early in the anthesis and opening process. We've been interested observers of this phenomenon in our garden this spring.



At this stage we've only observed it in *I. cuneatus* (pictured above), *I. dubius* (below), and *I. gardneri*. It will be interesting to find out if some species are more likely to open this way than others. And if it also happens in petrophile species. Let us know whether you see this happening in your garden or the bush.



Isopogon linearis Meisn., Hooker's J. Bot. Kew Gard. Misc. 7: 69 (1855)



Isopogon linearis was first formally described by Swiss botanist Carl Meisner in *Hooker's Journal of Botany and Kew Gardens Miscellany* in 1855. The name *linearis*, referring to the long, undivided, flat leaves, is no longer particularly useful given that a number of other species also have linear leaves.

Description – *Isopogon linearis* is a many-branched shrub usually up to half a metre high but sometimes to 1.5m, with a lignotuber. The leaves are flat, often noticeably curled, up to 9 cm in length and 0.5 to 1 cm in width. They are distinctively thick, rough/scabrous and finely hairy. The leaf apex has a very pungent point. New leaf growth has a striking

red colour. Flowering is relatively early, from August to October, and the flower colour ranges from pale pink to magenta. Relatively large flower heads are mostly terminal, with upright, often curled leaves protruding through the flowers. Individual flowers are large, up to 22 mm long, and glabrous. The pollen presenter is spindle-shaped with a marked constriction at the mid-point.

Distribution – *Isopogon linearis* is commonly found north of Perth between an area southeast of Geraldton south to the Moore River and east to Wongan Hills. Excellent places to find this species are Lesueur National Park and the roadside verges around Eneabba.



Cultivation – this is an under-rated species rarely seen in cultivation despite its showy pink terminal inflorescences and compact habit. It is less popular than other pink-flowering species such as *I. cuneatus*, *I. latifolius*, *I. dubius* and *I. formosus*, probably due to the protruding leaves showing through the inflorescence and less crowded flowers. However, we have seen many spectacular specimens in the wild and these should be sourced for cultivation. Like most WA isopogons, grafted forms are probably required for reliable results in east coast gardens. It grafts readily onto eastern species but requires an interstock of *I. cuneatus* or *I.*

'Stuckey's Hybrid'.

Confusing species – surprisingly, the most confusing species is not an isopogon but *Petrophile linearis*. *Petrophile linearis* is more popular because of its wide distribution and stunning soft pink inflorescences. *I. dubius* superficially resembles *I. linearis* in its bright pink flowers and they often grow together but *I. dubius* has divided leaves.



Left, *I. linearis* habit, Hi Vallee Badgingarra

Petrophile axillaris, Meisn., Hooker's J. Bot. Kew Gard. Misc. 7: 68–69 (1855)

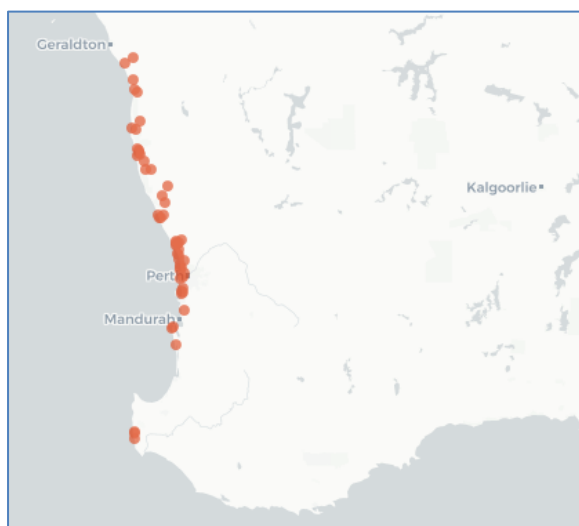
Petrophile axillaris was described by petrophile specialist Carl Meisner in 1855. Its specific name alludes to the way its flower heads emerge at the point leaves join the branchlet (leaf axils or literally, armpits). Although relatively common, this species is little known these days largely due to being treated as synonymous with *P. serruriae* for many years by taxonomists such as



Bentham. However a widely held view that further investigation was needed led to this species being informally reinstated in 1998 in the Census of Western Australian Plants, and formally reinstated in 2011.



Description – *Petrophile axillaris* is an upright or sprawling shrub of variable height (up to around 1.5m), single-stemmed and killed by fire. Its very rigid leaves are narrow and slightly compressed with scattered hairs. Ranging from 17 to 30mm in total length, leaves are deeply and widely divided 2-3 times with sharp points. These prickly short divided leaves form an intricate network around the long stems. Branchlets are clearly visible and have a dense covering of shortish hairs as well as a sparser layer of longer hairs over the top. A distinctive feature is many flower heads, relatively small at 15-25mm long, nestled along the branchlets at the base of the leaves (leaf axils). These attractive flower heads ranging from pale pink to candy pink push out from amongst the leaves and are very prominent. As well as lovely flowers, the inflorescences have eye-catching greenish-yellow bracts with distinctive pink tips. Both flowers and bracts are velvety (hairy), the erect flowers around 11-17mm long having longer hairs on their darker tips. Tepals open only part way along their length and hang downwards after opening. The flowering period is mainly September to November.



Distribution – endemic to Western Australia. Occurs in yellow or grey-brown sand in limestone areas along the west coast from near Geraldton south to near Mandurah below Perth. *P. axillaris* can easily be found in Yanchep National Park and along Indian Ocean Drive. There is an isolated population further south in Leeuwin–Naturaliste National Park partly corresponding with a break in the limestone habitats along the coast.

Cultivation – not known in cultivation although it may have been grown as *P. serruriae* which is rarely seen in gardens. *P. axillaris* is a high priority for the study group to bring into cultivation. A good specimen has been grown successfully to full maturity at Kings Park in Perth. Its many flower heads, intricate foliage and arching stems make it a great choice for an ornamental garden shrub. As a pink flowering species it is likely to be highly sought after. The fact that it thrives in higher rainfall near the coast may indicate greater adaptability than *P. serruriae*, given the horticultural rule of thumb that holds that species from wetter areas are more adaptable to dry than vice versa. Its requirement for the presence of limestone needs to be assessed and only the best forms selected. Grafted forms are probably required for reliable results in east coast gardens. Propagation trials have begun.



P. axillaris in cultivation at Kings Park, Sept 2009



P. axillaris cone scales (floral bracts) before (left) and after (below) flowering



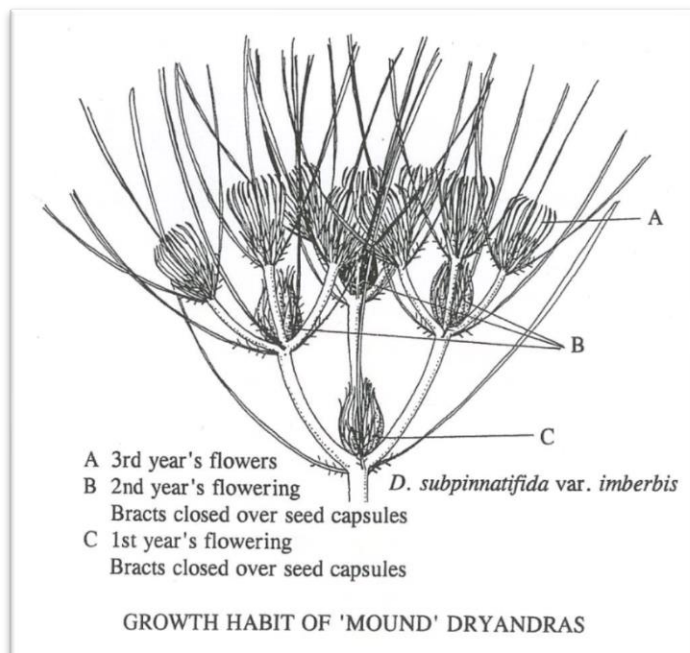
Confusing species – although now separated from *P. serruriae*, the two species are very similar. However *P. axillaris* is easily distinguished by its pink, rather than yellow flowers. It also has a more compact growth habit and has a quite distinct habitat and distribution, being confined to coastal limestone. *P. biloba* has superficial similarities such as long canes and axillary flowers, but it has short flat leaves on a stalk. The isopogon of the same name, *I. axillaris*, also has pink flowers but is morphologically dissimilar having entire leaves.

Species that mound – Dryandras, *Petrophile filifolia* and *Isopogon villosus*

Margaret Pieroni

Among the most attractive, neatly shaped plants for the garden are the 'mound' dryandras. They are shrubs, usually less than 1 m tall and wide, which do not have a lignotuber or underground stem and so are killed by fire. From a single stem, the first branches arise from the base of the first flower head which is produced on a short stalk surrounded by ascending leaves. Several of these branches are formed and each of them produces one flower head, the following year. Each year, a mound of closely packed flowers accumulates. The flowers are hidden by the equally dense, long leaves, as the plant matures. Dryandras which conform to the habit of growth described and illustrated in the diagram (right) are:

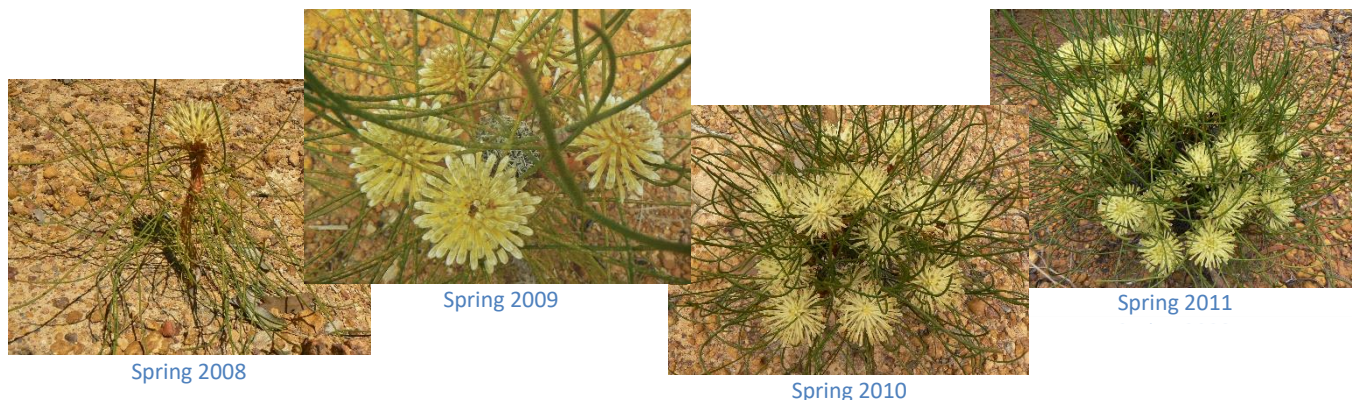
- D. nivea* subsp. *nivea*
- D. nivea* subsp. *uliginosa*
- D. sp.* Morangup
- D. drummondii* subsp. *drummondii*
- D. drummondii* subsp. *hiemalis*
- D. drummondii* subsp. *macrorufa*
- D. subpinnatifida* var. *imberbis*



D. subpinnatifida var. *imberbis* Banksia Farm

Soon after I moved to Denmark in 2005 I grew from seed a plant of *Petrophile filifolia* which I had wrongly identified as *P. longifolia* subsp. *longifolia*, at the time. As it grew, I realised that it, too, had the same growth habit as the dryandras. The photos below show each year's growth in my garden in Denmark WA. Alex George told me that *Isopogon villosus*, *Conospermum capitatum* and *C. petiolare* do, as well.

These plants are ideal for a formal garden, don't grow too big and, of course never need pruning to shape. My *P. filifolia* died suddenly after only four years and it is possibly short-lived. It would be good to know whether this is the case. Plants that I have seen in the wild appear to have been, as well.



Spring 2008

Spring 2009

Spring 2010

Spring 2011

Species named for people

Catriona Bate

As we learn about isopogons and petrophiles and become familiar with particular species, we try to get the names to stick in our brains. Sometimes the specific name refers to a morphological or geographic characteristic. This can be a helpful way to remember a species name, depending how unique or obvious that characteristic is. However, the practice of retaining the earliest naming sometimes makes a species name less useful in this respect, as for *Isopogon teretifolius* named for its terete leaves. It was one of the earliest species to be described but discoveries since have shown that terete leaves are very common in isopogons and petrophiles. There is also a *Petrophile teretifolia*.

Species named after people can be less easy to commit to memory. It can help to know something about the individual. In the case of isopogons and petrophiles there are relatively few species names derived from people, a somewhat unusual circumstance. Only five petrophiles and five isopogons have been named in this way. An additional person name occurs in the species *P. serruriae*, named for its similarities to a South African genus honouring James Serrurier, a professor of botany at Utrecht University early in the 18th Century.

The individuals we come across in isopogon and petrophile names were almost all botanists or collectors of type specimens. This is the case for many genera, so certain names do tend to recur across genera. Of currently accepted names, there is only one person honoured in both *Isopogon* and *Petrophile*, James Drummond.

One species name is of particular interest because it honours a woman, a very rare occurrence. (Most will have heard botanical illustrator Celia Rosser, for whom *B. rosserae* is named, observe that she is in illustrious company – only one other banksia species is named for a woman, and that is Queen Victoria!) The species is *Petrophile shirleyae* which was named for Emily Shirley (nee Day). Her exact identity was unclear until we got Peter Olde onto the case recently; see his article below on the etymology of this species. Here is a brief glimpse of the people for whom our isopogons and petrophiles are named.

I. baxteri (1830) – William Baxter was a well-known English gardener who visited Australia in the 1820s to collect plant material for British nurseries. After being propagated, many of the species he collected featured in *Curtis's Botanical Magazine* through the 19th Century. He collected the type of this species in 1824 and it was described by botanist Robert Brown. According to FloraBase, this species flowers in every month of the year. Other species you might know also named for him are *Banksia baxteri*, *Hakea baxteri*, *Eucalyptus baxteri* and the genus *Baxteria*.

I. fletcheri (1894) – Joseph Fletcher, science teacher and leading light of the NSW Linnaean Society, collected the type specimen at Blackheath, overlooking the Grose Valley, Blue Mountains. Victorian Government Botanist Ferdinand von Mueller's description of the new species was published in the Linnaean Society of NSW journal.

I. dawsonii (1895) – James Dawson was a surveyor from Rylstone NSW with an interest in native plants. This little-known enthusiast collected a number of species, working with botanist Richard Baker who is thought to have named the Rylstone species *Isopogon dawsonii*, *Acacia dawsonii* and *Eucalyptus dawsonii* in his honour.

I. gardneri (1995) – named by Foreman for Charles Gardner who first described this species as *Dryandra petrophiloides* in the 1930s. A great plant collector and long-time Western Australian Government Botanist (1929-1960), Gardner also encouraged the WA Government to set aside large reserves for conserving flora (one of them is Charles Gardner Reserve near Tammin).

I. drummondii (1843) and ***P. drummondii*** (1845) – both named for Scotsman James Drummond, an early settler in WA and prolific collector of Australian plants for overseas collectors and botanists as well as first Government Naturalist of WA. His material was the basis for a large number of new species descriptions. French botanist Jacques first described 'Isopogon de Drummond' or Drummond's isopogon in an article on rare or little-known plants. Swiss botanist Carl Meisner named *P. drummondii*. He worked on many

Drummond specimens, naming so many current isopogon/petrophile taxa that he is only surpassed by Robert Brown.

P. shuttleworthiana (1848) – named by Meisner for Robert Shuttleworth, an English botanical collector in whose herbarium Meisner studied many of Drummond’s collections of Proteaceae.

P. shirleyae (1891) – named in honour of Mrs J.F. Shirley (Emily Day) by Queensland botanist Frederick Bailey. Her husband John Shirley, an Inspector of Schools, was prominent in Brisbane botanical circles and in the Royal Society of Queensland. He first collected this species in 1890 on Moreton Island and his close friend Henry Tryon collected it around the same time on Fraser Island.

P. merrallii (1995) – Edwin Merrall was a gold miner who found this species near Southern Cross in 1890 and again near Parker's Range in 1892. However, it was not until a century later that Foreman named it in his honour.

P. foremanii (2011) – from the 1980s, botanist Don Foreman revised both *Isopogon* and *Petrophile*, collecting at least two type specimens and describing 14 new species of *Petrophile* and five new taxa in *Isopogon*. His 1995 treatments of both genera, although now partly overtaken by more recent taxonomic work, remain the only comprehensive, national source of reference information.



Top row from left: *I. gardneri*, *I. dawsonii*, *I. baxteri*, *I. fletcheri*

Bottom row from left: *P. shirleyae*, *P. shuttleworthiana*, *P. drummondii*, *P. foremanii*

On the Etymology of *Petrophile shirleyae* (Proteaceae)

Peter M. Olde

Petrophile shirleyae is the only species of *Petrophile* endemic to Queensland. It occurs from near Bundaberg south to the Logan River, south of Brisbane, where it was last collected in 1881 by Fr. Benedetto Scortechinii. It was described by F.M. Bailey, then Queensland Government Botanist, in 1891 in an early publication dedicated to the taxonomy of Queensland plants. The species was described from two specimens, one collected by Mr J.F. Shirley on Moreton Island and the other, gathered on Fraser Island, by Mr Henry Tryon, the Government Entomologist and close friend of Mr Shirley. The specimen collected by Shirley was selected by Don Foreman (1995: 478) as the lectotype. The Tryon specimen is missing, presumed lost, though it may reside in some local herbarium unrecognised as the now residual syntype of the species. Bailey indicated in the protologue that he named it ‘after the wife of J.F. Shirley, B.Sc., F.L.S. etc, botanical lecturer to the Pharmaceutical Students, Brisbane’. This explains why the epithet is ‘*shirleyae*’ and not



Photo: Allan Carr

'*shirleyi*', as it might be if it were named after her husband. In the same publication Bailey expressed great admiration for his research on Lichens (Bailey 1891: xli). The person to whom Bailey referred in the *Petrophile shirleyae* honorific was Emily Day 1850–1924. After her marriage, and throughout her life, Emily's identity was very much submerged under that of her husband. She was known universally it seems simply as Mrs J. Shirley.

John Frederick Shirley (1849–1922) was a highly respected member of the Queensland educational and scientific community. He had married Emily on 11 July 1874 at Aston Juxta, Birmingham. John was then still a student but in 1877 he qualified as Bachelor of Science, which he obtained from Queen's College, Birmingham, then affiliated with London University. He, his wife and two daughters (Daisy and Lilian) came to Queensland, Australia, in May 1878 at the invitation of the Queensland Department of Education, among a party of teachers from England.

On 1 January 1879, John was appointed a District Inspector of Schools. This meteoric career progression for a man who had spent only a few months as headmaster at Roma, was not without basis. A young man was needed. There was no rail. As he said himself, for more than twenty years, he attended his duties over 6000 to 8000 km annually visiting schools up to 400 km apart in outback Queensland, 'with saddle and pack-horses, a tent and the services of a farmer's son'. He subsequently obtained district inspectorial appointments to every school district in Queensland, one at Cooktown where murderous disputes then still raged between indigenous and white settlers.

In December 1886, the journal of the Royal Society of Queensland recorded him as a new member. Within two years, he was publishing papers including the Lichen Flora of Queensland, becoming in the process recognised as a world expert. He met F.M. Bailey, Colonial Botanist, and other important scientists of the day. Bailey (1891: xli) praised him for his efforts of self-education on the subject of the Lichens. Shirley also gave extra-departmental lectures in Botany, Geology and Physiology to young teachers qualifying for their certificate 1 at the Queensland Pharmaceutical Institute over a period of 18 years. Ultimately in 1909 he became Inspector of Schools for all Queensland and in 1915 the first principal of the Queensland Teachers' Training College. Upon his retirement he obtained a doctorate in Science from the University of Sydney.

Shirley, with others, was the main force behind the establishment of the Queensland Naturalist Society and, in 1914, the Gould League of Bird Lovers. In all of his favoured natural history organisations he served variously as President, Vice President, Honorary Secretary or Councillor. He held the position of Queensland Secretary of the Australasian Association for the Advancement of Science for the uniquely long period of 31 years (from 1891 until his death). For many years he had been Honorary Conchologist to the Queensland Museum and in 1920, after his retirement from the teaching profession, was appointed Conchologist.

Shirley's relationship with the Czech botanist Karel Domin (1882–1953) is unclear. Domin collected in Australia between December 1909 and April 1910, visiting Brisbane where he almost certainly befriended Shirley. Domin named three species after him. In the honorific for *Ficus shirleyana* (syn. *Ficus rubiginosa*), he wrote 'I dedicate this species to my dearest friend Dr J. Shirley of Brisbane, a most diligent researcher of the Queensland flora.'

John Shirley fathered five children (listed below) with Emily Day. All except one child had the same middle name Ferrers, possibly a genealogical link. Their youngest child, Raymond, was killed on 25 April 1915 at Gallipoli. His body was never found and there is no grave. Raymond was also a Queensland Junior Tennis champion and articled clerk. He was the first in Queensland to seek suspension of articles in order to enlist. The sadness of this loss and Dr. John Shirley's sudden death from heart failure on 5 April 1922 greatly affected her health. Emily had no particular claim to fame, other than as a support to her husband and family which she largely reared on her own because of her husband's long absences at work and later in pursuit of his interests and study. On December 16, 1923, she organised a stained glass window in her husband's memory to be installed in the Holy Trinity Church, Valley. Although the family home was in Bowen Hills, Brisbane, she travelled to Sydney in questionable health in 1924, but became seriously ill almost immediately and was

hospitalised at Manly where she died on June 20. Her father Henry (b. 1826) is listed on her death certificate (9425/1924) but not her mother Sarah (b. 1824). She had an older sister (Sarah A., b. 1846) but the other details of her life are unknown.

Emily Shirley was not a listed member of any of her husband's scientific organisations. Her own name could only be gleaned from an examination of the birth and death certificates of her family. She was interred at Toowong Cemetery, Queensland, beside her husband. F.M. Bailey deserves great credit in recognising her humble support for science in naming *Petrophile shirleyae* in her honour.

Children

Mrs Townsend (Beenleigh), Daisy Ferrers Shirley (b. Aston UK Sep 1875 m. 3 May 1898 Victor Louis Townsend, Queensland)

Mrs Scammell (Sydney), Lilian Martha Shirley (b. Derby UK Dec 1876 m. 1921 Alfred F. Scammell, Berry NSW)

Harold Ferrers Shirley (South Coast NSW) (b. Qld. 2 May 1881 m. 1917 Louisa Mildred Duff, Redfern NSW)

Mrs Eric Raff (Toowoomba), Edith May Ferrers Shirley (b. Qld. 18 May 1887 m 31 July 1920 Eric Raff, d. 1942)

Raymond Ferrers Shirley (b. Qld. 17 October 1892–d. Gallipoli 25 April 1915)

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A comprehensive list of references to the work of John Shirley can be obtained from the author

Petrophile shirleyae (conesticks)

Allan Carr

Petrophile (pet-ROFF-il-ee) means rock loving, so named because the first species collected and named by Robert Brown were from sandstone areas around Sydney. Australia has 66 species, all endemic to this country. Most of them occur in south-western WA with two species found in south-eastern Qld. For many years this genus was known as *Petrophila* but the name *Petrophile* was published first and has priority.

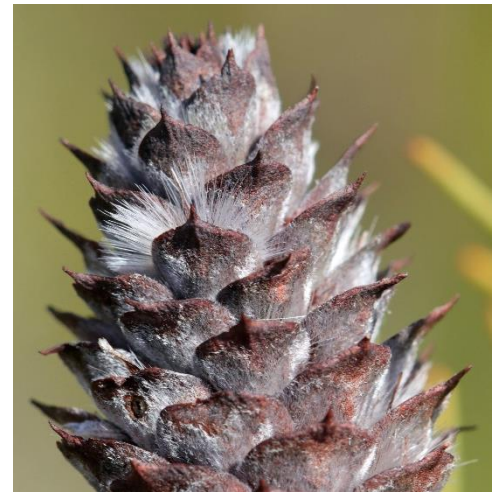
P. shirleyae occurs as a small shrub to 1.2m in wallum heathland of south eastern Qld from Bundaberg to the Gold Coast including Fraser Island and the three larger islands of Moreton Bay. It has fine tough leaves to



Brown woody fruiting cones have nuts to 3mm x 3.5mm embedded behind persistent scales. These small nuts have flattened surfaces covered with tufts of white spreading hairs to 6mm long that assist in wind dispersal.



Like some others in the Proteaceae family it has a lignotuber that can shoot again when the plant is damaged by fire. This species is not widely cultivated, requires very good drainage and full to part sunshine. It is used successfully by members of the ANPSA Isopogon and Petrophile Study Group as rootstock for grafting some of the WA species.



200mm x 1mm divided two or three times. They are cylindrical, grooved along the upper surface and have a sharp point. New growth is often reddish-bronze.

Flowers are creamy-white to yellowish with the faintest hint of pink and borne at branch ends in inflorescences to 80mm x 25mm from September to February. Individual flowers are about 10mm long, silky-hairy outside and have conspicuous yellow brush-like pollen presenters.

This article first appeared in Native Plants Queensland Vol 58 #1 June 2019

Interstock grafts

Phil Trickett

Interstocks are used to overcome incompatibility issues between a scion and a stock, choosing a species which is compatible with both the stock and the scion. A piece of this species (the interstock) is then grafted between the stock and the scion. A lot of experimentation is required to establish which species are compatible or not and whether an interstock will work.

Most isopogon species graft straight onto eastern rootstocks *I. 'Coaldale Cracker'*, *I. anemonifolius* and *I. anethifolius*. Isopogon species which don't work this way but do graft successfully using an interstock so far include *I. formosus*, *I. linearis* and *I. baxteri*. Two species which have proven to be successful as interstocks for all three of these scion species and the stocks listed above are *I. cuneatus* and *I. 'Stuckey's Hybrid'*.

Petrophile grafting is still in its infancy and not much is yet known about which species require an interstock to work with eastern rootstocks. So far, *P. linearis* has been identified as needing an interstock when grafted onto *P. pulchella*, *P. sessilis* or *P. shirleyae*. The successful interstock used to graft *P. linearis* is *P. teretifolia*.

There are two ways of approaching grafting with an interstock:

1. Graft the interstock onto the stock and wait to see if this graft is successful before grafting the scion onto the interstock.
2. Graft the interstock and the scion at the same time. This option is best when success rates for the interstock graft are known to be relatively high.

For isopogon grafts, I strongly recommend the second option because the interstock graft using *I. cuneatus* or *I. 'Stuckey's Hybrid'* can be expected to achieve success rates of close to 100 per cent. High success rates are also likely using *P. teretifolia* as an interstock for petrophile grafts, so again the second option is recommended.

Method (demonstrated with a cutting graft of *I. formosus*)

- Cut a 3 cm piece of interstock the same diameter as the scion, leaving a leaf at the top of the piece of interstock – see **Figure 1** showing from left to right the stock, scion and interstock
- Slice approximately 1.5 cm into centre top of interstock
- Cut either side of bottom of scion, creating a wedge to fit into the interstock
- Slide scion into interstock and tape together using Parafilm or Nescofilm – **Figure 2**
- Slice approximately 1.5 cm into stock
- Cut either side of bottom of interstock into a wedge (already has scion grafted on top)
- Slide interstock into stock and tape together – **Figure 3**
- Treat resulting interstock graft as for a normal graft. Cutting grafts should be placed under misting conditions. Grafts onto a seedling rootstock (i.e. having roots) should be placed under misting conditions or covered with a plastic bag until the grafts have taken.



Figure 4

Figure 4 shows the result of a cutting graft of *I. formosus* done in April 2019, with the scion (*I. formosus*) growing vigorously.



Figure 1



Figure 2



Figure 3

Cutting grafts are highly recommended for isopogons because of the ease of striking roots on chosen rootstock species such as *I. 'Coaldale Cracker'* or *I. anemonifolius*. Hopefully in time, we can identify an equally successful stock for petrophiles which strikes easily from cuttings.

WA Report Spring 2019

WA is the hotspot for isopogons and petrophiles given the majority of species are found there and spring is the peak season for flowering. Thanks to members for their reports.

Members report a very dry year in WA. At Badgingarra Joy Williams says '[it's] very, very dry here, only 1/3 last years rain to this time'. Margaret Pieroni notes: 'It wasn't a good year for the flowers, generally but they must have had some good rain [around Corrigin] because I also found dryandras that I have been looking for for a number of years, in flower.' Kevin Collins was involved with one of the conference tours and says: 'It was exceptionally dry (drought conditions) for many of our Esperance bus tour stops. Many that were flowering on our 2018 reconnaissance had finished or not flowered'. Roger Farrow reports very dry conditions in the north and disappointing displays in Fitzgerald and Cape Arid.

Luckily there was enough to keep isophiles happy. Roger found plenty to admire in the kwongan heathlands of Lesueur and Stirling Range as well as Two Peoples NP. He was lucky enough to find one of the lesser-known species, *P. semifurcata*, in flower way up at Shark Bay. Miriam Ford went on the conference day tour to Stirlings & Porongurups: 'Saw plenty of petrophiles, some isopogons. Probably missed plenty too being so awestruck by the sheer abundance & beauty.' Marilyn Sprague found a surprise flowering out in the Lake King area (an as yet unnamed species, *I. sp. Newdegate* but known as *I. nutans* for its nodding habit, pictured right). Ian Evans found some beauties up near Kalbarri – including the little-known species *P. foremanii*. Margaret Pieroni went to Corrigin in mid-October where *I. divergens* was flowering beautifully at the reserve just west of the town although *I. gardneri* was finished. Kevin Collins found plenty of I&P species on the conference Esperance tour but it appears not many were flowering. Some of his finds were unusual, including dwarf forms of *I. trilobus* and *P. teretifolia*.



Finally, a number of other enthusiasts put in reports of I&P sightings online in the Wildflower Society of WA Facebook page. Among these were some excellent photos and even some less common species, including *I. sphaerocephalus*, *I. spathulatus*, *P. axillaris*, *P. pilostyla ssp. pilostyla* and *P. conifera ssp. conifera*.

Here's a larger sample of what's been happening this season in the west.

Ian Evans I have a few shots from the west when I was over with Peter Olde, they were all from Kalbarri NP mostly from near the Airport. I will leave the ID to you.



From left, *P. foremanii*, *I. divergens*, *P. shuttleworthiana*

Roger Farrow We travelled from Cairns to Queanbeyan via WA briefly visiting many national parks, reserves, state forests and roadsides, photographing flowers of all and sundry. It will be a while before I get even a fraction of the plants identified. However I am happy to forward my pictures of what I believe are Isopogons and Petrophiles some of which may have a name.

The Parks and Reserves that we visited in WA were, from N to S, Purnululu NP, Wanjinini NP, Millstream NP, Karijini NP, Cane River CP, Zuytdorp NR (Shark Bay), Kalbarri NP, Beekeepers NR, Lesueur NR, Julimar SF, Stirling Range NP, Fitzgerald NP, Two Peoples Bay NP, Cape Le Grand NP, Menginrup NR and Cape Arid NP. The north was very dry and there were no fields of ephemerals but we did see some wreath plants. The best displays were in the Kwongan heathlands of Lesueur [including *I. dubius*] and Stirling Range [*I. formosus*]. Those in Fitzgerald and Cape Arid were disappointing in terms of flower abundance and Two Peoples NP although small was the best. Still no insects on those Isopogon flowers!



P. semifurcata, Zuytdorp



Left, *P. linearis* Lesueur, right, *P. prostrata*, Fitzgerald



Kevin Collins I & Ps seen on Albany to Esperance and return post conference tour. F denotes flowering. **Quaalup** – Isopogons *trilobus* (two different leaf forms) & *formosus* F; Petrophiles *prostrata* F, *divaricata*, *teretifolia* F & *ericifolia*.

West Mt. Barren – Isopogons *teretifolius*, *trilobus*, *polycephalus*, *formosus* F & *buxifolius*; Petrophiles *prostrata* F, *squamata* & *fastigiata*.

Roe Hill – Isopogons *teretifolius* & *nutans* (sp. Newdegate); Petrophiles *fastigiata*, *squamata* F, *glauca* & *teretifolia*.

Swamp Road near Bremer Bay – Isopogons *formosus* F, *trilobus*, *polycephalus* & *teretifolius*; Petrophiles *seminuda* & *rigida*(?)

Archer Lookout Ravensthorpe Range – Isopogons *trilobus*, *polycephalus* & sp. *Ravensthorpe* F); Petrophiles *fastigiata*, *glauca*, *seminuda* & *squamata*.

Rotary Hill Esperance town – Isopogons *polycephalus* & Sp. *Ravensthorpe*(?).

Frenchmans Peak, Cape Le-Grand – Isopogons *trilobus* & *teretifolius*.

Thistle Cove – *I. polycephalus*; *P. squamata*.

Lucky Bay – *P. squamata*.

Chingarrup Sanctuary (near Boxwood Hill) – Isopogons *formosus* variant (very broad foliage form) & sp. *Fitzgerald* R.; *P. squamata*.



I. sp. Ravensthorpe

Pallinup R – *I. spathulatus*

West Beach eastern end of FNP – *Isopogons trilobus* (dwarf), *polycephalus* & *squamata* (broad leafed); *P. teretifolia* (dwarf) thickened leaves.

Jerdacutup – *P. heterophylla*.

I & Ps Mondurup Reserve day in-conference trip, Mount Barker, Langton Rd – *Isopogons formosus* F & *attenuatus*; *Petrophiles divaricata*, *serruriae* F, *rigida*.



Dwarf *I. trilobus*, West Beach

Wildflower Society of WA Facebook page

There were plenty of enthusiasts enjoying isopogons and petrophiles in the WA bush this season. We've seen them being called stars and sparklers before, with amazing spiral patterns. This year there was talk of them exploding into flower, and flowers arranged like a ballet tutu. Even pollen presenters were praised, their display described as orange fireworks.

There are some great photographers among the many out admiring both genera. While far from the most popular of all our wonderful endemic genera, it was encouraging to see people not only enjoying isopogon and petrophile species but sharing and recording them, raising awareness and educating all in the process. Here's a taste of what people recorded this season in WA on the Wildflower Society of WA Facebook page.

There were at least 17 isopogon sightings of nine species this season, with many just amazed and thrilled at such intricate and beautiful flowers. *I. divergens* was a favourite, seen at Kalbarri then further south at Moora then Chittering between August and September. *I. formosus* also featured, seen at Cape Riche way back in June and into August in the Stirlings. *I. asper* featured too, not often seen in the Stirlings but found there in July and in the Perth Hills in August.

Also at the Stirlings in July was *I. baxteri*. I&P SG member Lyn Alcock spotted what is probably the little-known species *I. spathulatus* in the Stirlings (see her photo, right) in July and the popular *I. cuneatus* at Bremer Bay in August. Another pink favourite, *I. dubius*, was seen by enthusiasts at Roleystone in July and Mogumber in August. Beyond the glamorous pinks, there was *I. sphaerocephalus* in the Perth Hills and *I. trilobus* at Bremer Bay, both photographed in September.



Petrophiles had a big impact this season. There were at least 28 sightings logged along with photos of a total of 12 different petrophile species. How good to see petrophiles being appreciated for a change. Not surprisingly, many were unsure or not able to identify the species they found, so the opportunity for others to contribute and educate via comments was invaluable.

After our straw poll of members in the last newsletter it was no surprise to find that the favourite petrophile was none other than *P. linearis*, our Study Group Number Two. Well-known as a favourite of photographers, this year it was stealing hearts from September through to October, from Pindar down to Badgingarra and Donnybrook. Also popular was *P. biloba* which just scraped in as our Study Group Number One. In August and September it was noted in the Perth Hills and around Kalamunda. To round off the lovely pinks, just this month *P. axillaris* was spotted at Yanchep National Park and *P. teretifolia* at Bremer Bay just beginning its run.

A number of people discovered *P. striata* this year between August and September, on the outskirts of Perth and south at Bremer Bay. It was the subject of much debate as to its identity but as it has very distinctive flowers it is very easy to identify from photos if you know what to look for. *P. macrostachya* was admired for its flowers and foliage in September/October at Kalbarri and near Perth, while in September *P. seminuda* was noted at Kalbarri and Roleystone. *P. serruriae*, a common and stunning flowerer, was only mentioned once

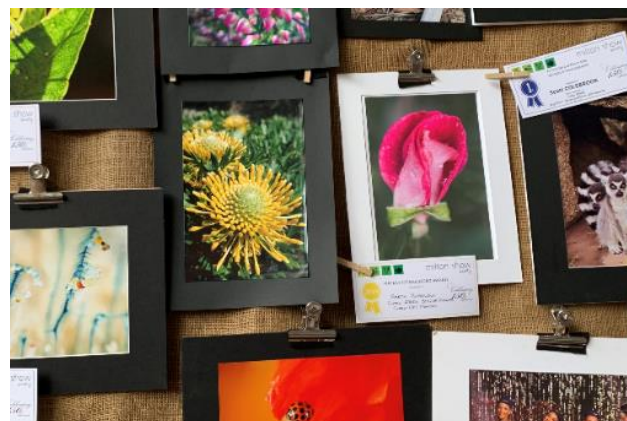
this year (at Dryandra by Lyn Alcock). There were also sightings of *P. ericifolia* (Bremer Bay, October) *P. pilostyla ssp. pilostyla* and *P. conifera ssp. conifera* (Kalbarri, September) and *P. divaricata* (Stirlings) which by late August had already finished flowering.

Turning heads in the bush

Isopogon anemonifolius has been capturing attention in our neck of the woods on the NSW south coast. The



photographic competition at the local show featured *I. anemonifolius*. Although it didn't win a prize, the photo really stood out in the display with its bright yellow, just like this species does in the bush.



A series of council-funded workshops for children with a local artist in the South Pacific Heathland Reserve resulted in printed greeting cards now on sale locally. Featuring a variety of colours, textures and shapes, *I. anemonifolius* can be found among the grevilleas, banksias and ferns.

In the press

Australian Plants Winter 2019 Vol 30 No 239

This issue of our national ANPSA journal has a focus on Gondwana plant connections. Dr Tonia Cochran's article on the Proteaceae family is of particular interest, outlining the history and structure. Named after the shape-shifting god Proteus of Greek mythology, it has a huge variety of floral shapes. The article includes pictures of species from the different groups within Proteaceae chosen to demonstrate similarities of species from landmasses which are now separated by considerable distances. Under tribe Leucadendreae, *Isopogon cuneatus* (Subtribe Isopogoninae) is pictured alongside *Adenanthos sericeus* (Subtribe Adenanthinae). Other photos in the article show species from the same tribe with striking similarities to isopogons and petrophiles – *Leucospermum* hybrid 'Mardi Gras Ribbons' (detail below, left) and on the back cover, *Serruria phyllicoides* 'Strawberry Burst' (detail below, right) – both from Subtribe Leucadendrinae.



APS NSW monthly newsletters

- [June 2019](#) features some photos from our PETROPHILE ISSUE NL24
- [August 2019](#) features Linda Handscombe's crocheted hat complete with *I. cuneatus* (pictured below left)
- [September 2019](#) features Lloyd Hedges' photo of *I. cuneatus* growing at Illawong Fire Station (pictured below right)

Photo finish

What is this floral marvel, seen on a Correa Study Group outing? This hat was crocheted by Linda Handscombe to wear when she sells plants at a market. There's no pattern and she made them all up. There's wattle, daisy, epacris, eucalypt and correa flowers – but, as Linda says, it's open to interpretation.



From the Correa Study Group newsletter June 2019.

Photo finish



Isopogon cuneatus at the Illawong Fire Station garden (photo Lloyd Hedges)

Financial Report

Total 25/04/2019	\$1,627.31
Bank balance	\$1,510.62
Cash on hand	\$116.69
Donations	\$100.00
Native Plants Qld	\$20
APS SA Region	\$10
ANPSA	\$20
APS LaTrobe Valley	\$50
Expenditure	\$13.25
Total 23/11/2019	\$1,714.06
Bank balance	\$1,610.62
Cash on hand	\$103.44