



# Isopogon & Petrophile *Study Group*

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*Isopogon anemonifolius*, Moss Vale NSW, December, 2014.

See page 6 for our profile of this species.

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

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

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Dear fellow isophiles,

We are just back from the Plant Collectors' Fair at Clarendon NSW and are pleased to report that we saw a few isopogons and petrophiles for sale, both eastern and western. It is often impossible to find them so this was encouraging – both our profile plants in this issue were available.

*Isopogon anemonifolius*, this issue's cover plant, is still flowering on the coast here, perhaps encouraged by recent rain. Wow it's been a topsy turvy three months of extremes! We had our hottest summer on record in NSW with very low rainfall, then a deluge of 499 mm in March at our place. This is our wettest month in the six and a half years we have been on the South Coast. While the east coast of NSW has seen welcome rains, many other parts of the country remain extremely dry and unseasonably warm. Ros and Ben Walcott in Canberra have reported a very dry summer with record high temperatures, while Neil Marriott in the Grampians sadly reports that he has lost nearly all his I & Ps after a similar hot, dry summer followed by a March with more than 20 days over 30°C. It's not only extreme weather making growing isopogons and petrophiles even more challenging – members are reporting that long-term changes in climate are also having a damaging effect.

Over the summer, we had a lovely display of *Petrophile pulchella* in our garden but gradually some of our grafted isopogons succumbed as did a couple of large *I. anethifolius* plants. It appears that the form of *I. anethifolius* we have growing in our garden is not reliable enough in our conditions to persevere with it as a rootstock. See Phil's grafting update for more on this topic. All our other eastern isopogons and petrophiles are thriving through the challenging conditions.

In this issue, Margaret Pieroni and Neil Marriott have further reports on the stunning wildflower season in the West last spring. Our plant profiles this issue are *I. anemonifolius*, the most common isopogon in cultivation, and *P. fastigiata*, another stunning WA petrophile, which sadly we rarely see in gardens. Also, Mark Noake demonstrates the benefits of pruning I & Ps. Following this lead, we recently kneecapped an *I. dawsonii* which was about 2.5m tall so it will be interesting to see how it reacts. We also report on our visit to Tony Henderson, who has been successfully grafting isopogons and petrophiles for over 30 years! Phil also provides his grafting update, which includes early results in using *I. mnoraifolius* as a rootstock.

We are always looking out for good places to view isopogons and petrophiles. Our 'garden' report this issue is the great natural garden of 'Hi Vallee' in the Eneabba region north of Perth. We also look at the response of some of our eastern I & Ps to fire. A part of our local coastal heath at Ulladulla was burnt in late Spring last

year. We visited it recently to see the regeneration among the I & Ps which has been quite spectacular! Let us know if you have also observed I & Ps regenerating after fire. And of course, we report our members' experiences in propagating and growing I & Ps.

Don't forget to take advantage of the arrangements we have put in place for exchanging cuttings and seed (see details at the end of this newsletter). Some members did so after last issue, and we will be keen to follow progress. All the best for a cool, wet autumn and winter, and for success in your I & P endeavours.

Catriona & Phil

## From our members

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### **Robbie Blackhall-Miles and Ben Ram, North Wales, UK**

We grow a whole range of Proteaceae in our small garden and research nursery based in North Wales, UK. Our interest in Proteaceae stems from our interest in the evolution of land plants. Our very small back-garden (115m square) is an institutional member of BGCI (Botanic Gardens Conservation International) and houses the UK's National Collection of southeast Australian Banksia species. Robbie is the chairman of the Australasian Plant Society in the UK and Ben is the society webmaster.

Our climate is cool temperate, receiving about 2000mm of rain annually, with an average minimum winter temperature of -6C and summer temperatures occasionally reaching between 25C and 30C. Humidity is often between 50% and 80% and strong winds reaching over 70mph are not uncommon in the Autumn and Winter. The area where we garden has acid soils with slate bedrock which we have altered by adding a lot of gravel and raising some beds to increase drainage. When we started growing Proteaceae we did so cautiously, under the belief that many would not survive but, bolstered by some successes, we now grow well over 100 species both in the ground and in pots. We are now experimenting with some genera that are less well known in the UK; including *Isopogon* and *Petrophile*. We currently grow *Isopogon anethifolius*, *I. anemonifolius* and *I. formosus*. Accessing plant material of *Isopogon* and *Petrophile* is proving difficult and we intend on trying to grow some more from seed. We have specialist seed germination facilities as well as a protected growing on area that allow us to acclimatise seedlings to our climate.

You can find out more about our garden at [www.fossilplants.co.uk](http://www.fossilplants.co.uk). Robbie also tweets as @fossilplants. We look forward to being part of the group and have already started reading all the back-issues of the newsletter.

### **Ros Walcott, Canberra**

Canberra has had the hottest January on record and only received 8mm of rain for the entire month. We have had quite a few losses of well-established plants, even some of my old favourite pot plants have carked it. The [grafted] *Isopogon cuneatus* is fine, thank heavens. We have lost a couple of *Isopogons* too, two Candy Cones and a *cuneatus* on its own roots.

### **Patrick Laher, Uralla NSW**

*Petrophiles*: At this stage, I'm only growing *P. biloba* and *P. teretifolia*. The latter is quite hardy in our cold climate and both plants have flowered prolifically this year as well as coping with heavy January rain. I've recently planted a third specimen in a more open position to see how it handles the frost. *P. biloba* doesn't like the frost at all. I have previously lost several plants trying to find the right position for it. This current plant is in a protected position on the western side of my cottage and has grown and flowered well. Recently I've planted a further two cutting grown plants on the edge of my shelter belt. A plant of *Petrophile linearis* in a large pot died very quickly after planting. I'm not aware of any grafted *Petrophiles*.

Isopogons: Plants of *Isopogon mnoraifolius* are winners in my garden. They have handled frost, drought and floods and I'm pleased to see that Phil is trialling them as rootstocks. My grafted *I. cuneatus* in a large pot on the verandah has buds on it for the first time. *Isopogon formosus* is quite hardy in the garden but *I. dubius* planted next to it didn't survive the frost. I have several plants of our local *I. petiolaris* growing and flowering in several positions in my garden. It's been a trouble-free plant.

#### Karlo Taliano, Georges Hall, Sydney

Following on from the plant profile in the last newsletter, Karlo sent some lovely photos of *Isopogon divergens* taken in 2014 on a road verge near Badgingarra NP, WA.



#### Shirley & Warwick Daniels, Canberra

This to let you know what happened to the four Isopogons that you gave us in February 2016. At the time, temperatures remained in the high 30's so we delayed planting. We also had to go away for about a week. When we returned all plants were showing stress with some upper leaves browning quite badly. We decided to plant them all straight away and wish them luck. *Isopogon* 'Stuckey's Hybrid', *I. formosus* and one *I. anethifolius* all died within 2 weeks. They were planted in areas shaded in the morning. The afternoon sun proved deadly. The second *I. anethifolius* planted in full shade has recovered and thrived. Do you know how long it takes before they flower? Because of our initial death rate I asked around and found some encouraging responses and other experiences similar to ours. Ian Tranter said he had not had any success with Isopogon. Pamela Finger has a beautiful specimen in her front yard, also in mostly shade, which has thrived with no special attention.

*Sounds like they dried out too much before they could get established. It seems like it was an unfortunately hot period in Canberra. They don't need shade or special attention. I. anethifolius flower pretty early, maybe this spring it will happen. You should try again [with the others]. Autumn/winter planting should give them a good time to get established. It all provides valuable knowledge for the study group.*

#### Neil Marriott, Grampians, VIC

Really bad news of the isophiles and petropogons this summer –we have just had 20 days over 30 degrees in March following an extremely dry summer and nearly ALL our Pets and Isos are now dead!!

#### Liesbeth Uijtewaal, The Netherlands

Your isopogons (from the cuttings you sent December 2015) are doing very well too, I've been potting them on today since they're actively growing and definitely needed a larger pot. Most other plants are not all that active yet. The bracts of *I. latifolius* are coming apart too so I trust those will properly develop as well.



All *Isopogon formosus* plants came through winter OK. It was interesting to see though that the ones I'd been growing before are still nice and green whereas 'your' plants turned purple in winter. They may not be as cold hardy as the ones I had and reacted by producing stress pigments.

Oh, spring is just awesome. Noticed developing buds in *Hakea bucculenta* yesterday as well as good progress in the buds of 'Stuckey's Hybrid'. It's so interesting to see how differently the buds of the different isopogons develop.

The flowers of *Isopogon cuneatus* are absolutely stunning, there are three on the plant now and four more to come by the looks of it. It'll be great if those are going to flower as well!

It looks as if the flowers of *I. latifolius* are they stop I'll add the potash. My *divergens* seedlings came through winter grow well this summer and flower next year! I suppose you didn't get any replies as for time from seed to flowers from the other members? *Sorry but we didn't receive any info. on time from seed to flowers but I would expect it to be within 3 years.*



developing too, as soon as I feel *Petrophile linearis* and *I. undamaged*, cross fingers they'll

### Paul Kennedy, Elliminyt (Colac) VIC

We have had a wonderful summer with a few days over 30 degrees C and some 125mm of rain. The grass is still green which means that there is enough moisture still at the top of the soil. I have erected a new hot house made out of aluminium and corflute and it certainly is a lot more sturdy than the previous one. The isopogons have put on a lot of growth over summer, and I am looking forward to adding some more.

### Kevin Collins, Mount Barker WA

The only plants I have established in the garden are two *Petrophile longifolia*, one flowered profusely last year and three *I. latifolius* that have flowered well over the past three years. I do intend very soon as the season has changed to mulch all the cones from our field trips and direct sow it. You can visit down the track and ID what comes up.

Cutting wise I have a few species that struck in my peat plugs in the open nursery. These either had no hormone and some just honey. Others calloused but didn't produce roots. I've been told that indicates the hormone is too strong? I was trialling clonex purple for soft wood. I grew one underground stem piece of *Petrophile helicophylla* which is now sending up new shoots & looks promising. (branchlet scratched, dipped in banksia honey and grown in Richgro native plant mix in a 50cm deep tray).

Others in coir plugs that have struck are two forms of *I. buxifolius* from Point Henry Bremer Bay and Gairdner R., the *P. surruiae X diversifolia* from Mondurup Reserve, *P. rigida* from Mondurup reserve, *I. trilobus* from Chillinup Rd., south Stirlings, *P. Sp.* from Bremer Bay with short narrow elliptic leaves, *I. cuneatus* (dwarf form) Cheynes headland, *I. attenuatus* from Mondurup reserve, *I. & P. Sps* with terete foliage from Boonalling Reserve Corrigin, *I. Watheroo?* (oblanceolate- elliptic foliage), *I. formosus* (dwarf) Cheynes headland. The Mondurup Reserve cuttings were planted Feb. 2016. The others either July or August 2016. Most took over 6 months to produce roots. They have recently been potted up into 70mm pots. I'm sure in a more temperature controlled environment with some bottom heat they would be faster.

## Maria Hitchcock, Armidale

Maria was one of those who took advantage of our process for exchanging cuttings and seed, and she sent an update on her results so far.

Cuttings: All cuttings are placed individually into plugs in foam trays under a misting system. Clonex purple used.

- I. 'Stuckey's Hybrid' - struck very quickly - potted on into tubes.
- *I. latifolius* - took about two months to strike - potted on into tubes.

Seed: sown 2/1/17 in punnets filled with equal parts peat, fine perlite, fine vermiculite. Punnets are kept in an igloo covered in plastic and shadecloth. They are watered with a fine overhead spray once a day.

- *I. petiolaris* - germinated within a month
- *I. formosus* - germinated in about 5 weeks
- *I. dubius* - germinated in 2 months
- *I. mnoraifolius* - not germinated yet
- *I. divergens* - not germinated yet
- *I. spathulatus* - not germinated yet

Yes it's a record wet time for us too. We had a very hot and humid summer followed by all this rain. Brilliant for the garden. None of us are having much luck with *I. mnoraifolius* seed collected from John Nevin's garden. Is there a trick to this species or should we grow it from cuttings? I find *I. mnoraifolius* very easy from cuttings. Try some and let us know how you go. John Nevin has *I. mnoraifolius* growing. I'll see if I can get some cutting material. Am looking forward to planting out my I. 'Stuckey's Hybrid'. I'll be very interested to see how it fares in our winter. I suspect I. 'Stuckey's Hybrid' will be pretty tough on its own roots. Look forward to hearing its progress.

## *Isopogon anemonifolius* (Salisb.) Knight, Cult. Prot. 93 (1809)

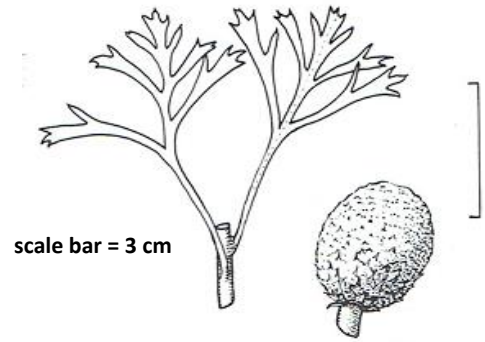
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*Isopogon anemonifolius* (Broadleaf Drumsticks) is the type species for the *Isopogon* genus. It was initially named *Protea anemonifolia* by Richard Salisbury in 1796. The species name was due to the resemblance of the leaves to anemones. It was given its current name in 1809 by English plantsman Joseph Knight, who rushed out a controversial paper before Robert Brown's paper 'On the natural order of plants called Proteaceae', which included a section on the genus *Isopogon*, was published in 1810.

**Description** –*Isopogon anemonifolius* is a low, bushy shrub up to 2 m in height with dwarf forms around 25 cm found on exposed coastal headlands. It has a lignotuber. The leaves are extremely variable not only between specimens but also on a single specimen. They are mostly 2-3 lobed to pinnatisect but sometimes simple and linear. The lamina is flat, 5-11 cm in length with the petiole around half the lamina in length. The new growth and leaves may be turn reddish-purple, particularly in winter. It produces masses of terminal and axillary yellow flowers between July and December. The cones are globose (ball-shaped), to around 25 mm diameter.





**Distribution** – *Isopogon anemonifolius* is widely distributed along the coast and ranges of N.S.W., and grows in sandstone soils in woodland, open forest and heathland.

**Cultivation** – This is one of the easiest isopogons to grow successfully, easily adapting to a range of soil types and rainfall conditions. The dwarf forms commonly in cultivation are spectacular in flower, producing masses of bright yellow terminal flowers which persist for a number of weeks. This form is a must for any garden.



## *Petrophile fastigiata* R. Br., *Trans. Linn. Soc. London* 10: 70 (1810)



*Petrophile fastigiata* was first described by Robert Brown in his landmark paper published in 1810 on the natural order of plants called proteaceae titled 'On the Proteaceae of Jussieu'. It is sometimes called the pineapple petrophile.

**Description** – *Petrophile fastigiata* is a medium, bushy shrub to 1.5 m in height. It is non-prickly with erect leaves up to 11 cm with a petiole up to 5 cm making up half the length of the leaf. The lamina is terete and 2-3 times ternately divided. The lower leaves are 2-3 times divided and 20-50 mm long, whereas the top leaves are less than 20 mm in length. It produces bright yellow terminal flowers between September and November.



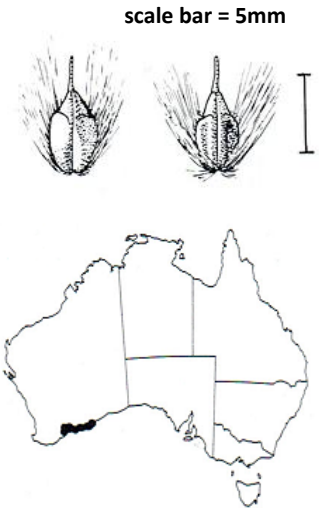


The cones are ovoid (egg-shaped, broadest below middle), and between 20 and 40 mm in length.

**Distribution** – *Petrophile fastigiata* grows in southern WA on well-drained relatively heavy gravelly/clay soils between Ravensthorpe and Esperance.

**Cultivation** – This is one of the spectacular petrophiles in flower, displaying masses of creamy, yellow terminal flowers. Its foliage is also

very attractive, with the striking bronze-red new growth a highlight. Despite these attributes, it remains very rare in cultivation. Like most WA petrophiles it requires very good drainage, and needs to be grafted for introduction to east coast gardens. It should be a priority plant for Study Group members to study in cultivation as it is one of most striking WA petrophiles.



Photos taken at Fitzgerald River National Park WA, September 2006.



## Tony Henderson: isopogon & petrophile grafter

### *Phil Trickett*

One of the first names mentioned by serious native plant growers in Sydney chasing grafted Western Australian plants is Tony Henderson. Until recently we hadn't met him. This was rectified last month when Catriona and I drove to Sydney to meet him and talk grafting.

Tony was aware of our role as I & P Study Group leaders and had generously summarised his experience successfully grafting over twenty WA isopogon species and ten petrophile species. This experience dates back to 1983! As expected he finds WA isopogons easier than petrophiles but he has still had many successes with petrophiles. His method involves growing the stock plants first and then grafting onto the rooted stock plants using a top wedge. One advantage of this method over cutting grafts is that stock plants that are difficult to



strike from cuttings can be produced from seed, whereas the cutting graft method demands that the stock cuttings strikes readily.



Phil talks grafting with Tony Henderson

**Isopogons:** Tony's list of successfully grafted isopogon species includes a few that I have been unable to do, and a couple of these require interstocks for success. This is valuable information for the study group to introduce grafted plants into cultivation. It is so important that this information is shared so that the wheel doesn't have to be continually reinvented. Tony mainly uses *I. anemonifolius* as his root stock as it is easily available (also *I. anethifolius* and *I. dawsonii*) and reports no issues with resprouting below the stock due to its lignotuber. He questions how reliable *I. dawsonii* would be in higher rainfall/heavy soils of eastern Australia.

Below is Tony's list of isopogon graft successes (with interstock noted where relevant). Many of these are growing in Tony's garden, some nearly 30 years of age! Last year Tony lost a grafted *I. polycephalus* at the impressive age of 29 years. We saw remarkable grafted plants of *I. trilobus* and *I. cuneatus* in his garden. The one frustrating isopogon species Tony has been unable to graft despite numerous attempts is *I. inconspicuus*.

*adenanthoides, asper, attenuatus, axillaris* (3 varying forms), *baxteri* ('Candy Cones' interstock), *buxifolius* (three subspecies), 'Candy Cones', *cuneatus, divergens, dubius, formosus* ('Candy Cones' interstock), *latifolius, linearis* ('Candy Cones' interstock), *polycephalus, scabriusculus* (two subspecies), *pruinosis ssp. glabellus, sphaerocephalus, 'Stuckey's Hybrid', teretifolius* (both subspecies), *trilobus*

**Petrophiles:** Tony has successfully grafted ten species of petrophile, which include some of the most spectacular species. In his garden are many results of his work, including *P. glauca, P. biloba* and *P. longifolia*. He has also tried a further fifteen species without success. He uses *P. pulchella* and *P. sessilis* as stock plants. The successes are:

*diversifolia, divaricata, drummondii, fastigiata, glauca, linearis (teretifolia interstock), longifolia, prostrata, serruriae, teretifolia*

For the record, species that Tony has not yet had success with are: *anceps, biloba* (with interstock), *carduacea, conifera, ericifolia* (or similar species), *heterophylla, incurvata, macrostachya, media, propinqua, plumosa* (with interstock), *rigida, shuttleworthiana, squamata* and *striata*.

We would like to thank Tony for his generosity in providing this information to the Study Group. His knowledge and experience in grafting I & Ps is without peer. It is so important that such information is not lost from one generation to the other, as rebuilding such knowledge requires half a lifetime for someone as passionate and committed as Tony.

## 2016 Isopogon and petrophile activities in WA

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### Margaret Pieroni

#### *Travel discoveries and a mystery...*

In the last newsletter, Neil Marriott wrote of visiting the amazing roadside display near the Bluff Creek turn off on South Coast Highway. With Tim Darrington, a Dryandra Study Group member from France, on our way back to Denmark (WA), after having taken part in the Hakea Crawl in early September, we stopped to look at this wonderful spot that had caught our attention. I notified Neil and, as he wrote, their tour group spent an hour there and later, with Neil and Wendy and other Study Group members, we spent another hour there, on 24<sup>th</sup> September. The flowering was even more spectacular as was the flowering of many other plants seen on the previous visit to Quaalup and Lake King with the Hakea group. Photos do not do justice to such a display as this. It is the most wonderful, completely natural garden.



Bluff Creek 'garden'

On a previous 5-day trip with Tim Darrington, and Lyn Alcock, a Dryandra Study Group member from Narrogin and fellow orchid enthusiast, we travelled from Mount Barker as far as Eneabba and Three Springs, including a visit to the Williams' Hi Vallee. I was able to show Tim 91 dryandras in the wild – 51 of which were flowering. We also found many Isopogons and Petrophiles flowering well.

We stopped at the type location of *Dryandra nobilis* subsp. *fragrans* that occurs almost exclusively at Hi Vallee. At this spot, on Garibaldi Willis Rd, north of Badgingarra, we couldn't find any of that dryandra left. There were, however several isopogons and petrophiles including *I. dubius* and *Dryandra stricta*, *kippistiana* var. *kippistiana* and *carlinoides*. One shrub, about a metre high with very unusual flower heads caught my eye. I haven't been able to identify it. I wonder whether it is a malformed *I. dubius* or some sort of Isopogon X Dryandra? The 'flowers' appear to be imperfectly formed. What do you think?



Looks a bit like *I. dubius* foliage but there is something different going on with those large brownish flowers....could it be similar to the bronze buds of *I. dubius* found at Badgingarra by Neil Marriott illustrated in his article later in this issue?

In early August I made a return visit to Boolanelling Reserve with Brian Moyle and Alex George. We found 5 or 6 petrophiles and isopogons, there. Below, left *P. glauca*, middle *I. pruinosis* ssp. *pruinosis*, right *I. scabriusculus* ssp. *stenophyllus*, Boolanelling Nature Reserve, August 2016.





*Plant discoveries: the story of Petrophile antecedens*

At some time in the late nineties, a friend, Ray Garstone who is a bird expert and also interested in the flora, told me about and showed me a photo of a petrophile he had seen. There was just one plant in a disused gravel pit, one of my dryandra 'hot spots', west of Woodanilling. I never did find the plant though I looked for it on several visits to the location.

Meanwhile, in June 2002, Fred Hort who has discovered, re-discovered and found new populations of many plants including verticordias, grevilleas and two new dryandras, took me to see a petrophile that he had collected in several places in what is now the Wandoo Nature Reserve, between Perth and York. I'm almost sure that it is the one Ray saw but didn't collect. Mike Hislop and Barbara Rye [from the WA Herbarium] described it and named it *Petrophile antecedens* because of its early flowering time compared to other members of the genus. Another friend and Dryandra Study Group member, Val Crowley from Darkan who has also discovered new species had also collected it, further south, in 1992.



The Dryandra Study Group is compiling an archive of photos of all the dryandra taxa. Some plants, in the wild had not flowered since I began taking photos with my digital camera. Last year we had exceptional rainfall and many dryandras were flowering for the first time in years. Since the flooding rains of earlier this year in most of the South West (but not here, in Denmark), I'm hopeful of finding flowers on autumn and early winter-flowering plants that did not flower, last year. I heard that a botanist is re-examining a form of *Dryandra baxteri* that grows south of Busselton – a long way from the type from around Albany. I had photographed it in 1984 and fortunately was able to locate the negative. After many enquiries, a friend found one firm in Albany that still prints from film and I had the image put on a thumb drive. I was very pleased with the result and while selecting some more dryandra negatives to have processed, I found those of *P. antecedens* (left).



# Hi Vallee: a private Eden

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## *Catriona Bate*

Don & Joy Williams have a huge natural garden on their farm Hi Vallee near Badgingarra, around 200 kilometres north of Perth. Although their 2000-hectare property is a working sheep and wheat farm, one-fifth remains untouched. Don was allocated the land over fifty years ago, and once he and Joy realised how special their remnant of kwongan heathland was, they began to protect and preserve this botanical gem.



The plant diversity at Hi Vallee is staggering. Everywhere you look there is another amazing species, often right under your feet or within a metre. The camera is kept very busy (on our first visit I had to continually replace batteries). There are some 520 different plant species in 56 families, including six declared rare flora and 30 priority species. In a number of cases, these rare species are found only on Hi Vallee.

This kwongan heath on white sand over laterite is incredibly rich in proteaceae. It's a dryandra mecca with 21 different species, and is also a great place to see good examples of banksia species like *candolleana*, *chamaephyton* and *grossa*. For isopogon/petrophile fans it's a wonderland. There are no less than thirteen species of petrophile and seven species of isopogon flourishing at Hi Vallee. The list of species is below. With so many different species from each genus, the property provides an excellent learning opportunity by allowing you to compare and contrast the characteristics of each one under Don and Joy's expert guidance.

### **Isopogons**

*adenanthoides*  
*asper*  
*dubius*  
*inconspicuus*  
*linearis*  
*panduratus* ssp. *panduratus*  
*teretifolius* ssp. *teretifolius*  
(Nodding Coneflower)

### **Petrophiles**

*aculeata*  
*brevifolia* (two variants)  
*chrysantha*  
*drummondii*  
*linearis* (Pixie Mops)  
*macrostachya*  
*megalostegia*  
*nivea*  
*pilostyla* ssp. *austrina*  
*scabriuscula*  
*serruriae*  
*shuttleworthiana*  
*striata*



*Petrophile striata*, Hi Vallee, August 2009

The leaves of these Hi Vallee species are mostly either terete or flattened. As isopogon and petrophile species always have so many inflorescences on each plant, they provide a spectacular display of massed flowers depending on when you visit. Even those with smaller flowers impress, such as *P. inconspicuus* which (despite its name) has an eye-catching display of closely-clustered small white flowers in July/August. The only problem is the competition from all the other lovely species on Hi Vallee! The flowers cover the whole I & P colour spectrum from white to cream, pale yellow, bright yellow, pale pink and bright pink.

Although spring is a good time to see these isopogons and petrophiles in flower, there is no need to limit a visit only to the middle of spring as these species are long-flowering. The isopogons mostly flower for three to four months, providing colour from winter right through to late spring (June to November). The petrophiles flower for a similar period, with *P. brevifolia* putting in seven months of flower production. Their display starts in May (with *nivea* and *brevifolia* a winter highlight) and continues right through to summer when the show finishes with the last flowers of *brevifolia*, *drummondii*, *linearis*, *serruriae* and *striata*.



*Isopogon linearis*, Hi Vallee, August 2009



*Petrophile nivea*, Hi Vallee, August 2009

The rarest species is *Petrophile nivea* which is found only on Hi Vallee. Named for its small snow-white flowers, it flowers through the winter. Although it co-exists with ten other petrophile species in the same locality, and is most closely related to *P. brevifolia*, it is distinguished by morphological characteristics as well as its earlier flowering time which prevents any possibility of hybridisation.

In the past we have spent many an enjoyable hour poring over wildflower books at night trying to identify Hi Vallee plants. Appreciating its flora has now become a lot easier with the release of a field guide to Hi Vallee Farm by Jolanda Keeble. See this link for more information.

<http://hivallee.com/field-guide/>

As demonstrated by Mike Beamish last newsletter, and Neil Marriott and Margaret Pieroni in their articles in this edition, a visit to Hi Vallee is not to be missed for isophiles. Don and Joy are patient and superb hosts, with a passionate interest in wildflowers. The whole area is interesting in botanical terms, and a visit to nearby Mt Lesueur, another flora hotspot, is also a must.



## Pruning eastern isopogons

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*Mark Noake*

*Isopogon anemonifolius* and *Isopogon anethifolius* put on an inspiring display of flowers this year in our garden at Glendeuart on the Far South Coast of NSW.

The dwarf, coastal form of *I. anemonifolius* is particularly rewarding in cultivation with its luxuriant growth and reliable enthusiasm for flowering. It does, however, have a tendency to drop dead when one is not looking. One of our three plants began to develop the tell-tale signs of browning off, particularly around the base of the plant. It was time to prune, and to take cuttings in the hope of growing replacements for next year.

The photographs below show progress through stages of the flowering, pruning and recovery. *I. anethifolius* was a bit too close to the action and became embroiled in the process. Previous successful hard pruning of *I. anethifolius* gave us the confidence to cut hard and often.



*I. anethifolius* and *I. anemonifolius* in flower September 2016



*I. anemonifolius* after hard pruning November 2016



*I. anemonifolius* recovery January 2017



It so happened that this pruning took place at the beginning of one of our most difficult summers. These robust yet rather beautiful plants have come on strongly despite record hot temperatures with hot, dry winds, no useful rain for five months and extreme UV ratings.

In case you are concerned, we did lose one of our three dwarf *I. anemonifolius* but the good news is that the cuttings have taken well and replacements are on the way. Another local form of *I. anemonifolius* from about 10km inland



*I. anethifolius* hard prune November 2016



grows much taller (about 1.5m) and has much tougher, sparser foliage. Our specimen has lasted untended for several years.

As the IT Crowd might say, "have a go but make sure that you have backups before you try anything too drastic".

*I. anethifolius* recovery January 2017

## Grafting update

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### *Phil Trickett*

As noted in the editorial we have begun to lose isopogons grafted onto *I. anethifolius*. Losses over the last couple of years include three *I. cuneatus*, three *I. trilobus*, two *I. latifolius*, two *I. panduratus*, and three *I. axillaris*. All these were advanced plants which had flowered and were 2-3 years old. Initially I thought it may have been a compatibility issue but this season we have also lost a couple of *I. anethifolius* plants. The provenance of these plants is unknown, but it is obvious that this form is not reliable enough in our garden for use as a rootstock for western species.

Over the last 18 months I have been trialling *I. mnoraifolius* as a rootstock. As previously noted, *I. mnoraifolius* has the advantage over *I. anethifolius* of being quicker to strike, and from all reports appears to be at least as tough as *I. anethifolius* in adapting to a range of conditions (including extended drought and severe frost). *I. mnoraifolius* strikes quickly for me, making it an excellent species for cutting grafts. Results so far look very promising. *I. cuneatus*, *I. latifolius*, *I. trilobus*, *I. axillaris*, *I. buxifolius* subsp. *buxifolius*, *I. panduratus* ssp.

*panduratus* and *I. 'Stuckey's Hybrid'* have all taken successfully and are growing on well. Trials with other species are underway.

Following our visit to Tony Henderson (see my report), I intend to trial *I. anemonifolius* as a rootstock. It is hardier than *I. anethifolius*, and also strikes easily from cuttings. Tony has not experienced any resprouting problems from the lignotuber which has been the reason for me not previously using this species as a stock. We have a couple of these plants growing in very moist conditions in our garden and although slow growing they have been unaffected by the hot, wet conditions thrown at them over the last 5 years.

I have not given up on *I. anethifolius* for our garden yet. It has many good points as a stock – vigorous, fast-growing, early flowering and easy to propagate. I have sourced some local provenance forms which I will trial to see if they are tougher than the forms we currently have. Provenance/origin of the stock, not just which species, seems to be very important in terms of how grafted plants perform in the longer term.

## Grafting WA petrophiles: a work in progress

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### *Phil Trickett*

Discussions with Tony Henderson confirmed my view that petrophiles are a greater challenge to graft than isopogons. While Tony has had some success with some of the spectacular western petrophiles he has not been able to graft others despite many attempts and stock/interstock experiments.

Even when compatible stocks can be identified, growing these stocks from either cuttings or seed adds another hurdle. Both *P. pulchella* and *P. sessilis* can be difficult to strike from cuttings, making cutting grafts problematic until this can be overcome. Growing stock plants from seed may be the better option but low seed viability reported by Tony means that it is difficult to grow a required number of seedlings with any certainty.

Using *P. pulchella* and *P. sessilis* as an interstock may be an option if these graft onto a stock which strikes readily, such as *I. anethifolius*, *I. anemonifolius* or *I. mnoraifolius*. I have a small trial underway to see if *P. pulchella* will graft onto *I. mnoraifolius*. I will extend this trial to see if either *P. sessilis* or *P. pulchella* graft onto any of the three isopogon stocks.

*Petrophile shirleyae* is another rootstock option worth investigating. It thrives in our summer-wet climate and performed well in our Canberra garden through the long drought. I'll undertake some grafting trials with it with a couple of petrophile scion species to see how it performs.

**Have any of you had success in growing *P. pulchella* or *P. sessilis* from cuttings or seed?** Send us information on your methods and success rates. We will report this information in the next newsletter.



## WA Spring 2016: Northern Trip

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### *Words and photos by Neil R Marriott*

In the last newsletter Neil took us along with him on Neil Macumber's wildflower tours to WA. The wildflower season was so spectacular that there was not enough room to include all his travels. Last time he covered the area from Perth down to Albany, and now continuing the story he takes us north of Perth.

#### **John Forrest National Park**

The oldest park in WA, and right on the doorstep of Perth in the Darling Ranges, this park supports a diverse range of native plants, with the following species found to be fairly common: *Isopogon sphaerocephalus* and *Isopogon dubius* in Jarrah/Marri forest; and *Petrophile biloba* on granite outcrops.



*Isopogon dubius*



*Isopogon sphaerocephalus*



*Petrophile biloba*

#### **Badgingarra National Park and Mt Lesueur**

After travelling up from Perth we spent the day touring around the best areas in the Badgingarra/Lesueur region, one of the richest parts of the state. Here we found a host of plants including a most unusual form of *Isopogon dubius* with beautifully bracted flower buds of a distinct bronze hue. Further on at Mt Lesueur NP we found yet another form of *Isopogon dubius* with pale pink flowers that appeared to be "flatter" and finer than typical plants.





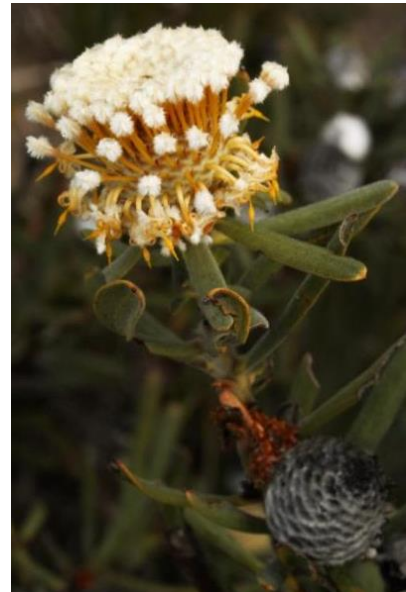
Bronze buds on *Isopogon dubius*  
at Badgingarra



*Isopogon linearis*



*Isopogon asper* –Mt Lesueur NP



*Isopogon sphaerocephalus*  
Badgingarra NP



*Isopogon dubius?* –very fine pale flowered form, Mt Lesueur NP





*Petrophile nivea* –Hi Vallee

### Hi Vallee

A highlight of the trip was the tour around Hi Vallee with Don and Joy Williams the next day, with Don showing us the vast range of plants found naturally occurring on his property including the rare and endangered *Petrophile nivea* of which the vast majority of plants only occur on his land.



*Petrophile macrostachya* –Kalbarri NP

### Kalbarri National Park

The floral display at Kalbarri this year was quite amazing, although we saw very few *Verticordias*, due to being a month earlier this year, combined with the cool wet season. Two of the commonest “*Isophyles*” were *Isopogon divergens* and *Petrophile macrostachya*. A feature plant along the Murchison River gorge is *Grevillea petrophiloides*, named by CF Meisner. I have often wondered what species of *petrophile* Meisner was referring to when he named this species? I also wonder whether we should be calling this the ‘*Petrophile Grevillea*’?



*Isopogon divergens* –Kalbarri NP

*Isopogon divergens* –free flowering habit



*Grevillea petrophiloides* –  
Murchison Gorge





### Dalwalinu to Goomalling

After a wonderful day exploring the Mulga country and finding thousands of Wreath Lechenaultias and Native Pomegranites, to name but a few, we headed further south, stopping regularly to admire and photograph the flowers along the way. At Reynoldson Reserve, just north of Wongan Hills we found dense low shrubs of what we thought were *Petrophile ericifolia* although the leaves seemed to be too ashy grey compared to plants I have seen previously. (it is likely to be *Petrophile scabriuscula* which is found at Reynoldson Reserve)



*P. scabriuscula?* – Reynoldson Reserve

## Fire response of isopogon and petrophile: a case study

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### *Catriona Bate*

Recent fires in August 2015 and late October 2016 in our local heathland affecting *Isopogon anemonifolius* and *Petrophile pedunculata* have given us an opportunity to observe their effect on these species. Increasing fire frequency can affect floristic composition and species richness.

The fires occurred in the South Pacific Heathland Reserve at Ulladulla NSW. *Isopogon anemonifolius*, *Petrophile pulchella* and *Petrophile pedunculata* are found in the reserve, which has been partially burned several times in the last decade. The fourteen hectares of this Native Flora and Fauna Reserve stretch along the cliffs on the NSW south coast east of Pigeon House Mountain. It contains a remarkable number of flowering plants (over 250 species) and is the southernmost limit of Sydney sandstone heath. Many of the plants in the reserve are relatively low due to the windy and rocky coastal conditions. The recent fires affected relatively small areas of the reserve, with the second covering more ground towards the sea, including some of the same ground burnt the previous year. The fires occurred near the track and in the location of some of the most diverse and botanically interesting heathland. *Isopogon anemonifolius* and *Petrophile pedunculata* plants were burnt in both recent fires while *Petrophile pulchella* was burnt in previous years.

In fire-prone ecosystems, many plant species are highly flammable. They have adapted to ensure that their offspring survives into the next generation by storing their seeds in the canopy in fire-resistant 'cones' or woody fruits. The adult plants are killed but their large, fire-activated seed banks germinate, grow, and mature rapidly following a fire, in order to reproduce and renew the seed bank before the next fire. These species are known as obligate seeders (with serotinous or fire-activated seed banks).



South Pacific Heathland Reserve 2015 – before being burnt

Isopogons and petrophiles have this adaptation to fire. Seeders tend to begin to reproduce several seasons after germination, and seed production then escalates annually for several years. By the time of the next fire a large replacement seed bank is likely to have been accumulated, reducing variation due to yearly fluctuations in climatic conditions. However, this is not always the case – *P. sessilis* has been found to replace its seed store annually, as seeds in the older fruits rapidly lost germinability and new fruits matured to replace them. (In contrast in *Hakea sericea*, the seed store appears to accumulate each year, because older fruits retain a high level of germinability.)

At South Pacific Heathland Reserve, *P. pulchella* occurs in relatively large thickets of crowded, tall plants, indicating seeding from fire within the last decade. Plants with fire-activated seedbanks like *P. pulchella* are at risk of population decline because they are very susceptible to short fire intervals due to their whole seed bank being released after a fire.



Is it dead? *Isopogon anemonifolius* a few weeks after fire, South Pacific Heathland Reserve, 11 November 2016. Note the black ash surrounds with not a tinge of green.



In the reserve, *Isopogon anemonifolius* is common. This species was burnt in both the August 2015 and October 2016 fires (in different areas), but was most affected in the 2016 burn which involved a larger area characterised by this species as well as *Lambertia formosa* and *Banksia serrata*. All the species stay naturally low in the main burnt area, possibly due to the prevailing coastal winds.

Last year's fire caught many of the plants still in flower and when we saw them soon after they looked a bit like marshmallows on sticks roasted in a campfire. Some heads were obviously burnt flowers while others, more advanced, were opening up to



reveal a fluffy interior. Some had fallen on the ground and when the fruit fell apart, the hairs were frizzled by the heat.

Not all isopogon and petrophile species are seeders. *I. anemonifolius* resprouts after fire. Other isopogons thought to have a lignotuber are *I. prostratus* and *I. ceratophyllus*. A strategy of resprouting allows rootstocks to survive fire and replace entire shoot canopies by sprouting from heat-resistant buds below ground. In some genera, resprouting comes from trunks and branches. One of the most uplifting sights after a bushfire is the green tendrils which soon begin transforming the branches of eucalypts with epicormic growth, and even casuarinas can resprout from branches. Instead of being killed these plants are fire-tolerant, able to withstand a degree of burning and continue growing despite damage. Some resprouters store extra energy in their roots to aid recovery and re-growth. Proteaceae such as banksias and hakeas also have resprouting species, and often the presence of an underground lignotuber is a defining characteristic.

Seeders and resprouters can be found in the same locations, even those from the same genera – resprouters tend to dominate in habitats that are frequently burnt whereas seeders flourish when fires are less common. In the reserve at Ulladulla, the resprouter *I. anemonifolius* and the seeder *P. pulchella* tend to occur in different, neighbouring locations.

*Isopogon anemonifolius* resprouts from its woody base, or lignotuber, around two months after being burnt. The new growth takes around two years to flower again, with older plants (having larger lignotubers) able to put on new growth more quickly. It takes around ten years to grow a lignotuber of around 1 cm in diameter, and 20 years for a diameter of 5 cm. The largest lignotubers found have a diameter of 40 cm. Plants need a lignotuber of around 2 cm diameter to survive low intensity fires. It is not until around 15 years of age that plants are able to resprout after more intense fires.



*Isopogon anemonifolius* resprouting 4-5 months after fire. Judging by the size of the burnt trunk (left), this plant must originally have been fairly old. Right, plants resprouting from smaller plants which have disintegrated, or from underground roots. Or are they new seedlings? South Pacific Heathland Reserve, 8 March 2017



Resprouters invest more in storage functions that help them re-establish quickly, rather than sexual reproduction. They can reproduce post-fire although seedlings take longer to begin flowering and may be outcompeted by seedlings of seeder species. *I. anemonifolius* drops its seeds to produce seedlings within a year of a bushfire, but very few are seen at other times. The seeds fall directly to the ground or are blown a short distance by wind. Seedling establishment is maximised with a soil-surface environment of litter or mixed ash. Seedling recruits do not start flowering for seven years and typically produce fewer flowers and smaller seed:ovule ratios than corresponding seeder species. The seedbank is most productive between 25 and 35 years after a previous fire.



*Isopogon anemonifolius* 4-5 months after fire (8 March 2017)

After 3-4 months, adult shrubs of *I. anemonifolius* at Ulladulla had about 10cm of new foliage sprouting from burnt bases. After a year, the new foliage had grown over 30cm high. Hopefully we will start to see the oldest resprouted plants from the first fire produce flowers after next spring at the two-year mark.

Some petrophiles are also thought to be lignotuberous, such as *P. shirleyae*, *P. canescens* and *P. multisecta* (from Kangaroo Island). Based on our recent observations at Ulladulla, *Petrophile pedunculata* has a lignotuber and resprouts after fire. Its particular fire ecology does not appear to have been studied previously. The location of these plants was burnt in both the August 2015 and October 2016 fires although only a few plants are likely to have been burnt twice in such quick succession. While this area is less subject to coastal winds, the plants are also relatively low-growing. Characteristic species here include *B. spinulosa*, *I. anemonifolius*, *Lambertia formosa* and *B. serrata*.



*Petrophile pedunculata* resprouting 4-5 months after fire (8 March 2017). The new foliage has the characteristic reddish colouring, particularly striking against a blackened backdrop. South Pacific Heathland Reserve



*Petrophile pedunculata* seed opened by fire – note the white hairs of the seed poking out of the cone and an individual heart-shaped seed which has fallen out. South Pacific Heathland Reserve, 11 November 2016



The burnt *P. pedunculata* plants at Ulladulla resprout from the base. In November 2016, a few weeks after fire, we also found evidence of the seed being distributed, so perhaps seedlings will appear – we will keep watch. The year-old growth on the petrophile resprouters is now around 60cm high. It will be interesting to observe next spring whether *P. pedunculata* flowers as early as its resprouting neighbours of *I. anemonifolius*.

The two most important factors determining changes in population numbers and density as a result of fire are the age at which a stand is burned, and the proportion of seeds which emerge as seedlings. The isopogons and petrophiles at South Pacific Heathland Reserve have different fire requirements to maximise reproduction.

*P. pulchella* has greater reproductive output after repeated fire at relatively short intervals. It is not clear whether this is also a requirement to ensure the survival of these plant populations. Its populations are highly vulnerable to decline if seedlings are burnt before reaching maturity and producing seed. This species can live up to 60 years, with seed able to remain viable for many years (and germination is possible for over two years after a fire). Seeds are first available at five years in *P. pulchella*, indicating that exact replacement would be possible when burnt at this age, as long as seedling establishment is very high. Late summer/autumn fires of high intensity favour high seedling establishment. For this species, fire also creates a favourable soil-surface environment for seedling establishment. Low establishment would delay replacement to up to 13 years. *P. pulchella* had greater reproductive output in areas that had had two short intervals of under seven years between fires, over areas that had had one short interval, and plants in these latter areas had greater reproductive output than areas with no intervals under seven years between fires.

The resprouter *I. anemonifolius* requires relatively long intervals between fires to ensure long term survival. Although its lignotuber allows it to withstand a degree of burning and continue growing, fire tolerance is not reached until about 13 years of age. This reflects the lignotuber's relatively slow rate of development in young juveniles. If fires occur before newly established plants are fire-tolerant, populations will decline.

Older adult *I. anemonifolius* plants will survive frequent fires but not replace themselves and will eventually senesce and die. Repeated bushfire intervals of less than 10 years' duration are likely to result in both reduced survival of older plants and recruitment of seedlings, possibly leading to local extinction in 50 years. Intervals of at least 12–13 years for low intensity fires and 15 years for hotter fires are needed for population stability.

*P. pedunculata*, another resprouter, could require similarly long intervals between fires although evidence is required to confirm this. In particular, it is not clear how quickly or slowly its lignotuber develops.

Near the *P. pedunculata* and *I. anemonifolius* in this part of the reserve are numerous impressive specimens of *Banksia serrata*. These plants only grow up to about two metres tall and have very large, gnarled woody bases which have only become clearly visible since they have been burnt. These banksias appear to be very old, and may rely on sprouting from a lignotuber as well as the characteristic epicormic growth from stems and trunk. The tolerance of *B. serrata* to frequent fire differs from *I. anemonifolius* in that it reaches first fire tolerance earlier (six years) and so is less vulnerable to longer fire intervals (around ten years). Lignotubers in young *I. anemonifolius* juveniles develop at a slower rate than in *B. serrata*. Extinction or substantial depletions of adult numbers in stands of either species may occur after 50 years under some repeated 5- or 10-year fire cycles. The rate of such declines will depend directly on the structure of populations (proportions of adults and juveniles).



Regenerating before our eyes: resprouters 4-5 months after fire, South Pacific Heathland Reserve, 8 March 2017 – *Isopogon anemonifolius* and *Lambertia formosa*

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## Exchanging cuttings and seed

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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 ([catrionaandphil@gmail.com](mailto:catrionaandphil@gmail.com)).
2. Once availability is confirmed, purchase a 500g Express Post satchel from Australia Post (costs \$10.55), 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. spathulatus (now I. spathulatus), cuneatus, dawsonii, divergens, dubius, formosus, latifolius, mnoraifolius, prostratus, petiolaris, sphaerocephalus, tridens, trilobus, 'Stuckeys Hybrid'

**Petrophile** – canescens, pedunculata, pulchella, serruriae, sessilis, shirleyae

## Financial Report

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Total 31/10/2016	\$1,102.31
Bank balance	\$985.62
Cash on hand	\$116.69
Donations	\$45.00
Total 10/4/2017	\$1,147.31
Bank balance	\$1,030.62
Cash on hand	\$116.69