
ISOPOGONS & PETROPHILES

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Petrophile divaricata. Stirling Ranges WA. (Photo by M. Pieroni)
(See page 4 for more details about this species)

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EDITORIAL

Hello and welcome to the fourth newsletter for the study group. It has been almost two years since the group was founded, just before the Canberra ASGAP conference. The next conference will be held in January in Launceston, Tasmania, and if the presentation at the conclusion of Canberra's was anything to go by, it will be marvellous. My family and I will be going and I hope to catch up with some of you there.

At last there seems to be some widespread rain across much of both the east and west coast. Not enough in Victoria to say the drought is over, but in typical fashion Sydney has almost been washed away. Even the little bit we have had down south has perked up the garden and the countryside is starting to look green again. Hopefully some good follow up rain will come.

I have increased my collection a little after a trip down the Geelong road to the autumn plant sale. It was great to see so many sellers and such a variety of great looking Australian plants. It is the best time of year to have a big sale, as you can usually get things straight into the garden. I picked up *P. longifolia*, *P. teretifolia*, and *I. sphaerocephalus*. Phillip Vaughan had a number of other species there and I visited his temporary plant storage lot in Campbellfield a week or so later and picked up *I. axillaris*, *I. polycephalus*, *I. trilobus* (long lobe variety formally known as *I. tripartitus*), *P. seminuda*, *P. linearis*, *P. media*, *P. anceps* and *P. fastigiata*. He had a number of other varieties of *Isopogon* and *Petrophile* as well, some of which neither of us could identify. He is still looking for a permanent address and so his plants are randomly placed with no labelling. If anyone is interested in purchasing plants from him, he can be reached on his mobile and will allow "inspection" by appointment.

Phillip has a number of grafted *Isopogons* and has previously grafted *Petrophiles*. In every case he has used *Isopogon anethifolius* as the rootstock, apparently with good success, even with the *Petrophiles*! It seems that this hardy species is the *Grevillea robusta* of cone bushes. Cas Liber tells me that Peter Abell had grafted *Isopogon dubius* onto *I. anemonifolius* and the plant lasted 6-7 years, and so the other common eastern *Isopogon* is another potential rootstock for some of the touchier taxa.

My garden plants are starting to grow well and I was very excited recently to find about ten to fifteen buds on my *Isopogon latifolius*. It is about 1.5m tall now and has been in for almost two years. It is on its own roots, in sandy soil at the top of a small

bank and so has excellent drainage. It gets a bit of run off from a small pond area that gets supplementary watering, but doesn't get any specific extra watering. In addition *I. mmoraifolius*, *I. anemonifolius*, and *I. prostratus* are in bud, so I'm looking forward to spring. The *I. anethifolius* that was exhumed to make way for the drainage works is back in the ground now and looking happy with plenty of new growth. It seems to have come through its ordeal unscathed (fingers crossed).

The study group has an Internet site through yahoo groups. The Internet address is: http://groups.yahoo.com/group/Isopogons_Petrophiles.

There is an email list where any issues, comments queries etc can be voiced, as well as some files of pictures and the like. Anyone is free to join.

The current issue of the emagazine Australian Plants online (APOL) features a general article on *Isopogon* and *Petrophile*. This regular publication contains all sorts of great information on Aus plants and is well worth reading. Its address is <http://farrer.riv.csu.edu.au/ASGAP/apoline.html>.

As I have mentioned in the past, I am developing an electronic library of images for the study group. Brian Walters sent me a number of slides recently that I scanned. In addition, Margaret Pieroni has sent me some more of her photos and slides. (Thanks very much Brian and Margaret). If anyone has photos, negatives or slides they would be happy to go into the library, please send them to me. I will scan them and then return the originals unscathed. If anyone would like particular photos, please contact me.

This issue of the newsletter deals with two potentially hardy species, the common *Petrophile divaricata* from WA and the very rare *Isopogon fletcheri* from NSW. Barbara Rye and Mike Hyslop from the Western Australian Herbarium have written a fantastic article on the species of the West Australian section of *Petrophile* known as *Arthro stigma* and have developed a key to the plants of the section. There are lots of letters and opinions from you, the members, as well as an update on the fate of the rare and endangered *P. latericola* ms (the Ironstone petrophile). I hope you enjoy it.

Thanks to everyone who has written to me and otherwise contributed. It's great to hear what's happening out there. If anyone has any observations or pearls of wisdom please write or send an email.

Finally, I hope that "Huey" has been good to you all and happy gardening.

David Lightfoot ☺

CONSERVATION PART 2

Meredith Spencer from CALM has an update on the P. latericola translocation project mentioned in the last newsletter.

Petrophile latericola ms is a critically endangered Declared Rare flora (DRF) species that is known from only 2 populations. The main population of about 150 plants occurs in State Forest near Busselton with 3 other critically endangered species and several further DRF and priority species, being part of an occurrence of the Southern ironstone critically threatened ecological community. Population 2 consists of 5 plants in a degraded rail/road reserve. An Interim Recovery Plan has been written for the species outlining actions designed to address factors threatening the species. This includes "translocation" of the species, i.e., establishment of new populations grown from seed and cuttings.

In 2001, 174 plants were planted into two Nature Reserves in the Busselton area. The sites are extremely harsh environments, being inundated during winter and undergoing drought conditions in summer. They are ex-pasture lands, with little soil over ironstone rock. The translocation included research into most appropriate establishment techniques, including mounding, ripping, sheltering, and watering treatments together with control sites. In the research site, 21% of plants survived, however, it should be noted that all controls (planted flush to earth) died, which greatly reduced survival rates. At the second site 54% survival has been experienced to date. Factors affecting survival included grazing, weeds, strong winds, inundation and longer than average summer drought. The species is also moderately susceptible to dieback disease.

In 2003 it is planned to undertake further site preparation by heavy planting of associated species in order to provide protection to seedlings from wind and other environmental stresses. Further translocations of the species will occur in 2004.

The species has relatively low germination and seed is difficult to obtain - any advice your group may have in this regard would be appreciated. If your members are interested in seed collection/cleaning we would also appreciate any volunteers later in the year! *[Anyone interested or with info please contact me and I'll send Meredith's contact details. I also have a number of info posters about this project if anyone is interested. Ed]*

From Bob O'Neill. Wandin North, Vic.
Jan 2003

Just an update on how things are here. The seed efforts were all in vain. I will need to follow Margaret Pieroni and set fire above the seeds. I thought if I punched holes in fruit cans and lit a fire above planted seeds. In this way all the seeds would be in their respective containers and I would be able to identify any emergent seedlings. So far all else has failed so there is little to lose. *[Perhaps a 24-hour soaking in smoke water before planting may help. Ed]*

At the meeting at Foothills last year I gave you a few little plants. Since then I have planted out all the rest of that group of Isopogon cuttings, making about 30 plants all up in the garden. There was very little fuss in striking the cuttings and I have not lost one of my struck cuttings that I have planted. All were planted at tube size, watered and mulched. Some have bolted, some are much more sedate, but all look well. All are in full sun. Some very well drained others with fair to good drainage. I guess that the current dry spell would suit them, especially as I give a light supplementary watering by bucket every few weeks for those in for perhaps several weeks. Perhaps as much as weekly for a start if the conditions become somewhat torrid. I read through the entire newsletter and was very interested in the species grown by members. I would be delighted to exchange cuttings with other members, especially those with *Petrophile* species. I obtained 2 plants of an unnamed *Petrophile* species from a nursery near Geelong, and they are the only ones I have, explaining my disappointment with my lack of success with the seeds. Is it possible for me to have the names and addresses (including email) of members who may be happy to exchange plant material in person or by post. I would be happy to exchange plant material other than Isopogon or *Petrophile* as well. *[I too, have noted that Petrophiles are not widely cultivated. Could all members please let me know if you do **NOT** want your details passed on to others for cutting/seed swaps etc? I will wait a few weeks and then give Bob some info. Please send me any similar requests you may have Ed.]*

As elsewhere the dry conditions continue and will almost certainly start to bite us. We have been spared the harsh outcomes others have

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***PETROPHILE DIVARICATA* R.Br.**
(SYN. *PETROPHILE INTRICATA* LINDL.)

This *Petrophile* has one of the most widespread distributions through much of south western Australia. It is truly spectacular in flower and has interesting foliage, with a naturally well-shaped bushy habit. Yet, only one of the study group's members is presently growing it!



The type specimen was collected by W. Baxter in the Albany region in 1823 and was described by Robert Brown in 1830. He named it from the Latin *divaricatus*, which means spreading at a wide angle and refers to the leaf lobes.

Petrophile divaricata is a dense shrub that grows to 2m in height and width. The woody new growth is



covered in fine hair but the branches become glabrous as they age.

The leaves are bipinnate, and of variable length, usually up to 11cm. They are deep green, terete with a central groove and end in a pungent

point. They tend to curl downwards into a spiral shape.

It displays its inflorescences prominently and profusely, flowering from August to December. They are usually terminal but may be subterminal or axillary. They are oblong to ovoid, with the cone 25mm long and 12-15mm wide. The scented flowers are covered in fine hairs, are creamy yellow

to yellow in colour and about 25mm long, (giving the whole flowerhead a diameter of up to 6cm).

The fruiting cones are up to 3cm in length, hairy and are cylindrical to ovoid in shape.

Distribution- This *Petrophile* is widespread in the southwest botanical zone. It can be found as far north as Eneabba (~300km north of Perth) and extends south to the Stirling Ranges, Albany and east almost to Esperance (~700km SE of Perth). It is



similarly found amongst a variety of vegetation, from Jarrah forests to open woodlands, shrublands and heath. The soil types it occurs in range from gravel to sand and sometimes clay, but are mainly over laterite, and always well drained.

Cultivation- This species is rarely seen in cultivation. It can be grown from seed with germination times quoted at 30-75 days. Cuttings can be taken from semihard new growth but can be slow to produce roots. It is probably tolerant of most well drained soils but does best with plenty of sun. It is moderately frost hardy. Its main detractor as a garden specimen is its spikiness, but this no doubt gives plenty of protection to small birds and mammals.



(Map reproduced from Flora of Australia Vol. 16 with permission of ABRS. Photos M. Pieroni, D. Lightfoot. Thanks!)

ISOPOGON FLETCHERI F. MUELL.

Isopogon fletcheri was first described in 1894 and was collected by JJ Fletcher, for whom the species is named.

It is an untidy shrub, usually to 1.5 metres in height and width but occasionally larger to 2m. The branches are brown to green in colour and are glabrous. *I. fletcheri* is unique amongst Eastern *Isopogon* and *Petrophile* in that it has entire, undivided leaves. They are light green and oblanceolate (or sometimes linear) in shape, 1.5-2.5cm in width and up to 12cm in length. New leaves are green, lacking



the red new growth often seen with plants from this genus.

The inflorescence is held terminally on a top shaped head of 2-2.5 cm across, with the bud being intricately patterned. The flowers, which appear



from September to November, are white to creamy yellow, with bright yellow pollen presenters, and are up to 1.5cm long. (The flowers of some plants are pure white and one

of these has been released commercially as the cultivar *Isopogon* "Mountain Mist".)

The fruiting cone is 2-2.5 cm long and about 1.5cm wide in an ellipsoid shape. The scales do not open to release seed until the branch has died or is burnt in a fire.

Distribution- This *Isopogon* is one of the rarest of the eastern species, residing only in the Blue Mountains, west of Sydney. Collections have been made in the higher areas of the Blue Mountains National Park close to the town of Blackheath. It can be found in wet, but well drained, areas on sandstone cliffs and ledges. The surrounding vegetation is heath and dry sclerophyll woodland.

This area is heavily toured and is frequently burnt, and thus, even though the plant occurs in a National Park, its long-term survival is at considerable risk. I once spent the good part of a day exploring the National Park near Blackheath trying to find *I. fletcheri* without success. Blombery and Maloney in *The Proteaceae of the Sydney Region* noted in 1992 a great decline in plant numbers over the preceding 10 years.



Cultivation- *Isopogon fletcheri* has only recently been brought into cultivation. I have seen it at the Hunter Botanical Gardens near Newcastle, the Mt Annan annex of the Royal Botanical Gardens of Sydney and the ANBG in Canberra. Each of these gardens has quite different climatic and soil conditions and this may indicate that *I. fletcheri* is reasonably hardy across a variety of areas.

As mentioned above at least one cultivar is now available in nurseries.



It can be grown from seed, or cuttings of semi-hard new growth. I am not sure of the length of time required to set roots.

Given its natural habitat, I would think that it would do best in a sheltered, moist area, with excellent

drainage. There is often frost and sometimes snow in the Blue Mountains and so it is likely to be frost hardy.

I have a specimen growing in my garden in Melbourne. It has done well through the drought and is now starting to put on new growth. It is in an area that gets partial sun and has reasonable drainage.

I believe that if the old heads are removed and a compact habit is encouraged with judicious pruning, this could be a worthwhile, relatively hardy, garden specimen.

(Map reproduced from *Flora of Australia* Vol 16 with permission of ABRS. Photos by C. Liber, D. Lightfoot & B. Walters with thanks!)

faced to date, but I can see a number of plants that are quickly showing signs of deepening stress and will almost certainly not survive the summer without a good downpour. We have planted 700 plants over the past 10 weeks and I do not expect to lose many of these for most are not in close competition with well established plants, they were all mulched at planting and have been receiving supplementary watering by bucket as required. Even so, my legs are being worn short and my arms are growing longer and would appreciate a good rain.

Wouldn't we all Bob!!!. Thanks for the update and keep us informed. Ed

From Joke Meyers, Tamworth NSW
June 2002

... I bought Isopogons before (*I. anemonifolius*), unfortunately they died (two of them); They were in pots. Then I was lucky to buy an *I. formosus*, which I had in a pot for a year; It had one lovely pink flower. Now it is transferred into a new garden bed (Dec '01) and it has lots of buds. [*Any news here?*] A piece of it was broken off by kangaroos and I tried to propagate it. Did so in a waterwell filled with coco peat and covered with an inverted soft drink bottle. They grew nice root systems but when potted on died. I used a commercial native plant potting mix. Any suggestions? [*Did you keep them under the plastic bottles after they were repotted? If not perhaps they were not yet hardened off. I. formosus is one of the more reliable Isopogons from cuttings. Ed*]

Mark Ross, Windsor, NSW

Feb 2003 [*Mark is a member of the Isopogon and Petrophile yahoo group on the internet (see editorial) and sent this email*]

Just a short note regarding the grafting trial that I have going at the moment. Last October I grafted *I. latifolius* onto *I. anethifolius* with the mummy method. The graft showed no sign of growth for several months, but the graft union healed after about six weeks. In early Jan the buds burst through the nescofilm and the plant is growing slowly but is very healthy. I will pot it up and see if it flowers next spring. One problem, the rootstock suckers a fair bit, but hopefully this will stop as the scion increases in size and age. [*Mark has uploaded a*

photo of this plant to the files section of the group's website]

From Dan K, Adelaide, SA
April 2003 [*also by email*]

Has anyone had any long term experience with one? [grafted *I. latifolius*] I nearly fell over when I saw one at a local nursery, and of course grabbed it. I don't know the rootstock or who grafted it. So far (9 months) its doing very well, a little leaf burn on a 43 degree day, but growing well and has one bud at least. My ungrafted plants have done well and flowered, but three years seems to be the maximum life I can get out of them. Here's hoping the grafted one will persist!

From Betty Denton, Eltham Vic
April 2003

I have no Petrophiles, but hope to rectify this defect post haste. I have only 7 Isopogons at the moment, having lost *Isopogon dawsonii* last Nov.- about 10 years old so it did not take kindly to the drought conditions. Most of the Isopogon plants have been planted only a few months. I'm looking forward to extending my garden to accommodate Petrophiles and some more Isopogons. ... addendum to my note. I visited the... Geelong Plant sale and acquired my first Petrophile, *P. longifolia*. This plant looks good. I also purchased *Isopogon cuneatus*, *latifolius*, *formosus* and *buxifolius*.

Best of luck Betty and you picked a beaut Petrophile to start with! Ed

From Margaret Pieroni, Attadale, WA
Feb 2003

I took a photo of ... *P. longifolia* subsp. *longifolia*. I brought it from Morande Nursery (Max Luscombe) last year. It died soon after I planted it out. The distribution according to Barbara [Rye]'s revised key is Stirling Range to Many Peaks so it is near the nursery. I think Max told me it was a local form. The range of subsp. "prostrate" is from Jerramungup to Fitzgerald River. I remember seeing it growing around the chalets at the Stirling Range Caravan Park and the plants were fairly prostrate.... My remaining seedlings of *P. antecedens* died but I still have a lot of *P. helicophylla*. Only one runty one has died.

I bought two Isopogons from a nursery in Albany last month. One is labeled *I. formosus* and the other *Isopogon* "purple flowers". I think it might be *I.*

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An introduction to *Petrophile* section *Arthro stigma* including an enumeration of taxa currently recognised and their distinguishing features.

Mike Hislop and Barbara Rye

Petrophile brevifolia, *P. longifolia*, *P. media* and especially *P. linearis* (Pixie Mops), are probably the best known members of the wholly West Australian section *Arthro stigma*. This group of species, which currently comprises 16 or 17 taxa, includes a number of very attractive plants that have excellent horticultural potential. Two outstanding examples among these are the prostrate, yellow-flowered, *P. helicophylla* with its highly ornamental spirally arranged leaves and the floriferous, white-flowered *P. nivea*.

Section *Arthro stigma* is best separated from the other taxonomic groupings within *Petrophile* by the following combination of characters – entire, simple leaves, usually glabrous involucre bracts and cone scales and by the shape of the pollen presenter.

Pollen presenter

The pollen presenter probably warrants a special mention at this stage because of its importance in the taxonomy of a number of genera within the family Proteaceae but especially in *Isopogon* and *Petrophile*. The pollen presenter is the name given to the modified style end from which pollen is distributed to incoming pollinators. So in the case of those genera that disperse pollen in this way rather than directly from the anthers the transference of pollen to the pollen presenter occurs in the bud stage. The morphological characteristics of the pollen presenter, in *Petrophile* and *Isopogon*, then are of prime taxonomic importance. Indeed several species of *Petrophile* can be recognised by a microscopic examination of the pollen presenter alone. These subtle differences between species in the detail of the pollen presenter may well correspond with differences between their respective insect pollinators with which they have coevolved.

Members of section *Arthro stigma* have a characteristically shaped pollen presenter, which comprises a narrowly to very narrowly turbinate dilation with a prominently hairy terminal projection, which is tipped by the insignificant stigma itself. The terminal projection is generally referred to as the ‘brush’ and this structure is particularly well defined and indeed brush-like in *Arthro stigma*.

Characters useful in separating species within section *Arthro stigma*

As indicated already the morphology of the pollen presenter is of primary importance and in particular the brush hair characteristics – i.e. the length, orientation and density of these hairs and even the shape of the individual hair apex. The size and shape of the pollen presenter dilation together with the relative length of the brush are also significant.

The involucre bracts that surround the inflorescence provide good separating characters, especially their shape and colour. The presence of hairs on these bracts or indeed on the stems is atypical for the group and occurs only in two closely related species – *P. antecedens* and *P. clavata*.

Other general characters that are always more or less applicable in Proteaceae, or for that matter any family of flowering plants, are those associated with leaf morphology and flower size and colour. Leaf length is certainly important, together with whether the leaf apex is pungent or just bluntly mucronate. Leaf cross section is usually terete with the exceptions of *P. linearis* and *P. anceps*. A few species within the section have pink, white or cream flowers but for the remainder they are pale to medium yellow. There are however often subtle differences in flower colour between closely related taxa. *Petrophile pilostyla* for instance can usually be separated from *P. brevifolia* by its paler flowers.

Growth habit is undoubtedly of some taxonomic significance but by its nature it is not always easy to assess especially by studying dried specimens alone. Some taxa, for instance, appear to have a strictly prostrate

growth habit while other closely related ones are ascending or erect. To what extent we should rely on this character, though, for the moment is not clear. Similarly whether rootstock is fire-tolerant or fire-sensitive is an important character, but again one which will necessitate a good deal of field observation before it can be applied with confidence.

Members of *Petrophile* section *Arthrostigma*

All currently recognised members of this section are listed below with a brief description of their distinguishing features. Those species with the prefix # are currently under active revision, and those with 'ms.' at the end are manuscript names, i.e. ones not yet published.

Petrophile acicularis Belongs in a tightly knit complex of species with *P. media*, *P. longifolia* and *P. filifolia*. But although superficially very similar to these species it can be readily separated from them by virtue of the hairs on the pollen presenter having a recurved apex. This character is unique in the section, with all the other members having pollen presenter hairs that are straight or incurved. Occurs in near coastal areas of the south coast from Scott River to just east of Albany.

Petrophile anceps The only species with flattened leaves and yellow flowers (but see note under *P. megalostegia*). Restricted to the Stirling Range.

Petrophile antecedens [Photo in newsletter 3] Has cream-coloured flowers, hairy branchlets and involucre bracts and clubbed hairs on the pollen presenter. The only other species with this combination of characters is *P. clavata*, from which it can be separated by its smaller (1.5–2.2 mm rather than 3–4 mm), differently shaped pollen presenter and smaller flowering heads. The pollen presenter shape of this species is atypical within the section, having a more or less fusiform rather than the usual turbinate-shaped dilation. This early flowering species occurs sporadically in an area bounded by York, Harrismith and Darkan.



P. anceps

Petrophile aspera Easily recognised within the group by its coarsely scabrous leaves and clubbed pollen presenter hairs. Very occasionally *P. filifolia* may have finely scabrous leaves but that species has acute pollen presenter hairs. *P. aspera* has an inland distribution between Narrogin and Lake Grace.



P. brevifolia

Petrophile brevifolia (including ***P. latericola*** ms.) Even after the recognition of *P. pilostyla* and *P. clavata*, which had formerly been included within a very broadly circumscribed *P. brevifolia*, this remains the most variable species in the section. The variability centres around flower size and colour, leaf length, diameter and orientation, and growth habit. In the broad sense *P. brevifolia* can be distinguished by its relatively short, sharply pungent leaves, glabrous branchlets, shortly and relatively sparsely hairy brush and distinctly bicoloured involucre bracts with a brown central stripe and grey margins. It is widely distributed from around Geraldton to Ravensthorpe.

Petrophile clavata Closely related to *P. antecedens*. See notes under that species for separating characters. Appears to have a disjunct distribution around Alexander Morrison National Park and in the Calingiri area.

Petrophile filifolia In the tightly knit group of species listed under *P. acicularis*, *P. filifolia* can be recognised by its uniformly brown bracts and a densely hairy brush with acute rather than clubbed hairs. Although this species was named by Robert Brown almost 200 years ago, for most of this time the name has not been in use because of confusion with *P. acicularis* and *P. longifolia*. Widely distributed from the Wandering district to Manjimup and Albany.



P. filifolia

Petrophile helicophylla A prostrate species with unmistakable spirally twisted leaves and long brush with clubbed hairs. Range extends from Pingrup to Ravensthorpe.

Petrophile linearis A well-known species – the only one in the section with pink flowers and flattened leaves. Occurs near the west coast from Dongara to south of Busselton.

Petrophile longifolia Most closely related to *P. filifolia*, with which it has long been confused. Best separated from that species by pollen presenter detail – having clubbed rather than acute brush hairs. There are known to be prostrate and ascending variants of *P. longifolia*. Further studies including field observations may show that these warrant taxonomic recognition. Occurs from the Stirling Range area to Fitzgerald River National Park.



P. longifolia

Petrophile media The fourth member of the widely confused group of species listed under *P. acicularis*. Again the best distinguishing features are to be found in the details of the pollen presenter and involucral bracts. Relative to the other members of this subgroup *P. media* has shorter, sparser brush hairs and greyish rather than brown bracts. Two subspecies will shortly be published – subsp. *juncifolia* ms. differing from the typical subspecies in its longer, denser brush hairs and longer leaves. Subspecies *juncifolia* occurs mainly in winter-wet areas of the coastal plain from Perth to Busselton whereas the typical subspecies is distributed in an area bounded by Williams, Manjimup and Ravensthorpe.

Petrophile megalostegia Although this species is superficially similar to the bright yellow variant of *P. brevifolia*, a closer inspection reveals that the involucral bracts are much broader and the flowers larger. There is one anomalous collection at the W.A. Herbarium which has flattened rather than the usual terete leaves though in other respects it is typical of *P. megalostegia*. Occurs in the northern sandplains from Mullewa to Badgingarra.

Petrophile nivea [Photo in newsletter 3] Easily recognised by its crowded recurved leaves and white flowers. Where this species occurs in the northern sandplains it could only be confused with *P. clavata*, with which it shares an early flowering season. The latter, however, can be readily separated by its larger cream-coloured flower heads and hairy branchlets and involucral bracts. Currently only known from a small area west of Alexander Morrison National Park.

Petrophile pilostyla ms. A close relative of *P. brevifolia* with which it co-occurs in the northern sandplains, sometimes in near proximity in the same habitat. It is especially similar to a pale yellow-flowered variant of that species but comes into flower earlier than that entity. Under magnification however several significant differences become apparent. Usually the most obvious of these is the style, which is nearly always distinctly hairy at least in the basal half as opposed to glabrous or very rarely with an occasional hair in *P. brevifolia*. The colour of the involucral bracts provides an important difference, being uniformly brown or grey brown in the basal half becoming grey distally in *P. pilostyla* but sharply bicoloured in *P. brevifolia* with a brown central stripe and grey margins. Additionally, in all the variants of *P. brevifolia* (including *P. latericola* ms.) the dilated portion of the pollen presenter is minutely but distinctly papillose whereas in *P. pilostyla* it is more or less smooth. Occurs in the northern sandplains from north of Kalbarri to Badgingarra.

Petrophile teretifolia The combination of pink flowers, a brush with clubbed hairs and terete leaves make this an easily recognised species. A near-coastal southern distribution from the Stirling Range to Israelite Bay.



P. teretifolia

Key to the species and subspecies of *Petrophile* sect. *Arthro stigma*

1. Leaves flattened.

2. Involucral bracts ovate or almost elliptic, the upper ones acute. Tepals yellow and c. 30 mm long.
(Mullewa to Badgingarra)..... **P. megalostegia**
(atypical)

2. Involucral bracts linear-subulate, acuminate. Tepals either pink-mauve or c. 15 mm long.

3. Tepals c. 15 mm long, yellow. Pollen presenter brush with obtuse or slightly clubbed hairs 0.15-0.2 mm long.
(Stirling Range)..... **P. anceps**

3. Tepals 25-35 mm long, pink-mauve. Pollen presenter brush with acute hairs 0.3-0.5 mm long.
(Dongara to Scott River.)..... **P. linearis**

1. Leaves terete.

4. Branchlets densely hairy; involucral bracts densely hairy on base.
Pollen presenter brush sparsely hairy with distinctly clubbed hairs, the axis clearly visible.

5. Pollen presenter 1.5-2.2 mm long, the swollen portion more or less fusiform and partially hairy, the glabrous base about as long as the brush. Involucral bracts conspicuously brown above the grey-hairy base.
(York to Harrismith.)..... **P. antecedens**

5. Pollen presenter 3-4 mm long, the swollen portion very narrowly turbinate, glabrous and much longer than the more cylindrical brush. Glabrous part of involucral bracts more slender and less conspicuous than in *P. antecedens*.
(Alexander Morrison National Park to Calingiri.)..... **P. clavata**

4. Branchlets and involucral bracts glabrous. Pollen presenter brush either very dense, the axis obscured by the very numerous hairs, or with hairs acute or obtuse.

6. Pollen presenter brush very dense, the axis obscured by very numerous hairs, which are usually all clubbed (rarely some obtuse in *P. longifolia*).

7. Strictly prostrate plants with erect spirally twisted leaves. Pollen presenter brush c. 4.5 mm long.
(Pingrup to Newdegate to Ravensthorpe.)..... **P. helicophylla**

7. Prostrate to erect plants with straight to slightly twisted leaves. Pollen presenter brush 2-3.5 mm long.

8. Leaves coarsely scabrous. Occurring inland.
(Narrogin to Lake Grace.)..... **P. aspera**

8. Leaves smooth or very finely scabrous. Occurring on or near the south coast.

9. Upper cone scales (in flower) ciliate. Tepals pink-mauve turning whitish. Brush of pollen presenter c. 3 mm long. (Stirling Range to Israelite Bay.)..... **P. teretifolia**
9. Cone scales entire or denticulate. Tepals cream or yellow. Brush of pollen presenter c. 2 mm long.
10. Growth habit somewhat ascending. Inflorescences mostly 2.5-3.5 cm diam. (Stirling Range to Manypeaks.)..... **P. longifolia**
subsp. **longifolia**
10. Growth habit strictly prostrate. Inflorescences mostly 3.5-5.5 cm diam. (Jerrungup to Cheyne Beach to Fitzgerald River.)..... **P. longifolia**
subsp. **prostrata**
6. Pollen presenter sparse to dense, with the upper hairs acute; basal hairs acute except in *P. filifolia* where they are occasionally obtuse.
11. Hairs on pollen presenter with a recurved apex. Cone scales very prominently striate; upper cone scales ciliate. (Scott River to Two Peoples Bay.)..... **P. acicularis**
11. Hairs on pollen presenter patent or incurved. Cone scales not very prominently striate; upper cone scales ciliate or glabrous.
12. Involucral bracts brown throughout.
13. Leaves very crowded, concealing the branchlets and involucral bracts, commonly 10-15 mm long, pungent. Tepals white. Pollen presenter brush sparse, with more or less patent hairs. (Near Eneabba.)..... **P. nivea**
13. Leaves not so crowded as to obscure the branchlets and bracts from view, 150-300 mm long, not pungent. Tepals cream or yellow. Pollen presenter brush dense, with the basal hairs usually strongly antrorse so as to give the appearance of a constriction between the base and the brush. (Wandering to Perup River Lakes to Albany and Stirling Range)..... **P. filifolia**
12. Involucral bracts grey throughout or with grey margins.
14. Involucral bracts ovate or almost elliptic, the upper ones shortly acute. Tepals c. 30 mm long. (Mullewa to Badgingarra.)..... **P. megalostegia**
14. Involucral bracts very narrowly ovate, the upper ones long-attenuate. Tepals 10-25 mm long or rarely up to 33 mm long in *P. brevifolia*.
15. Leaves 80-300 mm long, sometimes with a pungent point 0.5-1.5 mm long but more commonly not pungent.

16. Leaves 80-150(220) mm long. Pollen presenter brush 1.5-2.3 mm long, moderately dense, with axis clearly visible; hairs 0.3-0.45 mm long.
(Williams to Manjimup to Ravensthorpe.)..... **P. media**
subsp. **media**
16. Leaves 150-300 mm long. Pollen presenter brush 2-3 mm long, dense, with axis partially hidden; hairs 0.5-0.7 mm long.
(Perth and Darling Range to Busselton)..... **P. media**
subsp. **juncifolia**
15. Leaves 10-110 mm long, with a pungent point 1-2.5 mm long.
16. Young involucral bracts with merging brown and grey areas or grey above a brownish base. Style nearly always hairy at least in basal half.
(Tamala Station to near Badgingarra.)..... **P. pilostyla** ms.
16. Young involucral bracts distinctly bicoloured, with grey margins and brown thickened midrib. Style glabrous or with a few very scattered hairs.
(Irwin River to Perth to near Ravensthorpe.)..... **P. brevifolia**
complex

GLOSSARY

Anther- The part of the flower where pollen is produced

Antrorse- directed upwards or forwards

Bipinnate- a compound leaf where the initial division of the leaves is divided a further time.

Bracts- A modified leaf at the base of the flower. They can be the showy part of the inflorescence, e.g. in Flannel Flowers (*Actinotus helianthi*)

Ellipsoid- elliptical in cross section

Entire- Complete margins with no irregularities or divisions

Fusiform- spindle shaped

Genus- a group of species linked by similarities. The level of classification below family

Glabrous- without hairs, smooth

Incurve- bending inwards

Inflorescence- a group of flowers arranged as a distinct entity

Involucre- a ring of bracts at the base of an inflorescence

Linear- edges parallel and length at least ten times width

Mucro- a short point terminating a structure

Mucronate- having a mucro

Oblanceolate- having a rounded apex and a tapering base.

Ovoid- elliptical in shape with the base broadest.

Perianth- a non-fertile part of the flower consisting of petals and sepals

Pungent- a stiff, sharp point

Recurve- bending downwards or backwards

Simple (leaves)- entire without teeth or lobes

Striate- when a surface is has ridges, grooves or similar linear markings

Taxa- (plural of taxon) comes from taxonomy, which is the science of classifying organisms into groups. A taxon is a group of plants sharing a relationship and so are categorised together. It is a unit of taxonomy.

Tepals- part of the perianth not clearly differentiated into calyx and corolla

Terete- cylindrical and tapering

Terminal- at the end of a shoot

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heterophyllus and which, according to Barbara and Mike may be 'lumped' with *formosus*. It has buds on it but I think that if I plant it out they may not open. That's what happened to a plant of *I. dubius* last year. The unnamed plant had bigger leaves than *I. formosus*. The one I photographed in the Stirling's had a lot of simple leaves as well as divided ones especially near the flowers. It certainly is a complicated species-like some Dryandras!

April 2003- The rains of the last two months were pretty widespread and the farmers are happy. It came too late for the autumn flowering plants but just in time to keep a lot of them alive. *Verticordia brownii* on Mt Ragged hasn't flowered since 2000 and the plants are barely alive. If the rain keeps up it will be a good spring this year, I would think, for wildflowers. *Here Here!! Ed*

Isopogon and Petrophile Study Group Balance Sheet 2002-2003

Balance brought forward	160.62
Deposits May 29 th 2002-June 30 th 2002	
Membership subscriptions	24.00
Withdrawals May 29 th 2002-June 30 th 2002	
Stamps & Stationary	13.65
Printing expenses NL No.2	30.00
Balance at June 30 th 2002	<u>\$140.97</u>
Deposits	
Membership subscriptions	295.00
Sale newsletter back issues	5.00
Donations	<u>20.00</u>
	\$320.00
Withdrawals	
Stamps & Postage	52.45
Slide and Photo albums	22.00
Printing expenses NL No.3	<u>30.00</u>
	\$104.45
Balance at May 23 rd 2003	<u>\$356.52</u>

SEED BANK

The following seeds are available for members. Please send me a stamped self-addressed envelope, containing your requests and a small seed-type envelope for each species. I have purchased seed from Nindethana seeds. (Nindethana have the largest range of Australian plant seed that I have seen. You can order a catalogue by writing to them at PO Box 2121, Albany, WA, 6331.) In addition, I have added a couple of new species this issue. Thanks to Margaret Pieroni for her donations to the seed bank. Please let me know which species you would most like to see in the bank. Donations of seed from any taxa will be gratefully added to the bank

<i>Isopogon adenanthoides</i>	<i>Petrophile drummondii</i>	<i>Petrophile pulchella</i>
<i>Isopogon anethifolius</i>	<i>Petrophile ericifolia</i>	<i>Petrophile rigida</i>
<i>Isopogon buxifolius</i>	<i>Petrophile fastigiata</i>	<i>Petrophile scabriuscula</i>
<i>Isopogon ceratophyllus</i>	<i>Petrophile heterophylla</i>	<i>Petrophile semifulcata</i>
<i>Isopogon cuneatus</i>	<i>Petrophile incurvata</i>	<i>Petrophile serruriae</i> yellow & pink
<i>Isopogon formosus</i>	<i>Petrophile linearis</i>	<i>Petrophile shuttleworthiana</i>
	<i>Petrophile longifolia</i>	<i>Petrophile striata</i>
<i>Petrophile biloba</i>	<i>Petrophile macrostachya</i>	<i>Petrophile teretifolia</i>
<i>Petrophile canescens</i>	<i>Petrophile media</i>	
<i>Petrophile diversifolia</i>	<i>Petrophile pedunculata</i>	

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REFERENCES

The following references were used, with the permission of the copyright owners where appropriate, in the preparation of this newsletter. (Thanks)

Banksias, Waratahs & Grevilleas and all other plants in the Australian Proteaceae Family by John W. Wrigley and Murray Fagg

Flora of Australia Volume 16 *Elaeagnaceae, Proteaceae I*. Melbourne: CSIRO Australia

Encyclopaedia of Australian Plants suitable for cultivation by W. Rodger Elliot and David L. Jones

The Proteaceae of the Sydney Region by Alec M. Blombery and Betty Maloney

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