



Australian Plants Society

South East NSW Group

Newsletter 184

June 2022

Corymbia maculata Spotted Gum and
Macrozamia communis Burrawang

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Dear Members,

I hope you have all been enjoying the sunny days that we have been having and not suffering from the cold.

Last month I wrote about other people's passion for certain topics and this month we would like to continue the theme and ask you to contribute to our next meeting with a up to 10 minute talk about what you love about native plants. Please don't be put off by having to stand up in front of the meeting. We are all like-minded people who love learning and appreciate the environment, and this is your chance to inspire others and find out what projects people are involved with.

The topic can be anything that gets you fired up as long as it relates to native plants and or your garden. Or you can keep it simple as talking about the plants you bring in for show and tell.

We will have a projector on hand so you can show images if you wish. Once again, it would be good if you could send them to me prior to the meeting, rather than bring them in on the day, but please ask if you have any problems. (diClark293@outlook.com).

As you would be aware the NSW Australian Plant Society are hosting the Australian Native Plant Society Biennial Conference at Kiama in September.

We were going to be involved in the pre tour to the south coast. Unfortunately the tour has been cancelled due to lack of numbers.

As part of the planning process I met with Heather Miles and Janice Hughes. Janice is part of the Nowra APS Group, and there was a strong feeling expressed that our groups could meet together one day.

Since the tour has been cancelled Janice is proposing that we meet in Ulladulla on August 13th for a combined group walk of the South Pacific Headland and the geology sites in the district.

For those of you who have not been to the reserve it is a great opportunity to visit with a group of knowledgeable people or to just visit again and meet our neighbours. We still need to finalise the details of this gathering, so I will clarify in the next newsletter. If it is something you would like to do it would be helpful to hear from you.

In the meantime, enjoy the bush and the garden, stay safe and remember to be covid aware. See below for our monthly reminder.

Kind regards, Di

COVID Reminder

A few things to consider

- If you are feeling unwell, please do not attend a meeting
- Try and maintain 1.5m between yourself and others
- If we are gathering indoors and distancing is difficult consider wearing a mask
- Wash your hands regularly or use hand sanitiser
- NSW Health strongly advises people get fully vaccinated and wear a face mask where they cannot physically distance

Next Meeting Saturday 2nd July 2022, at Lesley and Norm Hulands Garden

9 Mountain View Rd Moruya

**Arrive 10.00 a.m. for morning tea,
meeting to commence at 10.30 a.m.**

Members' Meeting

Everyone has a story to tell, though some are reticent to speak up.

At this informal gathering, President Di asks each of us to step outside our comfortable zone, (e.g. seat in the back row behind a covert screen) and contribute to the conversation or add to the narrative.

- **Bring your loquacious, chatty anecdotes and yarns,**
- **think out loud about some troubling garden or plant problem,**
- **report on a plant or plants which have performed brilliantly, or less than so,**
- **reminisce about a place you visited and the plants you found,**
- **bring some plant specimens and tell their stories, histories, cultivation secrets,**
- **compile a simple powerpoint presentation to illustrate a topic you find interesting,**
- **share photos of your garden, and maybe the fauna which call your garden 'home'**

You are free to talk about anything plant related that other members might be interested in. Please don't think that nobody would be interested.

We are a diverse group with many interests and common passions.

We invite you to share your interests with the group.

The choice of subject is entirely yours, but you should limit your presentation to 10 minutes.

The committee will provide computer, screen and projector for those needing such. You need only provide your presentation on a memory stick.

As mentioned, bringing along specimens of plants is an ideal introduction to discuss the plants you grow, and the challenges our varying conditions present.

After lunch, we will stroll around Lesley and Norm's large garden to discover plants that have done well through the recent wet weather.

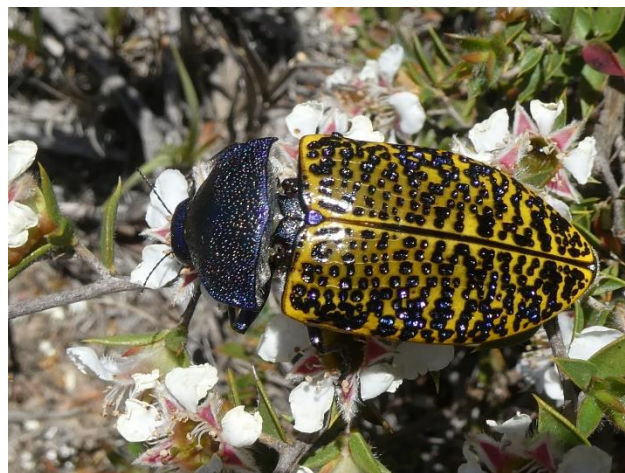
Last Meeting

“How Insect pollinators have driven the evolution of flower structure in the Angiosperms”

Dr Roger Farrow

I have not attempted to precis his talk, as the subject is very complex, but instead chose, with permission, to use information contained in his presentation slides to illustrate this article.

Roger is a retired insect ecologist who previously worked at CSIRO, Division of Entomology. He pointed to the diversity of insects in any particular area as an indication of the quality and conservation value of that environment because so many ecological processes depend on insect activity. This may include pollination of flowers, recycling of nutrients or providing food for other animals and birds.



Spectacular Jewel Beetle (*Stigmodera macularia*) feeding on a tea-tree flower. This beetle was described in 1805, having been collected on one of Cook's journeys to Australia. It grows to about 25mm in length

All photos and text by Roger, from his powerpoint presentation, or his excellent and comprehensive “*Insects of South-Eastern Australia: an ecological and behavioural guide*” (CSIRO 2016)

Insects are part of a large group of animals, **the Arthropoda**, which have a hard external skeleton that is divided into segments, and also have jointed limbs, which is the meaning of the word ‘arthropod’.

Adult insects are characterised by having **3 pairs of legs**, **usually 2 pairs of wings**, and **3 body sections**: a head with compound eyes, mouthparts and a pair of antennae; a thorax of 3 segments bearing the legs and wings;

and an abdomen with 11 or fewer segments and terminal reproductive organs.



A beetle, showing body parts and placement

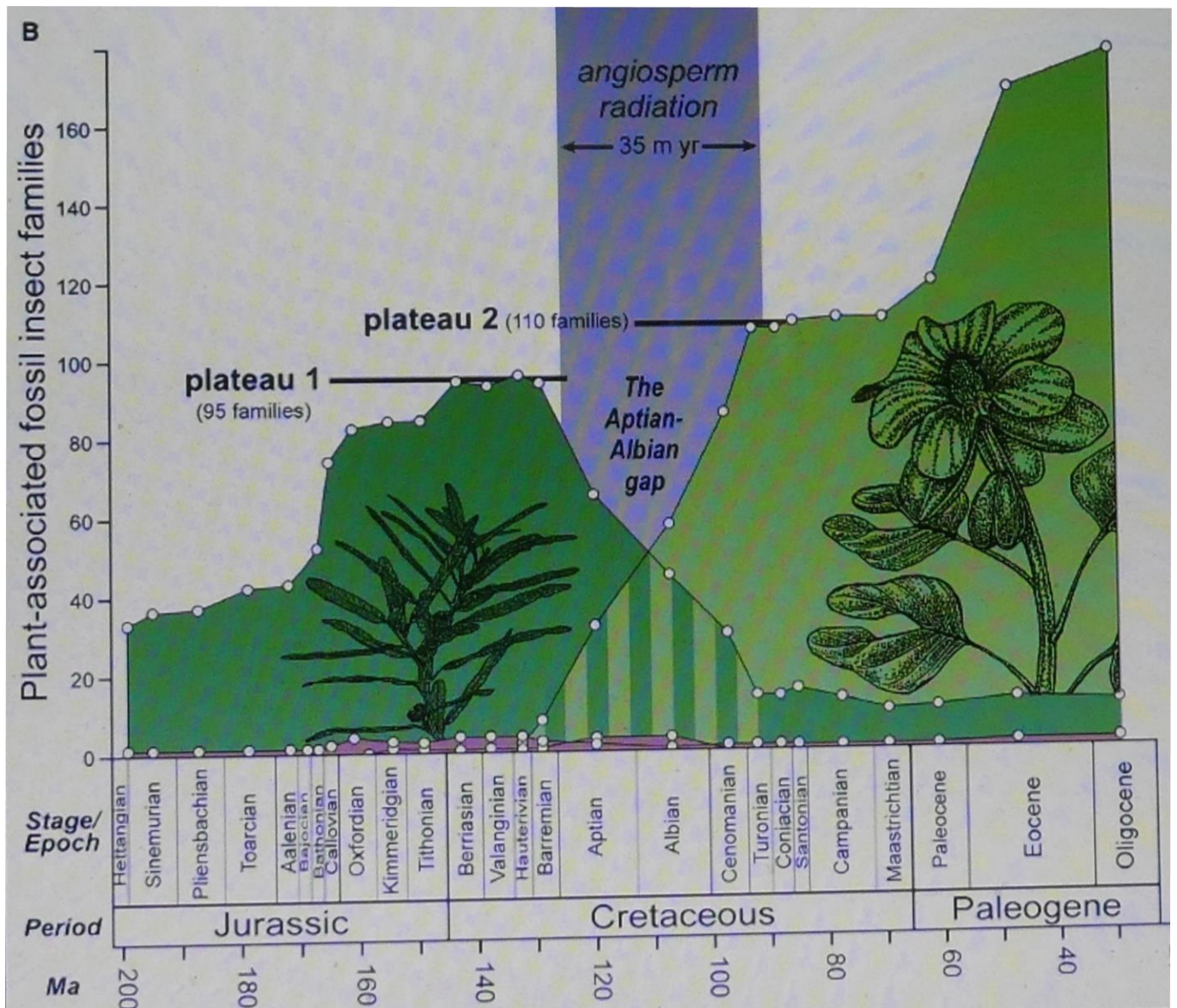
Spiders and other arachnids, centipedes, millipedes, slaters and other land crustaceans are not insects

Possible Advantages over the Gymnosperm line

In discussing how from early gymnosperm plants, such as conifers and cycads, flowering plants evolved and flourished, Rodger suggested

- flowering plants became more efficient at photosynthesis, and gaseous exchange through more numerous stomata in the leaves
- the small genome and compact DNA at the cellular level allowed more space for chloroplasts, which contain chlorophyll and in which photosynthesis takes place
- More efficient cross-pollination involving insects

Mass expansion of the flowering plants occurred during the mid-Cretaceous period



An impression of a prehistoric Zhangsolvidae Fly feeding at a female cone of an ancient cycad-like plant, in the mid-Cretaceous (Aptian-Albian) period 125MYA



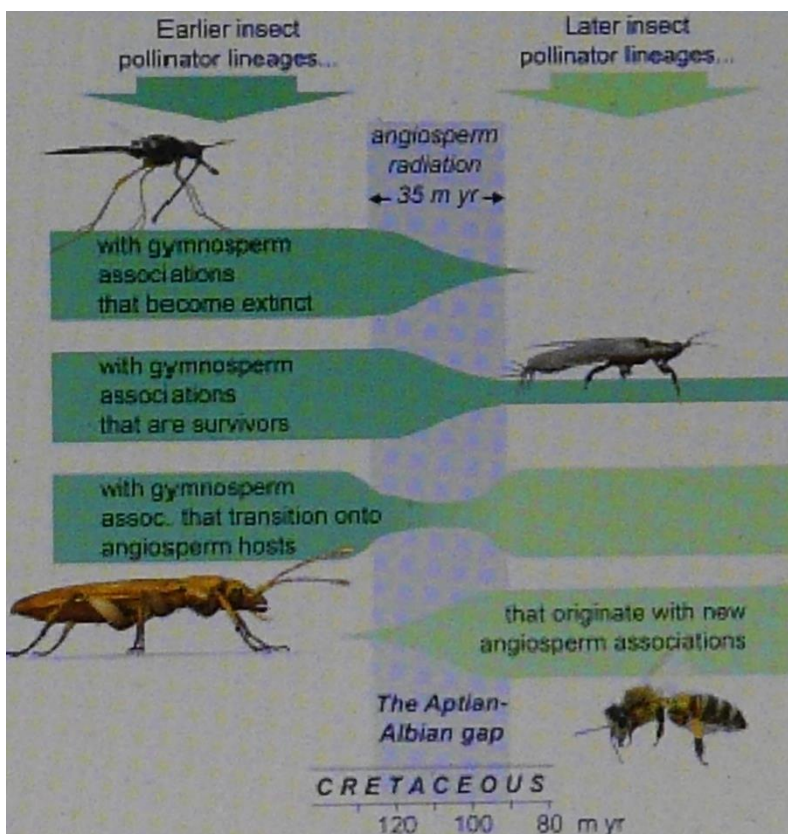
A modern Soldier Fly, Stratiomyidae feeding at a Geranium flower



Reconstruction of a false blister beetle, *Darwinus marcosi* with a dusting of Cycad pollen. 125MYA



Modern false blister beetle, *Pseudolycus hilaris* feeding on Acacia flowers



Roger discussed a range of insect/plant associations, explaining the theories of rapid angiosperm radiation during the mid-Cretaceous period

How well do you know ANITA?

The response to this question was a mute silence, so Roger explained.

The ANITA grade is an amalgam of the lineage names of an extant group of basal angiosperms (DNA studies) They comprises eight families :

- Amborellaceae,**
- Hydatellaceae,**
- Cabombaceae,**
- Nymphaeaceae,**
- Austrobaileyaceae,**
- Trimeniaceae,**
- Schisandraceae,**
- and Illiciaceae**

Fossils of some of these date back to the mid-Cretaceous.

They are all insect pollinated, mostly by flies and beetles and rarely by bees (Nymphaeaceae)

None produce nectar although the Nymphaeaceae produce nectar like secretions

Thermogenesis occurs in the flowers of 3 of the families, the **magnolids, eudicots** and **monocots**, but is much rarer in the rest of the Angiosperms. These groups have the ability to raise their temperature above that of the surrounding air. It is well developed in the Cycads

There are about 240 plant families represented in Australia largely distinguished by flower characteristics. Roger promised not to discuss all families, but restrict his talk to well recognised groups.



Although most modern gymnosperms are wind-pollinated, the ancestral angiosperms were insect pollinated.

So wind pollination in angiosperms is a **derived evolutionary trend** in about 10% of angiosperms, mostly grasses and some trees and shrubs, including Dodonaea.

The number of arthropod species visiting flowers for food is estimated at around 30% of the described species. Australia has about 59,000 described insect species and an estimated total insect fauna of 205,000 species. This would equate to about **61,500** species of which about **17,700** are described, feeding at flowers.

Grass flower

INSECT LIFE STYLES

The sole function of adult insects is to reproduce and maximise the survival of their offspring. Nectar provides the energy to sustain these activities, whereas pollen provides additional resources for growth through the supply of pollen and other essential compounds for their offspring.

Insects are divided into 2 main groups:

exopterygotes, in which the immature stages resemble the adults and have the same life styles and feeding strategies. i.e. the bugs and their allies. Few of these are flower visitors.

endopterygotes in which the immature stages and adults have separate and different life styles with different feeding strategies. The immature stages are sedentary larvae feeding on plants and other food sources whereas the adults are mobile and only require an energy source to survive.

However, one group collects pollen and nectar to feed its offspring, namely the bees.

The relationship between insects and flowers: co-evolution or mutualism

Co-evolution: the process of reciprocal evolutionary change that occurs between pairs of species or among groups of species as they interact

Mutualism: describes the ecological interaction between two or more species where each species has a net benefit

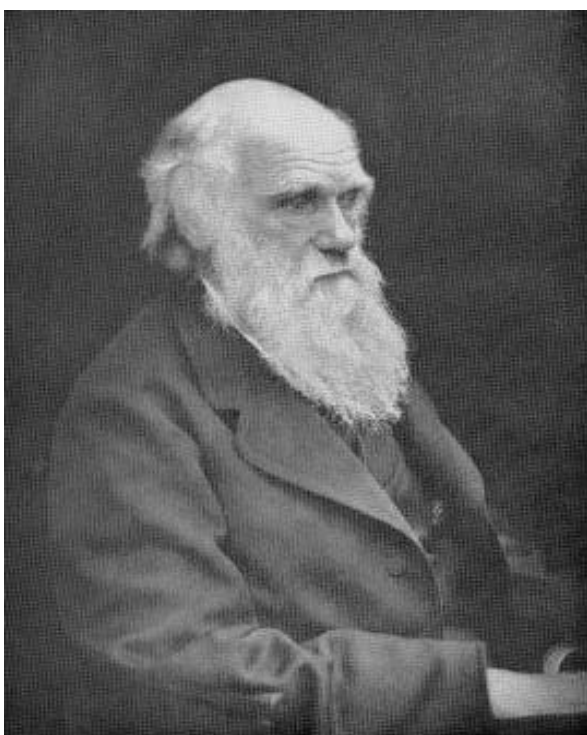
The theory of co-evolution goes back to Charles Darwin and the relationship between the Madagascan orchid with a 25 cm nectary spur and a moth with an equivalent length proboscis. Insects are not altruistic pollinators and are just seeking food at the flowers so that pollination is an accidental consequence of the visit

Most flowers are visited by a wide range of insect species and conversely most insect species visit a wide range of plant species, depending on what is available in the environment.

Consequently most plants and insects are generalists, suggesting mutualism rather than co-evolution is the best description of the relationship in most instances, except for groups like the orchids



An example of Co-evolution. An obligate relationship between the fig wasp and its host plant. This is also an example of brood site pollination



What is the pollination syndrome ?

A suite of floral traits, including rewards like nectar, associated with the attraction and utilization of a specific group of animals as pollinators.

This has proved a controversial subject, because flowers of many plants attract a wide range of visitors and potential pollinators, the generalists, whereas few plants attract a specific pollinating species. The latter strategy would be risky if the specific pollinator is absent, or becomes extinct, as the host species will share the same fate.

Traits such as flower shape, size, colour, patterns such as nectar guides, scent, presentation of anthers and styles, flower arrangement and forms of deceit that involve no reward all evolved by the need to attract insects.

Australia has 240 families of flowering plants, and all are distinguished by their floral traits.

Charles Darwin's First Dilemma.

Some 20,000 species of plants offer only pollen as a reward, and rely on pollen-foraging bees for pollination.

This creates a dilemma as pollen grains contain the male gametes and should be protected from becoming insect food.

However most plants produce large amounts of pollen, and it only takes a few grains to fertilise the ovary via the pollen tube.

In a few species, there is a division of labour between pollen for food and pollen for fertilisation. The provision of nectar provides an alternative and less demanding resource to divert insects from sourcing pollen.



Colletid bee, *Palaeorhiza disrupta*, vibrating central poricidal anthers to eject food pollen of a *Melastoma* flower. Later the same bee vibrates the outer anthers to release pollen for fertilisation



Brood site pollination. Shield bearing moth ovipositing in the ovary of *Boronia serrulata*, and feeding on pollen at the same time, and no doubt pollinating stigma.

The flowers and their adaptations to attract visitors



Beetle time on *Kunzea ambigua*

Single flowers of *Ranunculus*

Buttercups have highly reflective yellow, cup-shaped single flowers with nectaries at the base of the petals. They have a surprisingly low visitation rate, and the main visitors are small sawflies and beetles.

Wahlenbergia (*Campanulaceae*) have large, single blue tubular flowers, which are largely bee pollinated. The pollen is shed onto the style which a bee has to brush past to reach the nectary. Bees also harvest pollen.



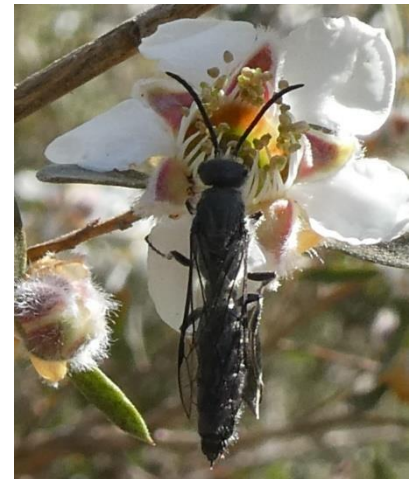
Hibiscus (*Malvaceae*) also have large single flowers, each of which lasts only one day. Specialised pollen-feeding weevils which visit a range of plant species, fly to a new flower every evening carrying pollen.

Alyogyne huegellii, is visited by a pollen feeding beetle, *Aethina concolor* (shown at left)



Prostanthera (*Lamiaceae*) have asymmetric flowers with a landing area on the lower petal with nectar guides and a hairy throat to obstruct entry to small beetles. Plants are a generalist, with a bias to bees. Pictured is a jewel beetle, and also we saw a colletid bee and soldier fly on similar flowers.

In the *Myrtaceae* family, *Leptospermums* are generalists with abundant flowers attracting a wide range of insects to nectar, often in large numbers. These include jewel beetles, short-tongued bee, small bee-fly and pictured, at right, a **flower wasp**.



Eucalypts produce massed flowers with conspicuous stamens and large supplies of both nectar and pollen. Plants are generalists, attracting a wide range of insects, especially bees and wasps. These include soldier beetles, satin-green forester moth, flower wasp, and the pictured **masked bee**.

Bursaria, (*Pittosporaceae*) produces abundant flowers attracting a wide range of insects to abundant nectar. These include tumbling flower beetle, jewel beetle, solitary bee, bee-fly, hairy flower wasp and *Heliothis* moth.



Specialist insect attractors include the peas (Family Fabaceae) Flower stamens and stigma are concealed in a petaloid keel that has to be depressed to gain access to the nectary, invariably by bees such as Masked bee, reed bee, colletid bee and *Trichocolletes venustus* here visiting **Hardenbergia violacea**.



bee has caused a sudden hydrostatic swing of the column, either depositing or receiving pollen.

Trigger plants, Styliidium, have a specialised dynamic pollinating mechanism, mostly triggered by bees. Here a reed



Acacias (Mimosaceae) present a paradox. Plants flower in winter and early spring when insect activity is low. They produce abundant pollen but no nectar, and are unattractive to bees and flies. Acacia is mostly pollinated by small beetles, including flea beetles, arboreal ground beetles, hide beetles, and the leaf beetle pictured.



Compound flowers of the daisy family (Asteraceae) favour crawling insects, and are generalists attracting a range of insects. Mirid bugs, ephydrid flies, fruit fly, blowfly, bristle fly, scarab beetles, tumbling flower beetle and many butterflies, such as the Silver Xenica pictured.

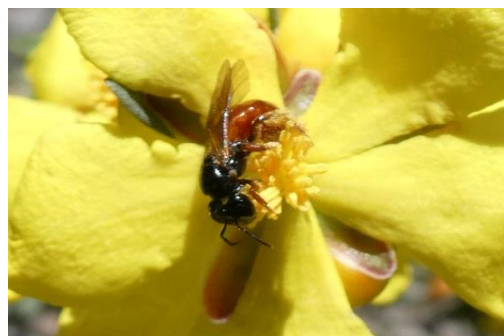


Some flowers produce **Foul Smelling Scents**, with **Stinking Pennywort *Hydrocotyle laxiflora***, pictured above left, a standout, attracting many beetles and flies including the common blowfly. Maybe not one for your garden.



Cauliflory

Several families of trees and shrubs of rainforests exhibit **Cauliflory**, where the flowers borne on the trunks and branches of plants. A common visitor to these plants is a pollinating weevil, *Baris* sp., which feeds exclusively on pollen while burrowing inside the flowers.



Buzz pollination, “Sonication” of Hibbertia anthers by a reed bee.

Having covered the first 14 families of Australian flora, Roger suggested he might need to return, as there is still 226 families to go, including a specialty, **orchids, the great deceivers**, a topic for another day.

Proteaceae Project Report

I have to apologise for not being in contact previously to let you know what is happening with this project. The group has not had working bees since we last reported. We have however added a few more grid lines in preparation for planting. More general drainage problems at the ERBG are reducing our planting area availability. The good news is that we haven't had to water the plants. We are also waiting on the warmer weather for our propagated plants to be ready to plant. I will send out a email to the Proteaceae Group members to flag some upcoming working bees. Thank you for your patience.

Di.

ANPSA Biennial Conference, Kiama, Saturday 10 to Friday 16 September 2022

The Australian Plants Society NSW is hosting the Australian Native Plants Society Australia (ANPSA) Biennial Conference at the Kiama Pavilion in September 2022.

Registration is now open, and speakers announced.

Highlighting presentations by Costa Georgiadis and Clarence Slockee, from Gardening Australia, leading botanist and ecologist Professor David Keith, Forest ecologist Professor David Lindenmayer, Grevillea Study Group leader Peter Olde and Eremophila Study Group leader Lyndal Thorburn.

For more details - austplants.com.au/ANPSA-Biennial-Conference-2022



Fabulous Peas 2022

FJC Rogers Biennial Seminar 15th-16th October 2022

Discover the extraordinary world of Australian pea plants.

Saturday York on Lilydale, Mount Evelyn

Speakers with expertise in identifying, growing and propagating peas. Learn about current research into propagation and growing-on techniques. Evening dinner and an entertaining speaker.

Plant sales of common and unusual pea species. Book sales. Displays. Raffle.

Sunday Coach tours to public and private native gardens which include a wide variety of pea species. Art exhibition and sale featuring pea plants from 8th – 16th October at Karwarra Australian Botanic Garden. **Plant sales.**

Expressions of interest, and for information: fabulouspeas2022@gmail.com

<https://apsvic.org.au/fjc-rogers-seminar-2022/>

Early-bird ticket sales available until June 30th, so get in soon.

Hosted by: Australian Plants Society Maroondah Inc

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