



It's the most wonderful time of the year!

I think it is safe to say that 2020 probably has not quite gone to plan for most of us but we can now finally say yay to springtime and all the wonderful flowers that are now blooming. August saw our first ever online presentation. A special thanks on behalf of the WANOSCG membership to Tobias Hayashi firstly for giving the time to present his research to us but also for undertaking this presenter role to a virtual audience over Zoom. This is the first time we have explored this medium as an organization and were very pleased with how things ran on the night. The best part was that members from all over Australia were able to log in and enjoy this presentation. For those who were unable to join, Tobias has kindly provided us with a summary of his talk in this bulletin. I hope everyone is getting a chance to get outside and enjoy our beautiful part of the world.



Image by Rachel Halls of Clubbed Spiders (*Caladenia longiclavata*)

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Next General Meeting:

Kings Park Administration
Building
Next date to be advised

The Committee:

President – Ramón Newmann
Vice President – Ian Puddey
Secretary – Pat Richards
Treasurer – Jay Steer
Committee Members – David
Lawson, Kevin Uhe, Debbie
Proudfoot, Andrew Brown, Bill
Gaynor

“It's all about the sexual chemistry”

Pollination of *Pterostylis* by male fungus gnats

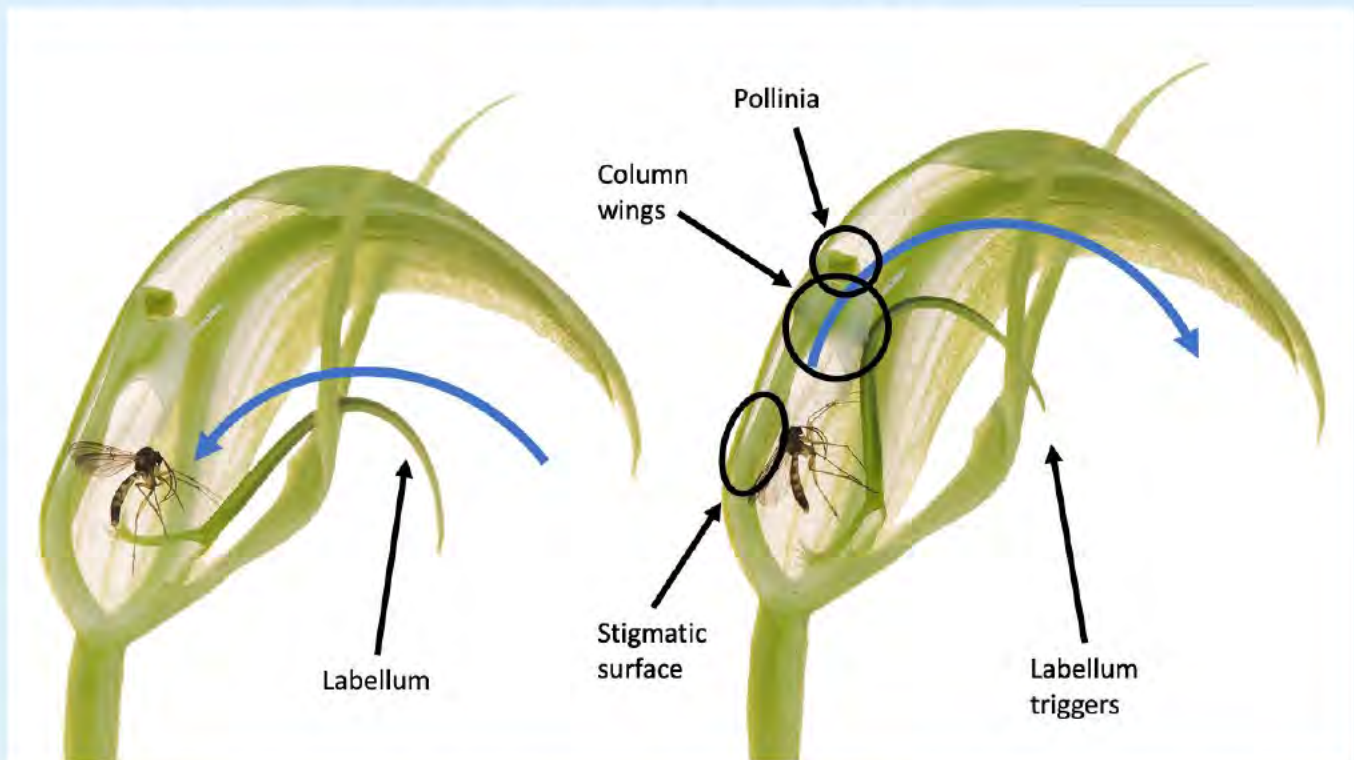
by Tobias Hayashi

Why are pollinators important?

- Plants are sessile, so pollinators often required to move pollen
- Flowers are key to attracting pollinators
- Insects are most common pollinators

Fly pollination in orchids

- After Hymenoptera, the Diptera are 2nd most important group of orchid pollinators
- ~ 25% of orchids are fly pollinated (=6000+ species)
- Various pollination strategies including food reward, food deception, brood site deception, and sexual deception
- Some fly-pollinated flowers, including *Pterostylis*, have a trap system!

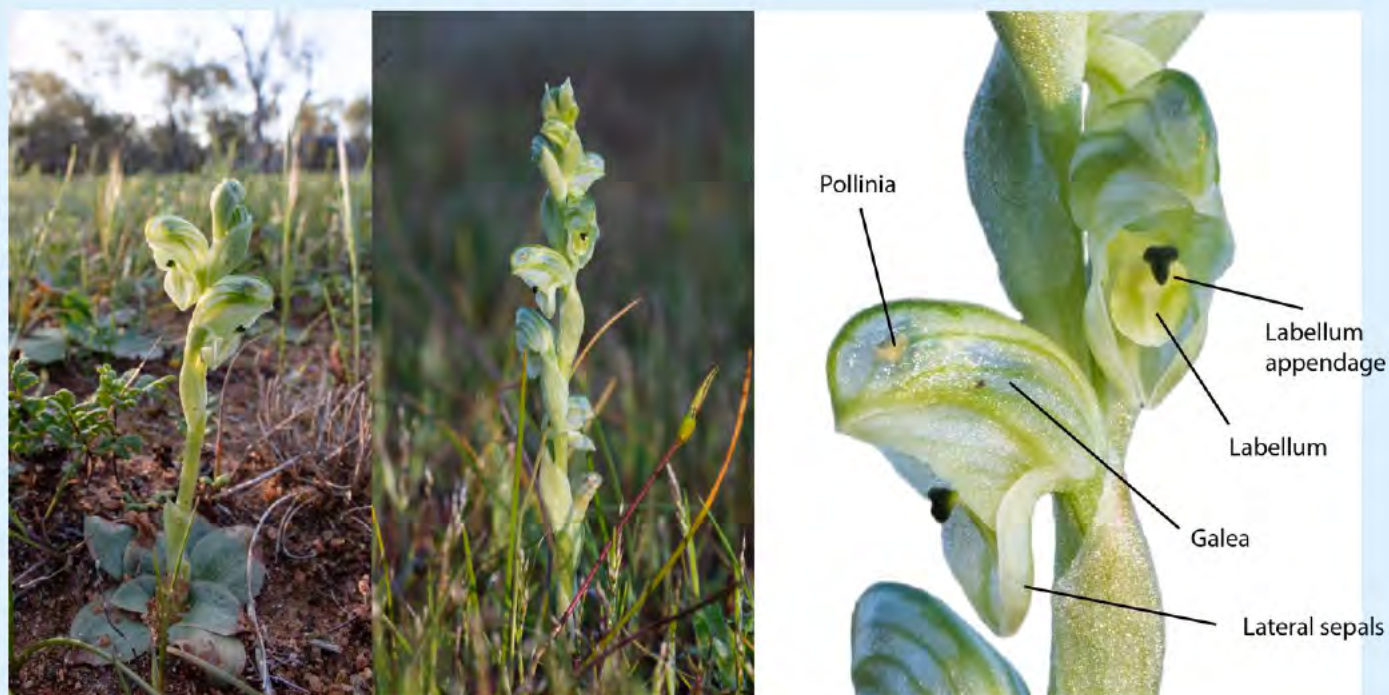


Above: trap mechanism of *Pterostylis acuminata* with *Mycomya* sp. (Mycetophilidae) pollinator for scale.
Blue arrows indicate movement of the gnat into and out of the flower.

Overview of my PhD research

- Is sexual deception widespread?
 - Yes → present in most groups, but not all
- How do the flowers fool the flies?
 - *Pterostylis cycnocephala*
- What chemistry is involved?
 - *Pterostylis orbiculata*

Pollination of *Pterostylis* continued...



Above: floral morphology of *Pterostylis cycnocephala* flowers at field site in Terrick Terrick National Park (northern Victoria).



Above image: sequence of male gnat pseudo-copulating with labellum appendage leading to entrapment. 1 approaching labellum appendage from below while wing fanning (abdomen slightly curled in photo); 2 curling abdomen fully through legs and under thorax; 3 grasping on to labellum appendage with gonostyli (genitalic claspers); 4 torsioning abdomen through 180 °; 5 assuming copulatory position; 6 labellum flips upwards with the male gnat still attached to appendage; 7 male gnat is trapped inside the galea (hood of flower); 8 male gnat with pollinia attached to the dorsal surface of the thorax.

Pollination of *Pterostylis* **continued...**

Pollination of *Pterostylis cycnocephala*

- Pollinated by male *Bradysia pictipes* fungus gnats (Sciaridae)
- We observed gnats removing pollinia (n=16) and depositing pollen (n=4)
- First detailed investigation of sciarid pollination in Australian orchids
- Sexually deceptive - strongly sexual response
- Actual genitalic clasping, not just attempted copulation, required for pollination
- Gnats attracted by floral scent
- Scent not produced in labellum, and there are no prominent sepal clubs (unusual)
- Dark labellum appendage appears to promote sexual behaviour

Investigating the chemistry of sexually deceptive *Pterostylis orbiculata*

How do you work out exactly which chemical compounds are responsible for sexual deception? It is a long and tricky process. The following is a brief summary of my process investigating the compounds attracting male *Mycomya* sp. fungus gnats by *Pterostylis orbiculata* flowers.

1. Extract volatiles in solvent (dichloromethane)
2. Run through Gas Chromatography - Mass Spectrometry (GC-MS) machine
 - Separation of compounds over time
 - Mass spectra 'fingerprint' (but need matching spectra to identify)
3. Analyse contents – but which compounds? Compare active (labellum and female gnat) vs non-active (floral remains and male gnat)
4. Isolate fractions using preparative-GC to narrow down which compounds are attractive
5. Test fractions on pollinators to confirm activity
 - Male gnats respond to fraction 3
 - Great! Two compounds in fraction 3... but what are they?
6. Compare mass spectra with literature
 - Match for smaller of two compounds = (Z,Z)-6,9-tricosadiene
 - Known sex pheromone in several species of moth and one species of wasp
 - Main compound unmatched, but related (tricosatriene)
7. Run on Nuclear Magnetic Resonance (NMR) machine to investigate structure
 - Could be (6Z,9Z)-1,6,9-tricosatriene??
8. Synthesise candidate compound/s to confirm
9. Confirm activity with male gnats using synthetic compound/s
 - Blend of 5 compounds in common between female gnats and *P. orbiculata* sexually attracts male gnats
 - Blend without the main compound (tricosatriene) is not attractive
 - (6Z,9Z)-1,6,9-tricosatriene is a new natural compound
 - These types of compounds are rare in nature – most similar are some moth sex pheromones
 - How do *P. orbiculata* orchids produce such unusual compounds?

Summary:

- Growing evidence now for widespread sexual deception of fungus gnats in *Pterostylis* (but not in all groups)
- *P. cycnocephala* pollinated by sciarid gnats with chemical and visual stimuli
- *P. orbiculata* unusual chemistry to attract pollinators
- Importance of fungus gnats as pollinators!

General Business

Unfortunately, we are still not able to hold our normal General Meetings (as the meeting room is currently restricted to 15 attendees) so alternative venues are being investigated. Last month we had a very high-quality Zoom presentation by Tobias as was summarized earlier in the Bulletin which was well received by the members who attended from around Australia and overseas.

We are privileged to announce our next online presentation on **Wednesday the 9th September at 7 pm** Western Australian time (UTC +8). (Please note that it's not the usual Wednesday of the month or the usual time slot.)

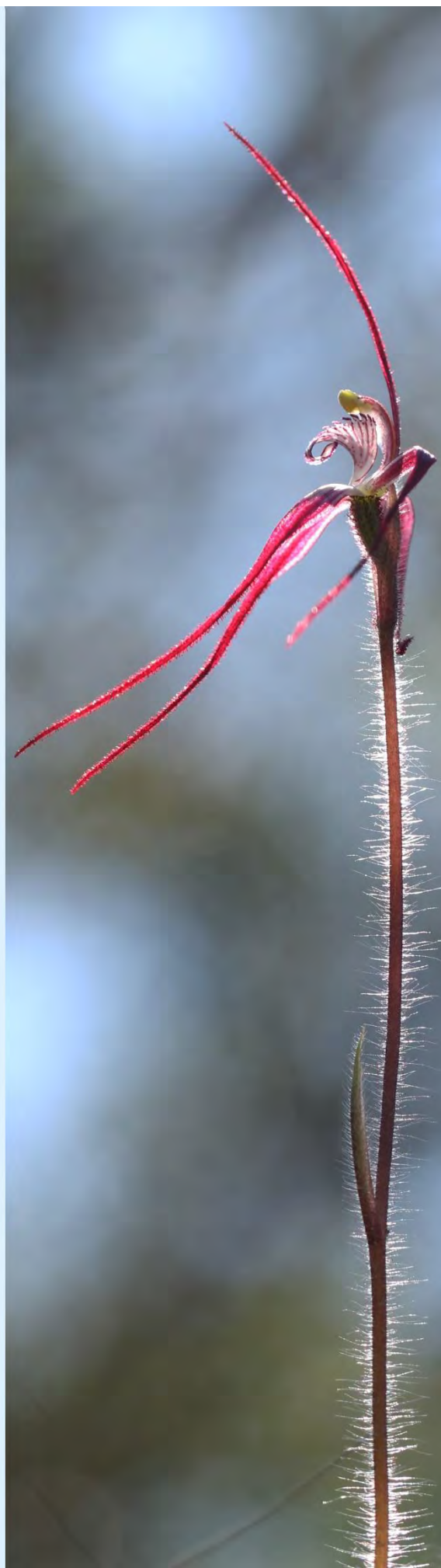
As it will be on-line, our members from across the State, Country and overseas will be able to participate. **Dr Ryan Phillips** has kindly agreed to present to WANOSCG members on the topic of **"Western Australia's remarkable hammer orchids."**

Ryan's family have been members of WANOSCG since 1991, following a chance encounter with *Caladenia flava* while on holiday at Bridgetown. From 2006 to 2009 Ryan did his PhD jointly between the University of Western Australia and Kings Park and Botanic Gardens, where he investigated the role of pollinators and mycorrhiza in rarity of hammer orchids. For his post-doctoral studies, he moved to the laboratory of Professor Rod Peakall at the Australian National University in Canberra. Here he continued his work on Western Australian orchids but broadened his research to include studies on the evolution of deceptive pollination strategies. In 2018, he took up a lectureship in Conservation Biology at La Trobe University in Melbourne where his research retains a strong orchid focus, tackling both theoretical and conservation-oriented questions

We are looking forward to hearing about Ryan's work in more detail in this presentation.

Please RSVP to wanoscg@gmail.com by 5 pm on Monday, 7 September (UTC+8), if you would like to attend this online meeting following which full details of how to log in and be part of this on-line presentation will be sent out.

If you haven't used Zoom before and need assistance, please see the email sent out by our Secretary, Pat Richards for further details on how to get set up.



ADORP News by Kevin Uhe

Welcome to Karen Southall, Tony Wood and Jess Parker, all new members of WANOSCG who have joined the ADORP program. Karen and Tony have been active in a number of surveys around the Albany area while Jess will assist in surveys around the Donnybrook area.

A number of surveys have now been completed with mixed results. The dry July has affected some of the August flowering species with lower numbers of plants being recorded this year.

Now that spring is upon us, many of the ADORP surveys will be undertaken over the next two months to cover the spring flowering species. Of particular interest will be to see how species respond in areas that have been the subject of controlled burns during Autumn.

Conservation News

Thelymitra variegata Update

Vivian and Peter McAvaney have been filling in for Graeme Walker this season for monitoring the Queen of Sheba (ADORP) survey. From what they have observed so far this season, there are around ten plants this year of which only four or five will likely flower. The environment remains extremely fragile so WANOSCG members are asked to refrain from visiting the site.

Burn Site Photo Request

Etienne Delannoy is currently writing an article about fire and orchids in Western Australia for the bulletin of the French Orchid Society. He is requesting that members that have any images of a landscape picture illustrating the enhanced blooming of orchids following a summer bushfire to please share them with him to assist with his article. If anyone has a picture that would fit with Etienne's request, could they please forward a copy to wanoscg@gmail.com for onforwarding to Etienne.

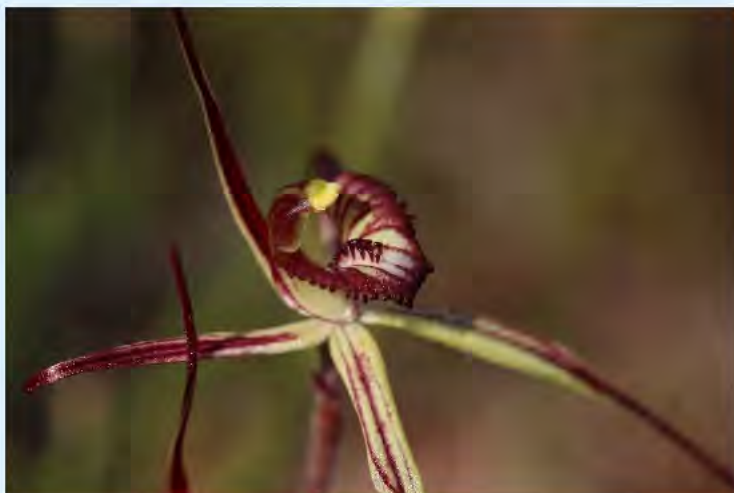


Image by Rachel Halls – *Caladenia douchiae* hybrid



2020 Proposed Field Trips

We are very excited to finally announce our first official proposed field trips for the year organized but some of our Committee volunteers. These field trips of course are subject to change with any Covid-19 restrictions that may be imposed.

Sunday September 13th: Serpentine-Jarrahdale Area

Field Trip Leaders: Andrew Brown and Kevin Uhe

The first official WANOSCG field trip for the year will be to the Serpentine-Jarrahdale area on September 13th. Instead of targeting particular orchid species it will be a bit of a magical mystery tour checking out forest and granite areas to see what we can find.

Lunch will be at a picnic area near Jarrahdale.

Register from the 3rd August to Andrew Brown

Note: The trip will be limited to the first 20 to register. Once registered a meeting place and time will be sent to you

Saturday September 26th to Monday September 28th: Blue Lake and Stirling Ranges Long Weekend

Field Trip Leaders: Kevin Uhe

A field trip is planned over the September long weekend to visit two burn areas, one around Blue Lake and the Stirling Ranges. This will give the opportunity to view a prescribed burn area and compare against a summer wildfire.

Accommodation is available at:

- Mt Barker Caravan Park (Caravans, Chalets, Cabins) Ph 98511691
- Stirling Range Retreat (Caravans, chalets, cabins, on site caravans) Ph 98279229
- Mt Trio Bush Camp (Caravans and Camping only) Ph 0419751801

As this is the beginning of the school holidays and is in the peak season members are encouraged to book accommodation options early.

Register from 24th August to Kevin Uhe

Note: As we will have the ability to split the group into two there will not be a limit on numbers attending.



“Great Southern Highway” by Su Hayman and Phil Wilding

FIELD TRIP REPORT: SOUTHERN RIVERS GROUP – AUGUST 15th

A small group of keen orchid hunters braved the weather on Saturday 15 August to visit a burn area on Great Southern Highway. Our little group ventured into a recent burn and saw potential for later on in the year as there were numerous *Caladenia* leaves emerging.

As usual at this time of year there were so many *C. reptans* (Little Pink Fairies) in full flower and in so many shades of pink. It was beautiful to see. There was also a nice showing of *Pheladenia deformis* (Blue Fairy). We were lucky in finding 2 *C. longiclavata* (Clubbed spider) in flower and another dozen in bud. Lots of *Diuris* in flower, not sure what they were, so hoping the photos will assist in identifying. *Eriochilus scaber* (Pink Bunny) were also seen.

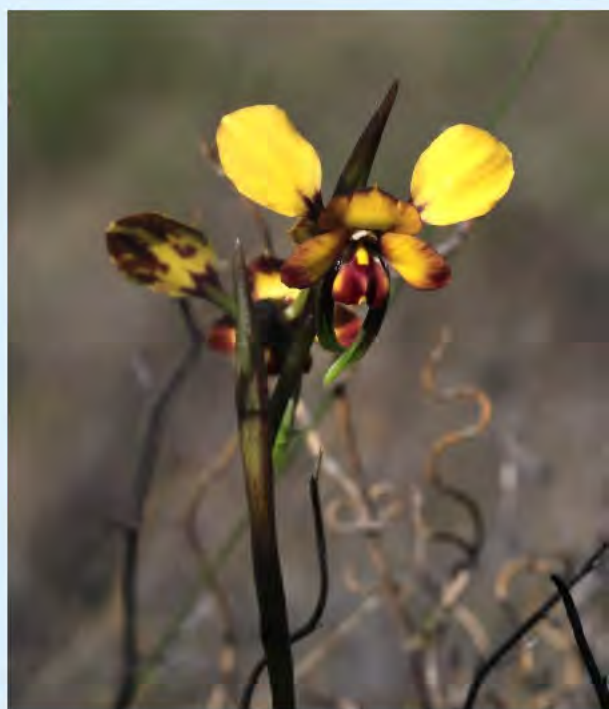


Images from top left clockwise – *Pheladenia deformis*, *Caladenia longicauda* subsp. and SRG group field trip photo.

SRG Field Trip continued...



Images clockwise from top left – *Caladenia longiclavata*, *Diuris* species, *Pterostylis* species, *Diuris* species and *Caladenia reptans* subsp. *reptans*



Also found were snails, but again we are not sure on what species they are.
We spent several hours checking the area and took note on what will be flowering in the next month or so.

We had a pleasant day out so thank you to the club members who attended.

Happy orchiding group down south.

Field Trip leaders – Su Hayman and Phil Wilding

Drakaea elastica Update by Ron Fauntleroy

From the Editor: For some of our newer members, a bit of background on the Glossy Hammer Project. Roy Fauntleroy has been super busy the last 2-3 years fashioning cages to protect orchids that are at risk of extinction from predation by pest species like rabbits. The cages function to cover the orchid during development but are large enough to allow plant growth and still let in sunlight and pollinators as not to interfere with the natural life cycle of the orchid. Below is an update from Ron as to the progress of the project that is run in conjunction with DBCA.

I've been very busy with my ADORP *Drakaea* target orchid this year having completed 20 separate trips checking the status of the plants inside the WANOSCG cages from areas in the Peel region and also the ones we sent down to Capel and Collie. In addition, I am working with DBCA as a registered volunteer on another 7 new locations, on new areas where we have managed to find more *D. elastica*.

If we keep going with these new finds, I think may be possible the orchid will be downgraded from Priority 1 to a lesser priority. In one location, the number of plants has passed 1,200 although in this area the rabbits are worse than ever, thank God for the cages.

The plants in all areas are looking far healthier than last year and many have started to send up their flower spikes, about 50mm tall at the moment. Hopefully this will come to fruiting as long as we get good rains from now on in.

I have sent some extra cages to the Goodale Reserve as they need more there (rabbit and kangaroo grazing). I have been doing the surveys here by myself because Bob and Lynette are away for 3 months in the Kimberly and he said more cages would be welcome.

On another note today, I drove out to Jarrahdale and then went down Nettleton Rd for about 5km and stopped near a burnt area which had very little in the way of orchids, but across the road in the unburnt area was plenty of silky blues and bird orchids (*Pt. barbata*) with a few donkeys and little pink fairies.

A Once in a Lifetime Find!

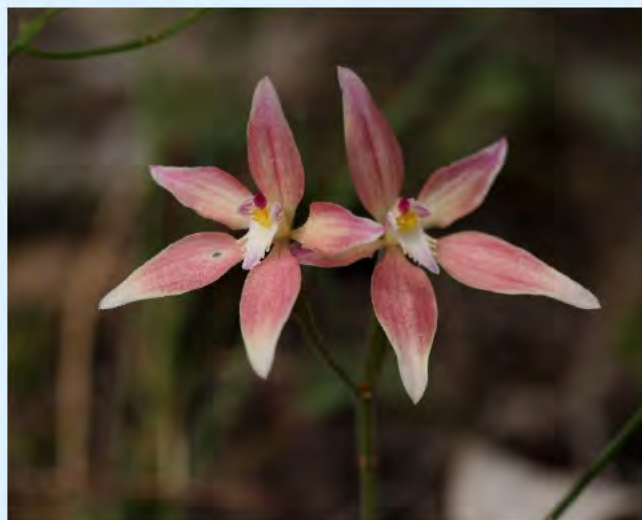
Every once in a while, someone stumbles across an absolutely incredible find that is too good not to feature in this issue of the bulletin. Lisa Wilson found this amazing intergeneric hybrid thought to be a cross between *Pheladenia deformis* and *Caladenia hiemalis*. Photos below have been kindly supplied by Mick Hurdus. Thanks to Lisa and Mick for sharing this unique beauty with the membership.



Currently Flowering Species



Clockwise from top left: Robin Parsons – *Caladenia chapmanii*, Nathan Piesse – *Caladenia douchiae* hybrid, Robin Parsons – *Caladenia nivalis*, Rachel Halls – *Caladenia flava* x *Caladenia reptans* subsp. *reptans* and Nathan Piesse – *Caladenia cristata*



Question Time!

This section is for any burning questions members may have in regards to Western Australia's native orchids. Questions can be simple or complex, there is no minimum standard and the authors are kept anonymous. Answers will be published in the next edition of the bulletin.

Last month's question:

Plenty of wildflowers grow in the mid-west north of Kalbarri to the Pilbara regions but what is it about the habitat that results in minimal orchid species growing?

Orchid species along the northern aspects of Australia are limited in numbers and are more commonly epiphytic species rather than terrestrial orchids. This is likely due to the different climate experienced compared to the south west. In the Midwest to northern Western Australia, longer dry periods are part of the usual cycle with a heavier wet / cyclone season over the summer months and milder rainfall through the rest of the year which would affect orchid flowering. In the southwest, heavier rains are experienced in Autumn and Winter that suits the flowering periods of many terrestrial orchids.

This month's question:

There are subtle differences in appearance between many of the different species within the White Spider (*Caladenia longicauda* complex) and often they can only be differentiated by experience, location and flowering time. Has there been any genetic studies to examine the degree of genetic difference between these species?



Image by Heather Adamson – *Ericksonella saccharata*



Image by Mick Hurdus – Pollinator on a Pink Bunny

Bulletin Articles

Please send Bulletin contributions to the Editor – Rachel Halls at wanoscg.newsletter@gmail.com

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