Australian Native Orchid Society - Macarthur Group

April, 2020

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President: Mr. W. Southwell (Ph. 46818589)

Secretary: Mr. R. Morrison

Treasurer: Mrs. C. Asquith (Ph. 46259874)

Postal Address:- 20 Colo Street,
COURIDJAH**. 2171**

Next Meeting: **Unknown Due Corana virus**

Life Members: Mr. J. Riley, M. T. Cooke, and W. & M. Southwell, A. & C. Asquith. (J. English)

Conservation Officer:

ANOS Macathur Group disclaims any responsibility for any losses which may be attributed to the use or misuse of any materials published in this newsletter

FITZPATRICK ROAD **BSB 062517 A/C 00909929**

Mt. ANNAN. **Doors open 7.15pm, benching closes 7.55pm, meeting starts 8pm**

Hi to All

Many thanks must go to Ross for putting the video meetings together. Ross put in a lot of time and effort to do this and is to be congratulated.

A big thank you to Greg for his presentation on miniature native orchids. Very well received by the members.

Video conferencing for our meetings is a very new thing for many of our members, but it allows people to stay in touch and communicate with other members, on orchids or any other matter. At our normal monthly meetings people form small groups where there is social interaction. This can't happen the same way on video, but it is a way for members not to be completely isolated.

Macarthur ANOS Group Facebook page allows for members and visitors to upload photos, questions and comments.

Richard Dimon will be doing the presentation at this meeting.

Hope to see you all on video

Wally

Vale - Terry Cooke (1938 - 2020)

I am sad to advise members of the passing of esteemed life member Terry, this afternoon 14/5/2020.

Terry was a foundation member of the club and an active member throughout the club's history until his passing. Terry attended his final meeting from his hospital bed via Zoom in April 2020.

Terry joined the club at the inaugural meeting in March 1990 and was active at the executive level throughout the club's history holding positions of treasurer, committee member, show marshal.

Terry was a 20 pound Pom who married another 20 pound Pom - Rosemaree, his soul mate, who together produced two wonderful children - Mark and Marion. Terry was awarded life membership of Macarthur ANOS in about 2012. - Terry was a mentor to members across growing all native orchids but Terry's specialized in growing terrestrial native orchids.

Terry excelled at growing all native terrestrials - especially diurus, corybas and pterostylis and shared his expertise with all that would listen. He greatly supported the MANOS tuberbank and encouraged the Group to maintain this tradition.

Terry was very proud to be awarded the second life membership of the club following on from his great mate , John Riley who became the original President of the club.

Terry was always very personable and encouraging of all members and was excited to be awarded an ACC/ANOS for his Corybas hipidis at the club autumn show in 2017.

We offer sincere sympathies to Rosemaree, Mark and Marion on behalf of all our members. Macarthur ANOS will be the poorer for his loss and our members will miss his company.

Ross Morrison (secretary) and Tony Asquith (newsletter).

General Meeting – 21 April 2020 7.30pm
Minutes of Meeting

The Meeting was Macarthur ANOS Group first remote meeting conducted via the ZOOM Meeting App due to the evolving of COVID -19 Virus situation. The President – Wally Southwell was unable to chair the meeting although in attendance was unable to vocalize but could hear everything happening.

The Secretary – Ross Morrison moderated the meeting.

Attendance: Members: Terry C, Jagath D, Greg S, Ian L, Robert M, Graeme M, Carol and Tony A, Jim C, Mary-Anne W, Margaret and Wally S, Mike M, Neil R, Noel B, Ross M, Colin L.
Visitors: Richard D, Robert G, Charlie M, Felicity C, Steve D

Due to the nature and initial experience with Zoom – the normal agenda was held over.

General Business

2020 Autumn Show cancelled due to the restrictions currently in place with COVID 19.

- Funding for ZOOM – a grant application has been lodged with Camden Council regarding the possible funding of the ZOOM App for a 12 month period costing $220. The Council has indicated a positive outcome is likely in the near future.
- Facebook page / group has been established to enable members to stay connected in these difficult times. Macarthur ANOS Group Facebook page allows for members and visitors to upload photos, questions and comments. In the future may be used to attach new members.

Meeting Presentation
Miniature Native Orchids and Their Use in Hybridization – Greg Steenbeeke

Greg provided a detailed presentation across current and possible future hybridization and the use of miniature native orchids. It was well received by all online and various questions were answered by Greg at the presentations conclusion. The presentation was recorded and has been uploaded to Macarthur ANOS Group Facebook page.

Further General Business

- Members were asked to spread the word amongst other members that this options for meeting would be available for the foreseeable future.
- Tony highlighted some of the articles in the monthly newsletter and the online group had a discussion about Densey Clyne.

- A 20 minute group discussion was then held regarding the use of ZOOM, current flowering orchids and guest presenters moving forward.
- Richard Dimon agreed to present at the next meeting on Symbiotic Germination and Conservation of Australian Terrestrial Orchids.

Meeting Closed at 8.58 pm

Hi Everyone,

The May Macarthur ANOS Meeting will go ahead via the ZOOM Meeting platform link to connect in are provided below. A new technology challenge - taking and sending photos!!!

Wally, our President, will conduct our normal meeting business but importantly two additional items will occur:

- **Presentation - Symbiotic Germination and Conservation of Terrestrial Orchids by Richard Dimon**
- **Virtual Orchid Benching - send (either text to mobile 0413314595 or as attachment in a reply email) two photos per entry (whole plant and one flower) of each orchid you have out currently. Please include name of each plant. I'll arrange plants into our monthly sections and create a presentation to view on the night. Greg S has agreed to judge the photos. *A new technology challenge - remember - you may need to send multiple texts / emails due to the data size of the photos.* Closing time / date of photos - 7pm Monday 18 May**

The virtual benching will only succeed if we all get behind it - visitor photos welcome.

Sections are : Dend. species, Denb. hybrids, Sarc. species, Sarc hybrids, Bulbophyllum, Rhizobium sp, Rhizobium hybrid, Australian Sp other, Australian hybrid other, Pterostylis sp, Terrestrial Evergreen sp, Caladenia sp, Diuris sp, Terrestrial hybrid, Terrestrial sp other, Australasian sp, Australasian hy, Seedling, Growing Comp.

ZOOM Meeting Link..... Ross Morrison is inviting you to a scheduled Zoom meeting.
Join Zoom Meeting
https://us02web.zoom.us/j/87108996232?pwd=NG1uWFdUVHBCWXVXUjYxVmJMTDVIQT09

Meeting ID: 871 0899 6232
Password: 405216

Ross Morrison

A History of Orchid Propagation (Part 2) Jim Brydie

Do you remember where we got to in Part 1? This quotation from Harry Veitch probably sums it up nicely. At the time of its writing (the late 1850's?) he was the owner of the huge Veitch establishment created initially by his father James Veitch. Harry describes that early part of history unfolding :

" …very few [horticulturists and gardeners] possessed even an elementary knowledge of botany. They could …distinguish…the stamens and pistils of many flowers…and they were aware of the functions of those organs, but the confluence of those organs into the solid column of an orchid flower was to them a profound mystery.

It was Mr. [actually Dr.] John Harris, a surgeon, of Exeter, who suggested to Dominy the possibility of muling Orchids *(cross breeding?)*, and who pointed out to him the reproductive organs seated in the column, and showed that the application of the pollinia to the stigmatic surface was analogous to the dusting of the stigma of other flowers with pollen. This simple fact being once fairly grasped, the work of hybridization proceeded apace…

Capsules were produced in abundance…dehiscing *(ie the splitting of the pod)*…and seed was at length in hand. Then arose a great difficulty …which still exists…to discover the most suitable method of raising seedlings. The seeds of Orchids are …so minute…that an ordinary pocket lens is powerless to enable one to know whether the seeds are likely to contain a germ or are mere lifeless dust. Following, or at least believing that we were following Nature… every method or available means that could be thought of was brought into request to secure the germination of the seed. It was sown upon locks of wood, pieces of tree fern stems, strips of cork, upon the moss that surfaced the pots of the growing plants, in fact in any situation that seemed to promise favorable results.

But…we seem far off as ever from hitting upon a method by which at least a moderate amount of success may be calculated upon. Seeds we get in profusion, but…little of it germinates…The seeds of hundreds of capsules have been sown without yielding a single result. In very many cases only a solitary plant had been raised from a capsule that must have contained thousands of seeds; in very few instances indeed has the number of seedlings reached a hundred. It is true that we have raised many seedlings in the aggregate, but many of them have appeared when least expected, and when we consider the myriads of seeds that have been sown, and the comparatively few plants raised, we cannot be said to have achieved great success…"

The seed germination method used at the Veitch establishment was similar to the methods used by Moore, Cole, and Gallier. " *(ie spreading mature seed on existing orchid pots etc)*

Part 2 – From those first hybrids, until 1899, there were no more major advances in the technology, horticulture, and basic understanding of orchid seed germination and seedling culture. Despite the fact that orchid seeds were now being germinated under horticultural conditions their requirements were not known.

Several botanists observed orchid mycorrhiza during the last half of the nineteenth century, but only one of them appreciated its importance.

Neottia nidus-avis

In 1899 Noël Bernard made a great discovery while taking a walk in Fontainebleu forest near Mulan. What he observed were seedlings of Neottia nidus-avis, 3 mm to 5 mm long, and all of them colonized by fungi. He also saw germinating seeds. On 15 May 1899 he published his discovery in a paper. In addition to other technical observations, he noted that all germinating seeds contained fungi and wrote that "mycorrhizae are indispensable for the plant [meaning the seeds of course] during the germination period [and] Neottia nidus-avis plants are associated with their fungi during all stages of development" (Bernard 1899).

After subsequent research, Bernard provided additional details: "Although the fungi can live apart from their host plants, the orchids themselves require the presence of their guests for their own development. I have sown the seeds of many orchids 'aseptically' *(sterilized)*… under these conditions they have not freely germinated; they swell, and later on they get green, but their growth remains insignificant. On the other hand, if germs of the appropriate fungus are sown with the seeds, they commence to germinate almost immediately in a very regular manner… I have examined a large number of young orchids which had germinated in very varying conditions, and I always noticed that they were invaded by the fungus from the beginning of their life. The orchids are therefore practically dependent on their parasitic fungi, since they do not grow without them."

In the early 20th century, a German botanist Hans Burgeff progressed Bernards work, looking for a way to germinate orchid seeds asymbiotically *(ie not symbiotically)* but had no success. He also believed that there was strong

orchid/fungus specificity for germination. In this he was partially correct because temperate orchids (north in the Northern Hemisphere and south in the Southern Hemisphere) in general often do not germinate asymbiotically and may require specific fungi.

In 1922, Lewis Knudson, an American plant physiologist at Cornell University concluded that "the fungus might… digest some of the starch, pentosans and nitrogenous substances (*ie in the seed)*; which are digestion products, together with secretions from, or products produced on decomposition of the fungus, might be the cause for germination" and that "it is conceivable that germination is induced not by any action of the fungus within the embryo, but by products produced externally on digestion, or secreted by the fungus".

On the basis of this reasoning Knudson decided that "germination of orchid seeds might be obtained by the use of certain sugars". His formula C was his third refinement of his formula for a sterile flask medium and proved quite successful for germination of most of the epiphytic tropical orchids, opening the way for widespread experimentation by nurseries and horticulturists all over the world. A process which continues until this day.

The 'article'*(1*)* tells us that although Knudson's theory was fundamentally correct he was perhaps fortunate to some extent in his initial experiments. The seeds he used were from genera that were amenable to germination on such a medium. If he had sown European terrestrial orchid seed he may have failed or taken longer to succeed. Also, the source of sucrose he used was from cane sugar. For some reason, not even now fully understood, sucrose from beet sugar does not support germination as well. As Arditti and Yam put it, 'fortune favours the prepared mind'.

Where to after Knudson? **-** We now had a relatively reliable and practical process for breeding many orchids *(at least most tropical orchids)*, while not yet fully understanding the whole bio-chemistry. Even today we don't understand all of it. For example, the seed of some of our Western Australian terrestrials still can't be germinated in flasks without the help of the right mycorrhiza.

However, since Knudson and his 'sugars' nearly 100 years ago, much further progress has been made and much learned. And it wasn't just a single factor they were missing. These are organic chemical processes and much more complex than simple inorganics. The road forward was complicated but was being explored.

Plant Hormones **-** The further development of orchid seed propagation was proceeding in parallel with the investigation of many other plant processes. Being very observant individuals, scientists are always want to know 'why', are always trying to figure out the answers. Way back in 1880, one of the greatest scientists of all time, Charles Darwin, investigated the physical reaction of plants to sunlight. In particular the way a leaf of a type of grass bent toward the direction of the sun. Experimentation in covering up parts of the leaf showed him that something in the very tip of the leaf was responsible.

In 1902 Gottlieb Haberlandt *(Professor of Plant Physiology in Berlin)* suggested that pollen tubes affected the growth of plant ovaries by releasing substances which he named "growth enzymes". *(NB: when a grain of pollen germinates on the stigma of a flower it grows tubular structures [pollen tubes] down through the style to enable the male germ to reach the ovary).*

Haberlandt also suggested that if vegetative cells were to be cultured in the presence of pollen tubes, "perhaps the latter would induce the former to divide". In the 1930's Haberlandt's "growth enzymes" would finally be isolated and are what we now call plant hormones *(auxins in this case)*.

Later, plant hormones were also discovered to include cytokinins and both groups of hormones were found to be integral to the chemical puzzles of orchid propagation and many other plant processes. For example, they were also confirmed to be the cause of Darwin's observed physical movement of his grass leaf.

Mass reproduction **-** At the same time that Knudson was developing a sterile medium for orchid seed propagation, there was probably even more work proceeding by others looking for mediums and methods for mass clonal propagation of all kinds of plants.

Historically, I would guess that mankind had been propagating plants from cuttings for many centuries and so must have observed the capability of plant tissue to callus where cut, and for the callus tissue to be able to differentiate into roots. Also, for some stem buds or tissues to generate new stems/trunks/leaves/flowers.

For plants to be able to regenerate a whole new plant from a piece of separated specialised tissue is pretty amazing when you think about it. It is hardly surprising that mankind wanted to explore exactly how a plant did all that. After all, even though our skin does callus when cut, we can't generate a whole new body from a severed finger can we? Or not yet anyway.

Development of Tissue Culture **-** In the early 1930's, Philip R White was the first to sustain unlimited growth of excised root tips in vitro (he used tomatoes). One of the reasons he achieved this was by the addition of yeast extract to his medium at each tissue multiplication and replate. Later research found that the key ingredient of the extract was

vitamin B1 (thiamine). Later, other vitamins were also found to be important to plant processes.

The first micropropagation of orchids - There is some disagreement about who was first, but Prof. Arditti records that the first simple (in vitro) clonal propagation of an orchid was the propagation of excised bud sections of the flower stem of a Phalaenopsis by Gavino Rotor at Cornell University in 1949. Buds developed leaves after 14 to 60 days and roots shortly after. No tissue culture or proliferation was involved, and the tissue extracts all contained existing buds, but this was genuine laboratory clonal production.

Independently, and not long after, a German nursery owner Hans Thomale was impressed with the work of scientist Lucie Mayer in producing callus and plant tissue from Pelargonium and Cyclamen. He and Mayer then combined to work on tissue culture of orchids plants. In 1956 Tomale reported to a meeting of the German orchid Society that they had produced shoots on in vitro tissue culture of stem tips of Dactylorhiza (Orchis), and of several tropical orchids.

Other flask medium additives – It is hardly surprising that experimentation along the way tried many different organic medium additives. Sometimes with logical scientific theory behind them, sometimes more curious.

-- In most plants, after the initial germination to form a seed, a tissue called the endosperm is created which surrounds the embryo and provides nourishment in the form of starch. For example, it is the endosperm in wheat that is ground to produce flour. In some plants the endosperm or part of it may be fluid and as early as 1902, Haberlandt suggested that 'one might consider the utilisation of embro sac fluids'. European botanists at the time were probably not aware of coconuts (the clear fluid in coconuts is liquid endosperm) but Dutch Botanist Johannes van Overbeek who had served at the Bogor Botanic Gardens in Indonesia, and M.E. Conklin, suggested its use as an additive *(perhaps 1941?)* and as a result, a very useful medium additive 'Coconut Water' was introduced into plant tissue culture.

-- Curiously, it was the use of stored herring sperm DNA (a product that could be stored for long periods) that led to the second part of the plant hormone requirement - cytokinin. Its effects aided the propagation of some tissues that had previously proved impossible and also led to its use in orchid seed germination.

-- Banana is nowadays a common additive to flask mediums and has proven beneficial, but as far as I know, the key ingredients of banana are still unknown other than as a source of macro elements like Potassium, and starch and sugars. It's first use began as powdered banana but quickly changed to the addition of the pulp of ripe bananas.

Imagining the Rest - I hope those few selected elements give you some sort of feel for the problems that were faced and I apologise for failing to mention all the other amazing stories and equally important discoveries that form part of the story. But in the context of this article, I am hoping that it doesn't really matter. The aim was always to just explain some of the basics.

Once the science of the propagation of orchids became established it was readily taken up by orchid nurseries and specialized businesses in their quest to mass produce cheaper and wider ranging orchids. Since then, business has been very prosperous and expanding rapidly. The industry in Australia now produces 30 million plantlets annually and employs more than 300 workers distributed among 15 laboratories around the country. Many thousands, of flasks produced by these laboratories are now sold in Australia every year. In addition, the technology has become so well-known and cost effective that it has been taken up by home orchid growers.

In just over 150 years we went from not even recognising orchid seed, to taking specialist 'flask stalls' for granted at all our major orchid fairs. Isn't science amazing? At the next fair, or society meeting, when you pick up that flask of the latest and greatest mericlone, or seedlings of the rarest orchid, I hope you see it with a new respect.

References and acknowledgements : 1. "History of orchid propagation: a mirror of the history of biotechnology" written by Joseph Arditti (Professor Emeritus University of California,) and Tim Wing Yam (Senior Researcher, Singapore Botanic Gardens)

2. The International Plant Growth Substances Association – the story of Auxins

3. Many thanks to Guy Cantor for edit suggestions and text additions which were all greatly appreciated.

This article is the second part of a two part article regarding the history of orchid propagation by Jim Brydie. It is reproduced with his permission. He first published it in Kuringai Orchid Society's newsletter .. first part last year and second part this month. This is published with my very sincere thanks.

GOOD GROWING and STAY SAFE.....

This article is from Orchid Societies Council of Victoria's website from a while back. Have a look at the website..although articles are around 2008-09 vintage, the information is well presented and by terrific authors.

AUSTRALIAN NATIVE ORCHIDS IN WINTER BY JIM DONEY

What is different during winter that will affect the growth of Australian native orchids?

- Light diminishes in strength
- Plants dry out more slowly after watering
- Plants grow more slowly
- What do we need to do to compensate for these changes?
- Increase light levels by removing any shading
- Extend the interval between watering
- Reduce the application of fertilisers
- What signs can we expect to detect in happy plants?
- Good white roots
- Nice solid leafy growths
- Glossy leaves

If you are happy with the growth of your plants, continue with your cultural program – don't be persuaded to adopt the procedures of other growers. On the other hand, if you're dissatisfied with the progress of your plants, try some alternatives. Should you decide to try some new ideas, carry them out on a small scale to see if they work before applying them to your whole collection. Observe your plants closely and try to identify any problems.

Conditions are still good (in April) for re-potting. Make sure that you use a pot of appropriate dimensions for the size of the root mass – DO NOT over-pot. Depending on your location and your watering habits, use a potting mix that drains adequately but doesn't dry out too rapidly. If your plants have rotten roots, determine the cause and take remedial action. Remove all rotten roots and any growths without leaves or roots to promote new growth.

Different plants need different positions. For example, I find that Dendrobium Tweed and D. Red River grow better when their pots are hung low down than when hung high. On the other hand, Sarcochilus ceciliae and S. hartmannii need higher light levels than S. fitzgeraldii and most other sarcochilus species and hybrids. In my experience, some orchids, such as Sarcochilus australis, Rhinerrhiza divitiflora and Peristerchilus Olive Grace, need to be kept drier than others.

Humidity, aeration, air movement and good light are vital for good culture. What can we do to ensure that these factors are satisfactory?

Humidity. Ensure that you have a layer of water-retentive medium, such as gravel or scoria, on the floor below your benches to hold moisture and provide humid air around your plants.

Aeration. Ensure that the composition of your potting mix allows for pockets of air between the roots and the particles of mix.

Light. Make sure that no trees or buildings block the light falling upon your plants, especially from the north and east.

Air movement, either natural or generated by electric fans, is vital to maintain healthy plants. Improvements in this area will help to reduce the incidence of scale and spider mite.

Watering in the morning on warm or windy days ensures that the foliage dries by nightfall, thus helping to minimise fungal infections.

Pests. Snails, slugs and grubs are the main pests during winter. Use carbaryl-based sprays for grubs and caterpillars, and Baysol® or other pellets* for slugs and snails.

* **WARNING** : Most snail baits are poisonous to pets.