THE MONTHLY BULLETIN OF THE KU-RING-GAI ORCHID SOCIETY INC.

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Next Meeting : Monday, 17th June, 2019

Venue : ***The West Lindfield Community Hall, corner of Bradfield Rd and Moore Avenue, West Lindfield***.
The hall is open from 6.30pm. Please try and get there early to help set up tables, chairs and lighting.

Benching is available shortly after 7pm but please be patient and **wait until tables and dividers are in place**.

The Culture Class starts at 7.15pm and due to the repairs needed in the annex room, class will be set up in an area of the main hall. **John Chang** will be our teacher, and his subject : **Neofinetia and the art of sphagnum moss balls**. Now that is surely a first time topic for Sydney. Make sure you get yourself there.

The main meeting **commences at 8pm.** After the formalities of the general meeting, judging, and the tea break, **Our Guest Speaker will be Herb Schoch** who will present **A tour of the Camino Walk in northern Spain.** More formally known as the Camino de Santiago, this has been a pilgrimage route since the middle ages, leading to the shrine of the apostle of St James in the Cathedral of Santiago de Compostela in Galicia. In modern times it is also renowned as a wonderful walking and hiking route. Herb and Jessie will show us the way.

Our **supper volunteers** this month are **John and Jean Hocking.** Thank you for helping John and Jean.

Best of the Evening Hybrid – Dendrobium Topaz Dream 'Weva' - *grown by* ***Garrie & Lesley Bromley***

I just love seeing these magnificent hardcane Dendrobiums that the Bromleys, the Onslows, and others bring to our meetings. Just stunning.

Topaz Dream was registered in 2002 by Full Sun Orchids in Qld. It shows itself as a delightful semi miniaturised version of our native species D. bigibbum. Each pseudobulb has multiple inflorescences, each up to 60cm long and carrying 8 to 10 beautifully arranged flowers. The flowers vary in size but average just under 5cm in width.

Surprisingly, the breeding of Topaz Dream involves only two species, both Australian natives. D. bigibbum is the dominant parent with 94% of the gene pool, and D. canaliculatum the other with 6%. You might remember the latter from that wonderful article on the species featured in our Feb bulletin a few months ago. Canaliculatum is definitely a miniature, with onion like pseudobulbs only 2 to 5cm tall, and with many starry 2.5cm flowers. Obviously D. canaliculatum is used in bigibbum breeding to miniaturise both flower and stem, but after the first generation cross to introduce canaliculatum, Topaz Dream is a 3rd subsequent generation hybrid of continual backcrosses to bigibbum leading to the tiny remaining 6% canaliculatum gene influence. It just shows how long a dominant breeding characteristic will continue in a breeding line.

You may have noticed that I used the expression 'hardcane' in the opening sentence and wondered what that implies? Well that is the term colloquially used to mean the group of Dendrobiums with stiff woody stems. Although there are others, the 2 main groups are : - Dendrobium Section Phalaenanthe which has only 6 or so species (one of which is bigibbum), and Section Spatulata, the antelope Dendrobiums, which includes D. canaliculatum. The petals of many Spatulata species have a spiral twist which is where the common name 'antelope orchid' comes from, but most also have a spatulate petal form. That is, the petals are wider at the tip than the base resulting in a flat paddle like end.

Orchids from these two Dendrobium sections can be readily interbred and many hybrids have been created to take advantages of the characteristics of different species within them.

Congratulations yet again Garrie. Your orchids are a pleasure to drool over each month. Please keep 'em coming.

Society News (if anyone has a news item, please phone Jim on 9476 3383, or email at jimbrydie@bigpond.com)

1.President Dennys' Desk **–** Our 'Pres' is currently away on leave. Back soon. Trev Onslow stands in at meetings.

2. New Members **–** First, an apology to Bronwyn Yager, whose name I misspelt in last month's bulletin. I am afraid its a case of "Oh Magoo, you've done it again" for me. Your name was given to me correctly, it was just a mistype on my behalf. My humble apologies Bronwyn. Next meeting please see me and say hello. Its good to have you with us.

Secondly, I have been remiss in welcoming aboard some other new members as they joined recently. (shame on me). Welcome to our club also to Sandra Lee and Ann Dimond. I hope you both have a smooth integration into our group. Sometimes it is difficult for people in a club to get to know one another but I have always found the best way is to be a little bold and say hello, ask questions, and don't be shy. We would all love to help you be comfortable among us and learn all you can about growing orchids. Its good to have you with us.

Would our official club hosts please seek out our new members and show them around.

3. Mingara Orchid Fair and Show *and* ***Royale Orchids Open days*** **–** Dates and details in the events list below.

The Mingara show and fair up on our nearby Central Coast area, on the Saturday and Sunday, is one of my favourite events of the year. Lots and lots of visiting orchid nurseries from all over the country, great club displays, and usually some art or pottery displays or something as well. Being held in a licensed Sports club, there are plenty of bistros and a coffee bar to refresh at when you get tired, and then you can go back and check out the orchid stalls a second time.

To coincide with Mingara, the nearby Royale Orchid Nursery also has Open Days for the Fri, Sat, and Sunday. (Mingara is just Sat/Sun). In addition to opening the nursery, Royale also arranges a guest speaker schedule, other orchid nurseries to join in and set up sales stalls (including George and Mick with all the pots and accessories), and a sausage sizzle with tea and coffee.

How could you not set that weekend aside to take in both events? It takes about 40 minutes to drive from Hornsby to Royale and perhaps another 20 minutes to get from there to Mingara.

Many growers like to do both in one day, but I talk too much when I meet old friends. I prefer to drive up to Royale on Friday, return home that afternoon, and do Mingara on Sat. Orchid fanatic bliss.

Royale is located at 70 Brieses Rd, which is a right turn off Peats Ridge Rd, about 6-7km along from where Peats Ridge Rd begins at the Peats Ridge exit off the M1 motorway.

The Mingara Sports Club is located near the holiday area called The Entrance, where the Tuggerah lakes exit to the ocean. To get to the club however, the best route is straight up the M1 motorway. Take the Wyong exit. The top of the exit ramp is Wyong Rd. Turn right and cross back over the expressway. Follow Wyong Road (the B74) for about 8km to Tumbi Umbi and look for the big signs pointing to the huge Mingara club complex on your right. You turn right at traffic lights to get into the club premises and carpark. There are club advertising signs, you can't miss it.

After checking out the Mingara show, if you haven't explored this area before, instead of returning via the M1 you might continue East along Wyong Rd and visit The Entrance and finally return to Sydney via Erina and Gosford.

Perhaps I will see you at one event or the other?

4. Meeting Suppers **–** I was occupied setting up the projector and screen last month and missed it, but they tell me that the supper was a very nice improvement. Thank you to everyone who supplied goodies or helped. The supper is a very important part of our meetings. It is the perfect environment for members to communicate with one another, share their pleasure, and to exchange information & knowledge. Please keep up the good work. (and talk to each other)

5. The Library (from Chris) **–** The April-May-June 2019 edition of the Orchid Digest is now in the library. As well as articles on European terrestrials and slipper orchids there is an interesting article on "Orchids in Extreme Environments " - here some Australian orchids are mentioned by virtue of their ability to survive fire and flower well afterwards. Other tough orchids mentioned live in seasonally flooded environments, grow in sinkholes, grow on twigs, grow in very cold environments and grow in the sand dunes by beaches.

Advance Diary Dates 2019

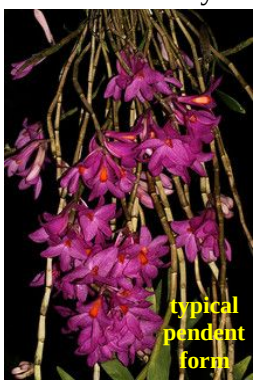
13th – 15th June : Manly Warringah OS show at Glenrose Village shopping centre, Glen St, Belrose.
13th – 15th June : North Shore OS show at St Ives shopping village, Mona Vale Rd St Ives
28th - 30th June : (Fri,Sat,Sun) Royale Orchid Nursery Open Days including tables from several visiting guest nurseries. Royale is located at 70 Brieses Road, off Peats Ridge Road.
29th – 30th June: Mingara Orchid Fair and Show - displays and sales, Mingara Sports & Recreation Club, Tumbi Umbi.
16th -18th August: St. Ives Orchid Fair Show at St. Ives Showground**.**
25th- 27th September: Combined Berowra OS/ Ku-Ring-Gai OS - Hornsby Westfield Orchid Show, Hornsby.

Best of the Evening Species – Den. glomeratum (syn sulawesience) *grown by* ***Geoff and Jean Fulcher***

Such magnificent colour. Lovely 'largeish' flowers at 3cm or so across the face and there can be clusters of 3 to 10 flowers at each node along the pseudobulb. From the front the flowers look almost Cattleya like in shape but examined closer you can see the classic trumpet shape of the whole flower. Magnificent.

I have always loved glomeratum, right from the first time I ever saw one. The attraction was probably the stunning colour contrast of the orange/red lip vs the bright mauve petals and sepals, but the very exoticness (if that is a word) of a species that I had never previously heard of, was no doubt also a factor.

Unfortunately for us, this is another orchid that has been known under several names. I will only mention the most recently important – ie: 'glomeratum' or 'sulawesiense', because you may well still find books, websites, or nurseries refer to it as either one. It was glomeratum when I first saw it, then I was convinced by experts that it was sulawesiense, but now the head office gurus at the Royal Horticultural Society in the UK assure us that glomeratum is the correct name after all.



This lovely individual glomeratum of Geoff and Jean's is an unusually good one. I have seen many, and raised many from seedlings myself, and not one was as good as the Fulchers'. From all the glomeratums I have grown, I assume that the natural growth form of this orchid is pendent or arching to pendent. Nearly every seedling I have raised had long, slender, 1 to 2 metre pendent canes that arched outward near the end. All the plants I saw benched in shows or at meetings were the opposite. That is, stiff, perfectly upright vertical stems. Obviously, a lot of staking and stem training was taking place. The Fulchers' plant on the other hand seems to grow pretty much vertically on its own. I have also seen a few pictures of plants in nature that were shorter growing and upright so it does occur, however rare.

Still, no matter what type you end up growing, you can grow them upright in the same way we do softcanes, by knowing in advance that we need to stake them as they develop and keep them upright. They seem to adapt to the change as long as you keep on top of it, and growing them vertically may even shorten the stem growth somewhat.

D. glomeratum was first discovered on the group of islands formerly known as the Moluccas or Spice Islands (west of PNG). Today these islands make up Maluku Province (Maluku Propinsi) of the Republic of Indonesia. It has subsequently also been discovered on the neighboring Indonesian island of Sulawesi (formerly known as Celebes), and in the western province of New Guinea. On the Moluccas Islands it was reported as occurring in old forests at elevations of 1200 meters and higher, but the Bakers in Orchidwiz tell us that plants usually grow at low elevations along swampy rivers in all areas. The latter would suggest that this is a warm, moist, tropical grower but my personal experience is that it happily grows in my roofed shadehouse year round much like softcanes do. Lower temperatures in winter and less frequent watering allow the plant to tolerate the cold in a semi dormant state, again as softcanes do. Although, sometimes in the coldest seasons, I think my poor plants look like they would be happier a bit warmer.

Perhaps it would be fairest to sum it up by saying that it is a 'cold grower' at Manly on the coast, but not quite as cold a grower at Richmond at the foot of the Blue Mountains.

Culture-wise, I find glomeratum fairly easy to grow so long as I keep it regularly repotted, watered, and fed. I have grown it successfully in bark and in 'peat and perlite' but I have to admit I haven't grown anything to compete with the lovely specimen Geoff and Jean bring in again and again.

Congratulations on a stunner Geoff and Jean.

Mathematics in the Workplace - *Ever wonder about those people who say they are giving more than 100%? Or been to those meetings where the boss wants you to give 100%. How do you go about achieving more than 100%? Here's a little mathematical formula that might help you answer these questions: (where A=1, B=2 etc)*

A	*B*	*C*	*D*	*E*	*F*	*G*	*H*	*I*	*J*	*K*	*L*	*M*	*N*	*O*	*P*	*Q*	*R*	*S*	*T*	*U*	*V*	*W*	*X*	*Y*	*Z*
1	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*	*11*	*12*	*13*	*14*	*15*	*16*	*17*	*18*	*19*	*20*	*21*	*22*	*23*	*24*	*25*	*26*

Then: H-A-R-D-W-O-R-K … 8+1+18+4+23+15+18+11 = 98%, K-N-O-W-L-E-D-G-E …11+14+15+23+12+5+4+7+5 = 96%
But , A-T-T-I-T-U-D-E …1+20+20+9+20+21+4+5 = 100%, And, B-U-L-L-S-H--T 2+21+12+12+19+8+9+20 = 103%*

AND, look how far sucking up will take you. – S-U-C-K-I-N-G U-P... 19+21+3+11+9+14+7+21+16= 121%
*So, one can conclude with mathematical certainty, that while Hard work and Knowledge will get you close, and Attitude will get you there, its the Bullsh*t and Sucking Up that will put you over the top. Now you know why some people are as high up as they are!*

Best of the Evening Novice – Laeliocattleya Little Susie 'Orchidglen' *grown by* ***Peng Toong***

For such an old orchid this sure has held its place well, hasn't it. It was registered back in 1959 by the famous American nursery Armacost and Royston.

The genus tag Laeliocattleya was the title back when it was registered. That was when Laelia purpurata was a Laelia but as we know now it is really a Cattleya. You might thus think that in modern times you should call Little Susie a Cattleya but back luck for us, around the same time the taxonomists decided that one of Susie's other forebears – Cattleya bowringiana is really Guarianthe bowringiana, which makes Little Susie a Cattlianthe (the official hybrid name for the combination of Cattleya and Guarianthe).

Did you follow all that? Good, because now I must discuss another name complication with this lovely orchid. Did you know that there is also another Cattleya type hybrid called "Little Suzie" with a "Z"? No, there couldn't be surely. What dumb bureaucrat would allow such a potential confusion between similarly bred orchids?

Well who knows why, but they did. In 1972 the RHS registered Potinara Little Suzie for Mr Haruhito Kubo in Japan. "Potinara" is the artificial genus name for a mix of Cattleya, Laelia, Brassavola, and Sophronitis. Some might well think that this genus mix is different enough to allow such a similar name, but the actual result is that I can't tell you what a real "Little Suzie" (with a "Z") looks like. The pictures on the internet under that "Z" name are nearly all clones of Susie with an "S". Some even quote a Suzie clonal name that was awarded as Susie (S). Even Orchidwiz has only two pictures of Suzie and I am highly suspicious of both pictures (they sure look like Susie to me).

Now you might ask, could Jim be wrong and these two hybrids just look like each other? Well that may be the case but Susie (S) is dominated by Cattleya bowringiana in its breeding and clearly exhibits that influence. The form of the plant itself, the clustered flower head, and the shape of the flower all say "bowringiana".

Suzie on the other hand has no bowringiana. It is 50% Brassavola fragrans (syn tuberculata) with odd little starry shape flower as the picture here illustrates. The other parent is SLC (Sophrolaeliocattleya) Anzac – an interesting hybrid which comes in a variety of colour in its clones. There is at least one really red clone, some are pink/mauve something like Susie (S), and others like the clone 'Orchidhurst' shown here are a mix of red, mauve, and pink. The genus mix in Suzie has also now significantly changed with the Sophronitis, and what were Laelia cinnabarina, and L. purpurata, now considered to be Cattleyas, making Little Suzie now a Brassocattleya. I suppose anything is possible, but I would be very surprised if the Orchidwiz picture of Little Suzie 'BK' shown here is really Suzie "Z" and not "S".


BC Little Suzie 'BK' ?


Brassavola fragrans


SC Anzac 'Orchidhurst'

Perhaps Garrie Bromley with his greater depth of Cattleya breeding knowledge can tell us more at our next meeting. What about it Gaz?

Now that I have got that burden of frustration of my chest, I must say that I really admire Little Susie "Orchidglen". Garrie gave me a piece of this wonderful orchid many years ago and its flowers give me pleasure every year. Garrie grows his taller, more lush and with bigger flower heads so I don't bring mine to meetings, but it is a beautiful thing. PS: I know I should bring mine in anyway, but I prefer to show you all my weird little species orchids instead.

Congratulations on your best of the evening Peng. I am sure you enjoy yours as much as I enjoy mine.

The Magic of Life

There are two statues in a park; one of a nude man and one of a nude woman. They had been facing each other across a pathway for a hundred years, when one day an angel comes down from the sky and, with a single gesture, brings the two statues to life. The angel tells them, 'As a reward for being so patient through a hundred blazing summers and dismal winters, you have been given life for thirty minutes to do whatever you've wished to do the most.'

He looks at her, she looks at him, and they go running behind the shrubbery. The angel waits patiently as the bushes rustle, and giggling ensues. After fifteen minutes, the two return, out of breath and laughing.

The angel tells them, 'Um, you have fifteen minutes left, would you care to do it again?'

He asks her 'Shall we?' She eagerly replies, 'Oh, yes, let's! But let's change positions.
This time, I'll hold the pigeon down and you s**t on its head.

50 Years of Pests and Pathogens –The Rocky Experience --- J.E. Frisch

Introduction from Jim Brydie : *The following article is by one of the most knowledgeable orchid pests and diseases experts I know in Australia. He has kindly allowed me to republish this article, which although written for the Rockhampton Orchid Society's 50th anniversary back in 2005, is still perfectly relevant today and gives a great insight into why some of the well known product names came and went. There will surely be more changes in the future but we must make our chemical support decisions for each day in whatever environment prevails at the time. The best way to do that is to understand the reasons behind changes that have brought us to where we are, and the strategies behind some of our armour. John's work will be a wonderful introduction for newcomers, and an update for many of us who have fallen behind. John tells me that* **most of the products mentioned in the article** *are still relevant today but if you are* **unable to locate a particular product** *ask your local experts for replacements. For example, Zyban and Thiophanate methyl are no longer available. Banrot (etradiazole plus thiophanate methyl), which is quite expensive, is the only present source of Thiophanate methyl that John is aware of.*

Rockhampton has a long history of orchid growing and while few of the growers of 50 years ago are still with us, many of their anecdotes remain. They have been used, along with personal experiences, in the following sketch. It is meant to be an outline of only some of the changes that have occurred in orchid growing over the last 50 years. It is not meant to cover all aspects of all pests and all diseases, or to offer definitive methods of control of either.

Insect Pests : - Before shade cloth, most sun-sensitive orchids were grown under trees or in lath houses at the mercy of insects, particularly grasshoppers, dendrobium beetles and cockroaches.

shade from lathes or slats

Fifty years on it is generally true that orchids grown under these same conditions face the same challenges. 'Japanese-type' softcane dendrobiums, which were not available till the 1970s, are an exception. In over 20 years of growing these orchids fully exposed to the elements, I have never used insecticide and have never had problems with cockroaches or dendrobium beetles. Occasional attack from the odd large grasshopper does occur, but that is dealt with using the Anne Boleyn method.

During the 1950s and 60s, Dieldrin, DDT and other broad-spectrum insecticides could be purchased at hardware and produce stores. DDT has low mammalian toxicity and was used extensively, and at times indiscriminately, to control mites and all insect pests, both chewing types (caterpillars, ants, cockroaches, beetles, grasshoppers) and sucking types (aphids, bugs, thrips, mealy bugs, and hard and soft scales). We may now look back in horror at the way these chemicals were used so freely and without concern for long-term effects on the environment or even immediate effects on non-target species. However, whatever their disadvantages, we should not forget that their predecessors were lead arsenate and nicotine sulphate !!!!.

DDT and Dieldrin are nerve poisons, which ensures an immediate knock-down effect on all susceptible insects. They are also almost indestructible, which ensures long-lasting control. However, there was no physical barrier to prevent insect re-infestation of the orchid collection. Regular chemical control was a necessity and this masked the potential problem of infestation with scale insects or mealy bugs, both of which spend most of their life cycle in a sedentary state.

advanced boisduval scale

cluster of mealy bugs

By the early 1960s, concerns were being raised about the indiscriminate use of the 'wonder' insecticides. About the same time shade cloth also became available making it possible to build insect-proof orchid houses and providing much more even shading. This advancement removed the threat of most chewing insects - cockroaches and ants excepted, but less spraying resulted in an increase of infestations of insects like Boisduval scale, mealy bugs, and mites. Some of these are tiny and hard to detect, others like Boisduval, hide under sheaths or leaf axils. If they are only sprayed when detected, the infestations can quickly spread and get out of control.

Infestations are commonly spread by transfer of plants between growers. This was especially true up until about the 1980's when the relative scarcity and high cost of orchids encouraged swapping of plants, which often also meant swapping scale insects. Sadly, it is still a major problem today.

In modern times, pests (including mites) can be controlled using systemic insecticides (eg Rogor, Confidor) and some contact insecticides like Maldison (malathion), or Procide (active ingredient bifenthrin). Unfortunately, generally through ignorance or inability to identify the pests, the distribution of scale-infested plants is still with us. The same is true of wingless cockroaches and exotic snails, all infestations of which enter the collection via infested plants.

Early orchid growers did not have to contend with these pests but by the 1970s both had become, and remain, widely distributed. Fortunately, relatively 'soft' insecticides (eg Carbaryl, Procide), and snail baits (based on metaldehyde or

measurol) control both pests respectively. Some of the synthetic pyrethroids, (eg Procide) have very low acute mammalian toxicity (25 times less toxic than aspirin).

Early orchid growers did not have the luxury of such 'soft', and yet effective, insecticides.

Cym mosaic virus

Orchid Viruses : - In the wild, orchids are free from infection with any important viruses. However, orchids are quite susceptible to viruses found in other plant families and unfortunately, many of these viruses have been transferred to cultivated orchids. This legacy is largely the result of historical accident. Orchids were cultivated for a long time before orchid growers knew that viruses (and bacteria for that matter) even existed. Initially, most orchids were grown on large estates along with plants from other families, many of which were carriers of various plant viruses. The principles of sterilization were not understood and as a result many different viruses that normally infect other plant families were inadvertently transferred to the orchid genera then in cultivation. As is still true, it is most likely that cross infection with viruses was the result of using infected tools or of removing plant parts with hands that were virus-infected. Over time, virus-infected orchids, many of which did not show symptoms of infection, were quite innocently imported to Australia. Divisions of these plants formed the basis of all early exotic orchid collections, including those established in the 1950s. Orchids imported to Australia and placed in quarantine were never tested for viruses. Seedlings propagated by flasking, which are generally free from viral infection, became increasingly available after the 1950s. It might therefore be expected that the incidence of virus-infected plants would fall proportionately. However, knowledge of viruses, particularly their modes of transmission, remained very limited until well into the 1970s. Many growers attributed viral symptoms to 'excess fertilizer', 'weather conditions' or 'the effect of fungicides' and failed to cull infected plants. All orchids are susceptible to virus infection, there is no cure, and infected plants must be culled.

Sadly, plants that were difficult to grow, often because they were infected with virus, were 'too valuable to throw away' and were given away on the basis of 'here, you see if you can get it to grow'.

It was also common practice to pinch off dead or dying flowers (which in infected plants contain very high concentrations of virus particles) and thus transferring virus from one plant to the next. At re-potting time, plant after plant was divided with the same pair of non-sterile secateurs. Several high-profile orchids remained symptomless, particularly if infected with only one type of virus, and acted as a continuous source of infection. Mericloning became available in the 1960s as a method of rapid propagation of desirable plants but unfortunately, many mericlones were produced from virus-infected plants. Each of these factors ensured that sooner or later and regardless of origin, the entire collection was at risk of viral infection.

From the 1970s onwards, both mericlones and seedlings became more readily available to hobbyist growers, and prices in real terms began their continuous decline. Knowledge of how to reduce the risk of spreading viruses increased considerably and methods for identifying virus-infected plants were developed. Reputable nurseries began testing plants for virus infection before they were mericloned. More and more growers began to sterilise their cutting tools, initially using heat, bleach or alcohol, however these sterilants are inconvenient to use particularly for spur-of-the-moment jobs.

Convenience arrived in the 1980s in the form of TSP (Tri-Sodium Phosphate), which is the active ingredient in Tricleanium. TSP is cheap, convenient, long-lasting and when used correctly, is highly effective in destroying virus particles. Because TSP protects cutting tools from rust, they are best left to soak in a saturated solution of TSP until required. It is then a simple matter of rinsing the tool before using it on a single plant, re-rinsing and returning the tool to the TSP to soak for 10 minutes or so before use on the next plant. Some growers place multiple pairs of secateurs in a jar of saturated TSP and use them in rotation to allow for the required sterilisation period for each set.

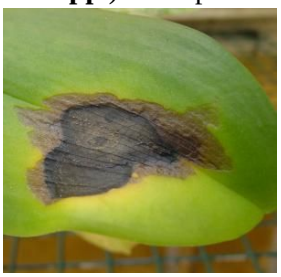
The convenience of TSP helps remove the temptation to use un-sterilised tools on any occasion and is a valuable aid in preventing the spread of viruses. While infected plants cannot be cured of virus infection and must be destroyed, it is sometimes difficult to recognise infection. Suspect plants can be tested, but is costly. Orchid plants are now cheaper than at any time in history and a more satisfactory solution is to destroy all suspects and replace them with non-infected plants.

It should be noted that some virus particles have been shown to **remain infective in dead plant tissue for at least 10 years** which makes it very important to **sterilise all re-cycled pots, tags or hangers before re-use**. TSP is ideal for this purpose. It is also important to wash your hands with soap before handling different plants. If this is impractical, alcohol-based hand sterilisers, which are both convenient and effective, should be used.

And remember, pinching off flowers should be left to those who are first prepared to sterilise their thumb and forefinger by heating to red heat.

There is **now no excuse** for failing to eliminate virus infection from every collection. Unfortunately, ignorance of viral infection remains widespread among orchid enthusiasts. Worse is that plants known to be virus-infected are still swapped or sold to a generally ignorant public. While this continues, viruses will remain the AIDS of orchids!!.

Bacterial infections :- Some bacteria (mostly **Pseudomonas or Erwinia spp**.) are capable of infecting plants of the Cattleya alliance. Infection is generally introduced into the orchid house with infected plants. Water is required for the spread and establishment of the disease. Infections in the Cattleya alliance generally occur on soft young leaves where they cause soft, water-soaked brown or black lesions that often have a foul smell. Either because of failure to identify the disease or because of other factors, bacterial diseases did not seem to be important to early orchid growers. It was not until the early 1980s, when Phalaenopsis became more popular, that bacterial diseases assumed real significance. Phalaenopsis are particularly susceptible to bacterial diseases and if the infection establishes in the crown of the plant, death of the plant is almost guaranteed. When the disease first became important it was generally assumed to be of fungal origin. However, control could not be achieved with fungicide. The solution was to use an antibiotic, generally aureomycin or streptomycin, to control the disease. Both antibiotics were readily available for the treatment of poultry diseases. Fortunately, antibiotics were withdrawn from sale to the general public. Effective disease control was then achieved by increasing air movement and when necessary using the copper based fungicide, Kocide. However, Kocide, if used regularly, can be phytotoxic. The surface sterilant, Physan, was not phytotoxic and proved to be highly effective in controlling bacterial diseases. However, Physan became locally unavailable and other surface sterilants are now used. Current practice is to remove the infected part, treat the affected plant and surrounding plants with a surface sterilant (eg Alginox) and dry off the affected plant.



Pseudomonas in Cattleya** **Erwinia in Paph****

(pics from St Augustine Orchid Soc. – Orchid diseases)**

Nevertheless, the most satisfactory solution to the problem of bacterial diseases is to not introduce them to the orchid house in the first place. Quarantine all new introductions and treat them with a surface sterilant before introducing them to your collection.

Fungal infections - The early orchid growers recognised the need to protect flowering plants and often incorporated a section of galvanised iron in the orchid-house roof for rain and dew protection. However, galvanised iron obviously excludes all wavelengths of light. The need was for clear sheeting that would offer short-term protection from rain while sustaining long-term growth. None was available to the early growers but the situation changed with the introduction of fiberglass and later, polycarbonate sheeting.

The germination of spores of many fungal pathogens is dependent on both the presence of water and exposure to ultra-violet light. To control excessive surface moisture, you need : control of rain and dew, sufficient air movement to quickly dry plant surfaces, and the use of any freely draining growing medium that dries out between waterings. The use of either fibreglass or polycarbonate sheeting not only protects plants from dew and excessive rain but also blocks most of the incident ultra-violet radiation while allowing transmission of light that is essential for plant growth. These factors reduce the challenge from fungal pathogens and consequently reduce the need to apply fungicides. Most serious orchid growers now incorporate a section of fibreglass or polycarbonate in their orchid house mainly to protect flowering plants. However, these protected areas are also ideal for growing plants that are somewhat susceptible to fungal infections.

Orchid species cannot survive in the wild unless they have a high degree of resistance to endemic pests and diseases. They may however be quite susceptible to exotic pests and pathogens. The European pioneers of orchid growing brought orchid species from every corner of the world, often accompanied by their attendant pests and pathogens, to their orchid houses. In time, these species were crossed and they and their progeny were of necessity grown with minimal treatment to control pests and diseases. Until the middle of the 20th century the only chemicals available to control fungal diseases were Bordeaux mixture (lime and copper sulphate) and sulphur. Both provide only limited control of diseases that attack orchids. The result was that only plants that had high resistance to disease survived to pass on their genes for disease resistance to the next generation. Many of the exotic orchids grown in the 1950s and 60s, many of which had been introduced from overseas, fitted this category. They grew quite adequately without the need to continually use fungicide. The synthesis of highly effective fungicides ultimately changed this situation.

Very effective broad-spectrum contact fungicides, such as Zineb and Captan, became available in the 1950s. Contact fungicides prevent disease by killing germinating fungal spores on the plant surface. They do not cure established fungal diseases. Effective disease control therefore depends on regular, prophylactic application of such fungicides to the entire plant surface. Complete coverage was initially quite difficult to achieve but the problem was soon overcome through the development and use of wetting agents, such as Agral. Their addition to the fungicide solution markedly improved the effectiveness of contact fungicides. By the mid-1960s it became routine commercial nursery practice to use fungicide at intervals of 7 to 10 days for the prevention and control of diseases. These commercial establishments became the source of plants for the rapidly expanding hobbyist trade. Genetic resistance to disease became less and less important in determining whether any particular plant survived the challenges from pathogenic fungi. Progeny that without regular fungicide treatment would succumb to the ravages of disease were now able to prosper and become potential parents themselves. The main factor then determining whether a plant became a parent was not its

susceptibility to fungal diseases but its ability to survive the award process. The end result is that there is now wide variation between different orchids in susceptibility to different fungal diseases. This is of no great concern to commercial or advanced growers who implement effective disease control measures. However, high susceptibility of some orchids to fungal diseases is a deterrent to the recruitment of new growers and a bane to many novice growers. Many people consider all orchids too difficult to grow and at least part of the reason is the susceptibility of some orchids to fungal diseases.

The growing need for more effective fungicides that controlled particular species of fungi led to the development not only of improved contact fungicides, such as Mancozeb, but also of systemic fungicides, such as Benlate (Benomyl). There is now a wide range of very effective contact and systemic fungicides available to the orchid enthusiast. Most are registered for use on ornamentals but not all have been tested on orchids. All comments regarding their use on orchids must bear this in mind.

These fungicides have been allocated to different fungicide groups, depending on their mode of action. Using fungicides from these different groups in rotation, for example, alternating Thiophanate-Methyl (Group A) and Rovral (Iprodione, Group B) gives effective control of fungal diseases and helps to prevent the development of fungicide-resistant fungi. Benlate was used extensively during the late 1970s and early 80s to control of a wide range of fungal diseases. However Benlate, like other systemic fungicides, kills fungal hyphae already established in the plant but does not kill fungal spores. The inability of Benlate to kill spores allowed some fungi to develop resistance to Benlate with the result that Benlate would no longer control the disease caused by the fungus. Excessive use of Benlate also causes phyto-toxcicity with consequent detrimental effects on plant growth and flowering. The end result was that by the early 1990s, Benlate was no longer used in most orchid collections.

The problems of fungal resistance and the phyto-toxicity created by continual repeated use of a single systemic fungicide can be overcome. An effective way is to alternate the use of a contact fungicide (such as Mancozeb, or Bravo [Chlorothalonil]) with a combination of a systemic fungicide and a compatible contact fungicide (for example, a combination of Thiophanate-Methyl and Mancozeb) and by not applying any single systemic fungicide more than three times/year. Systemic fungicides should always be combined with a contact fungicide so that both established fungi and fungal spores are controlled. Proprietary 'dual action' fungicides (eg Zyban) combine contact (Mancozeb) and systemic (Thiophanate - Methyl) fungicides.

Further advances in the chemical control of fungal diseases occurred in the 1990s. One of these advances was the introduction of new spreader-stickers in place of the older wetting agents.

Wetting agents aid in spreading the fungicide evenly over the plant surface. However, they do not prevent the fungicide from being washed off at the next watering. The result is that each watering of the plant results in less and less protection from fungal infection. Spreader-stickers (for example, Bond) not only spread the fungicide evenly but also stick the fungicide to the plant surface. Most spreader-stickers become rain-fast as soon as the solution dries. This significantly increases the period over which the fungicide will provide protection and thus the need to apply fungicides is significantly reduced.

Types of Infection and Common Infection Sources - While the early contact fungicides gave a high level of control of most leaf-spotting fungi (including ***Cercospora, Gloeosporium, Septoria*** and ***Alternaria*** spp.), they did not control the most significant root-rot fungi. This situation has not altered over time. Among the root-rot fungi are various species of ***Phytophthora*** (which causes a soft black rot of all plant parts), ***Pythium*** (soft brown rot mostly of lower plant parts), ***Fusarium*** (slow, progressive, yellow wilting of the entire plant caused by the fungus clogging the water-conducting vessels), and ***Rhizoctonia*** (dry brown rot of rhizome, roots and lower pseudobulb). All orchids appear to be susceptible to these fungi and untreated infections always cause death of the plant. These root-rot fungi are generally introduced to the orchid house in contaminated potting media, contaminated soil (mostly in pots of companion plants), or with infected plants. The introduction of infected plants or contaminated soil has always been a significant source of infection wherever strict quarantine and sanitation procedures are not followed.

The importance of contaminated potting media has varied over time. From the 1950s to the 70s charcoal was the most readily available potting medium. Freshly burned charcoal is sterile and was generally used by the early orchid growers either alone or later, in combination with bark. The 'charcoal burn' was a regular feature of early orchid growing and this helped to limit the spread of root-rot fungi. This situation changed when other media began to be used and as charcoal began to be collected from the bush. An example of how infection can be introduced is provided by the use of polystyrene, which became a favoured growing medium in the early 1980s. Fresh polystyrene is free from root-rot fungi. Stones were often mixed with or placed on the poly to hold it in place. Old charcoal and stones collected from the bush are not sterile and their use is a sure way of introducing devastating root-rot fungi. This practice was the most likely cause of the upsurge of infection with root-rot fungi when un-sterilised stones began to be used, either as the sole medium or as a component of the medium. Once root-rot fungi enter the orchid house, infection is then most commonly spread by spores being splashed from plant to plant in water droplets.

Infection with ***Phytophthora*** is used as an example. The spores of ***Phytophthora*** are quite motile and can spread by

swimming in the thin layer of water left on plant surfaces after dew, rain or overhead watering. Serious outbreaks of ***Phytophthora*** occurred in collections where non-sterile media were used. These outbreaks could not (and still cannot) be controlled with contact fungicides. It was noticed that despite contact fungicide being applied on a weekly basis, each watering spread the infection. It was therefore quite obvious that the infection was being re-introduced with each watering. Blame for the source of infection was therefore directed, quite incorrectly, at the town water supply (which is chlorinated). Water certainly spread the infection (via splashing of spores) but was not the source of infection. These days, ***Phytophthora*** infection, if inadvertently introduced to the collection through lax quarantine procedures, can be controlled by prophylactic treatment with phosphorus acid (as Phosject, Agriphos, Phosacid), or one of the more expensive fungicides (such as Alliette, Fongarid) that appear to be metabolized to phosphorus acid in the plant. Drench fungicides (eg Banrot) containing both etridiazole (contact) and thiophanate-methyl also control root-rot fungi.

However, the best cure is prevention. Thus, all companion plants must be grown in soil that is free from root-rot fungi, all stones must be sterilised and only disease-free plants should be brought into the collection. Diatomite, which has recently become available to orchidists, is light, water-absorbent and sterilized at high temperatures. It is an excellent substitute for the non-sterile blue-metal, creek pebbles and various sundry rocks used previously as or in orchid media.

Quarantine Issues - Until the early 1990s it was common practice for many orchid growers to import orchids directly or through owners of established quarantine houses. Quarantine was a farce and resulted in the introduction of several orchid pests (including 'bush' or 'garlic' snails) and diseases (including 'Thai disease') that pose serious problems even today. Imported plants were received and taken by their owner to be fumigated by the quarantine officer before being put into the quarantine house. Imported plants were expensive, bare-root and likely to be seriously affected by fumigation. Quarantine officers generally knew far less about orchids than did the importer. In many cases, local plants were therefore substituted for imported plants. While the local plants (generally 'dogs') were fumigated and placed in quarantine, the imported plants remained un-fumigated and along with any attendant pests and diseases, went straight into the collection of the importer. The introduction of 'Thai disease' of Vandas occurred because of lax quarantine. The disease (caused by a Guignardia fungus) is now the most serious leaf disease of strap-leaf Vandas and Ascocendas. Early collections of Vandas were based mainly on terete and semi-terete types that originated from Vanda teres and V. hookeriana. These types have very high genetic resistance to fungal diseases, including 'Thai disease'. Any fungal diseases to which they were susceptible could be readily controlled with contact fungicides. It was not until the upsurge in popularity and availability of strap-leaf vandaceous types in the late 1970's that 'Thai disease' became an important problem. It seems highly likely that the disease was introduced along with some of the early strap-leaf types. The fungus generally infects the lower leaves of susceptible plants, produces raised, elongate, brown-purple lesions and causes premature leaf-drop, reduced vigour and untimely death of affected plants. As enthusiasts increased the number of strap-leaf types in their collections, 'Thai disease' became more and more important. Once the disease is established in a plant it is very difficult or impossible to control with contact fungicides. Remember, contact fungicides (such as Zineb, Mancozeb, Antracol) will prevent but do not cure established diseases!!!!. The Thai solution for control was to treat all plants with a contact fungicide after each watering and in that way prevent the disease from establishing in newly sprouted leaves. The plant eventually 'grew out of the disease'. This is a very unsatisfactory solution. Fortunately, a range of fungicides (including Triforine) is now available to assist with the control of the disease. As is the case with all fungal diseases, control of 'Thai disease' is best achieved by using a rotation of fungicides that not only kill germinating spores (the contact fungicides) but also control the established disease (the systemic fungicides).

The importance of different fungi and the methods used in their control have therefore changed over time. There is now a wide range of highly effective contact and systemic fungicides, spreader-stickers, uncontaminated media and sources of information that were not available to earlier orchid growers. However, no single fungicide will now control all of the fungi that attack susceptible orchids. It is therefore necessary to use all methods available to minimize the incidence, spread and effect of fungal diseases. Growing disease-resistant plants, culling highly disease-susceptible plants, correct culture, observance of strict quarantine, regular sanitation of plants and the entire orchid house, and the implementation of an effective fungicide rotation are all important components of an effective disease-control program. These rules remain as important today as they did 50 years ago. However, unlike the situation in the early days when all chemicals that did not kill humans immediately were considered to be 'safe', there is now a great deal of skepticism and in some cases terror, associated with the use of fungicides.

Modern fungicides have very low acute toxicity to humans. In fact, the fungicides in common use have lower acute toxicity than common salt, which all of us eat in some form every day. Nevertheless, every precaution must be exercised when using pesticides or any other chemical, not only because of their possible effects on humans, but also because of possible effects on the broader environment. Despite the presence of more pests and diseases than ever before, the range of orchids, the availability and knowledge of how to control pests and diseases and how to grow orchids successfully, have never been greater.

- Go to it!!!