Cymbidium Chatter

Cym. (Spring Flame X Vanity Fair) 'Good One'
(Photo and cross by Steve Thomas)

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Latest News

Welcome to the third issue of *Cymbidium Chatter* for 2021. By now, most of us in the southern hemisphere will have plants in spike and the early-season blooms will be open. Last month's Cymbidium Orchid Society of Victoria (COSV) meeting featured a number of early-flowering plants

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Previous issues are available at https://www.cosv.com.au/publications-and-resources.

brought in by members, including a delightful *Cym. tracyanum* and two primary hybrids, Forster Alcock (*tracyanum* X *elegans*) and Floreat Eagland (*mastersii* X *elegans*).

The striking Cym. tracyanum. *The strong perfume was detectable meters away!*

A surprisingly open and near-white Cym. Floreat Eagland, considering the parentage.

An impressive example of Cym. Forster Alcock, flowering with four spikes and dozens of lightly scented blooms.

In more troubling news, there is a new strain of Orchid Fleck Virus (OFV) that can infect citrus, increasing the number of non-orchid hosts which can carry the virus. This new strain is covered in greater detail later in the issue.

The Future of Pauline's Lab

Many of us will be familiar with Pauline and Kevin McLean, who operate a lab service for orchid seed-raising and cloning in South Australia. They are now making plans for the future of the business, as Pauline explains:

> *Due to retirement and health issues, we are looking at selling Pauline's Laboratory Service in South Australia. This business has been going for over 40 years and has well established clients with ongoing orders. Expressions of interest can be made via email at kevin.mclean3@bigpond.com.*

Please note that Pauline will be away from late June through mid-July, so she will be unable to respond to emails during this period.

Cymbidium atropurpureum and its Descendants

Recently I was asked if I could prepare an article on this species; as I do not grow it myself, I reached out to several people familiar with the species and its hybrids to get their input. All have generously provided comments and photos for this article, and I hope the reader will find it both interesting and informative.

Cym. atropurpureum *courtesy of Justin Priddy.*

Species Background

Cym. atropurpureum was originally described in 1854 by Lindley, who considered it to be a variety of *Cym. pendulum* (now considered to be a synonym of *Cym. aloifolium*). It was not until 1903 that Rolfe treated it as a separate species, a classification that has remained ever since. The complete genome has yet to be sequenced, but Kobsukh Kaenratana (author of *Heat Tolerant Cymbidiums* and hybridiser at Pakkret Floriculture, Thailand) has closely observed this species as part of his breeding program and concluded it is not a close relative of *finlaysonianum* as others have suggested:

> *"The idea that* atropurpureum *is closely related genetically to* finlaysonianum *is wrong. Though geographically their major distributions overlap each other, … they occur totally apart by elevation. Cym.* atropurpureum *occurs at higher elevations; this means the species prefers a cooler climate than* finlaysonianum*."*

In nature the species is typically found in the forks of lowland and riverine forest trees (and occasionally rocks) at elevations ranging from sea level up to about 1200m. It prefers shadier

The species produces strongly pendulous spikes, as shown in this photo from Kobsukh Kaenratana.

A selection from a Melayu population of the species, showing a mass of upright roots emerging from the pot. Photo courtesy of Kobsukh Kaenratana.

conditions than *finlaysonianum* and is not usually found high in the canopy or in locations exposed to a lot of sun. Kobsukh has observed that it is demonstrates some terrestrial or lithophytic behaviour in its seed germination and reduced ageotropic (acute upright) root expression, compared with strongly epiphytic species such as *finlaysonianum* and *aloifolium*. It flowers in the winter months in south-east Asia (Jan-March), can grow into large clumps with hard leathery leaves, and flowers on pendulous racemes carrying up to 30 dark maroon flowers with white lips marked with maroon spots. There is a green albino form as well from Mt. Khao-Luang.

The species is relatively easy to grow in cultivation, preferring an overnight minimum of about 18°C, ranging up to the low 30s during the day. However, it is not always the easiest of species to flower; Stephen Early (Melbourne) reported that whilst he could easily grow it in his glasshouse, it would only flower every couple of years (which he suspects is due to the 10°C minimum of his glasshouse and reduced watering in winter).

Justin Priddy (Queensland) noted that it is never a prolific bloomer for him, with even specimen size plants never producing more than 2-3 spikes at a time. He explained that "once the flower spikes break [out of the] sheath, they elongate [rapidly,] and the first flowers begin to open within 2 weeks… very similar to *Cymbidium dayanum*." Flowers tend to last a month under his conditions, however, which differs to other reports.

The species seems to have a rapid bloom and seed maturation cycle (a trait that may be useful if it can be disassociated from the short flower life), as Kobsukh describes:

> *"The blooming time is extremely narrow and seasonal. The whole batch can bloom and finish within 1-2 weeks… Seed pods are usually ripe and split around 3-4 months with a lot of nice dusty yellow seeds, whereas all other species, including* finlaysonianum*, usually take well over 8 months or up to 12 months."*

The usefulness of the species in hybridisation depends on the context. For Andy Easton, whose primary breeding program is for the cut flower industry, he describes the short flower life, ugly plant habit and dark colours as being unsuitable for commercial use. Kobsukh has integrated it into his

heat-tolerant hybrid lines, however, utilising its unique "non-muddy reddish-orange colour in its progeny" and the promptness of bloom. Under his conditions, he reports that the species tends to produce many inflorescences once per year, a trait that may be useful for shows. He has also crossed two different geographical populations of the species (Melayu – southern Thailand and the Malaysian Peninsula – and southern Philippines), each with their own distinct blooming seasons, and made flasks available a couple of years ago (PK-2361). Kobsukh has also treated the species to produce a 4n form, which he intends to use in his hybridising program.

A comparison of the 2n and 4n forms of the species, courtesy of Kobsukh Kaenratana.

The Melayu form of the species. Photo courtesy of Kobsukh Kaenratana.

Progeny

At the time of writing, there were five registered primary hybrids and two other hybrids with *Cym. atropurpureum* as a parent. The species has met both *canaliculatum* (Australian Midnight) and *madidum* (not yet unregistered), with *lowianum* as the only of the large-flowered species to have been used in a cross with it so far. Kobsukh has made or remade at least four of these primaries:

- Australian Midnight = *canaliculatum* X *atropurpureum*
- Clare Natasha = *ensifolium* X *atropurpureum*
- Pakkret Vampire = *atropurpureum* X *bicolor* subsp. *pubescens*
- *Cym. madidum* X *atropurpureum*

Australian Midnight and Clare Natasha are the only two 20th Century hybrids and Australian Midnight is currently the only *atropurpureum* hybrid with any registered offspring (five in total). The other primaries are all 21st Century registrations, with Pakkret Vampire (2020) being the latest. Dark River (*atropurpureum* X *aloifolium*) is another recent registration (2019), whilst Rusty Leaves (*lowianum* X *atropurpureum*) was registered in 2012.

The recent hybrid of (madidum *X* atropurpureum) *courtesy of Kobsukh Kaenratana.*

Two more primary hybrids produced by Kobsukh – his remake of Clare Natasha (left) and the recently registered Pakkret Vampire (right). Photos courtesy of Kobsukh Kaenratana.

Gary Sweikert has kindly provided some notes on the hybrids from this species that he grows.

Cymbidium Australian Midnight is a primary hybrid between *atropurpureum* and *canaliculatum* originally created by Ken Russell of NSW and registered in 1991. My plant – named 'Black Beauty' – is an easy and quick grower with the foliage an equal mix of the two species. In fact, it looks like a *canaliculatum* with very thick and stiff lighter green leaves. The pseudobulbs resemble the typical *canaliculatum* shape and growth. The flowers are again an equal mix of the two species on pendulous racemes with about 25 flowers with dark segments and a lighter spotted lip. The flowers last about 5 weeks or so and have a slight coconut fragrance. It blooms in November for me.

Cym. Australian Midnight 'Black Beauty', courtesy of Gary Sweikert.

Cymbidium Black Stump 'Green' is a hybrid with the southern green/brown form of *canaliculatum* in the ancestry. This hybrid has four Cym species in its makeup – *canaliculatum*, *atropurpureum*, *devonianum* and *madidum* – and the parents are Cym. Australian Midnight X Cym. Cricket. My plant has shorter and narrower leaves with smaller pseudobulbs than the darker Black Stump clones. The flowers are light green, peppered with burgundy spotting on the segments and the lip is solid burgundy with a cream pollen cap. Racemes are pendulous carrying up to 35 flowers, being slightly smaller in size then the darker forms.

Cymbidium Black Stump 'Come in Spinner' is a hybrid using the darker "Sparkesii" *canaliculatum* form. My plant of this clone has the longest and widest leaves and has the largest pseudobulbs of the *atropurpureum* hybrids I grow. It also has the biggest and darkest flowers with a thin cream border around the segment edges. Flowers are up to 40mm in height, with up to 40 flowers well-spaced on long pendulous racemes.

Three named Cym. Black Stump clones, from left to right: 'Green', 'Come in Spinner' and 'Howzatt'. Photos courtesy of Gary Sweikert.

Cymbidium Black Stump 'Howzatt' again uses the darker *canaliculatum* form. My plant of this clone has slightly smaller flowers and is not quite as dark as 'Come in Spinner'. It also has cream edging on the segments, but also has some cream flecks as well. The raceme is more arched and carries around 35 well-spaced flowers. The foliage is smaller than 'Come in Spinner' with smaller pseudobulbs also.

The Black Stump hybrids are easy to grow although hard to find, as all 500 clones of each have been sold. Both dark clones have been awarded FCCs by the AOC. The best was a clone of 'Come in Spinner' awarded in 2015 by the AOC and was also named the 2015 Hybrid of the Year. It gained 88.7 points and is the highest ever pointed Cymbidium to get an FCC by the AOC. It had 15 racemes cascading over the pot edge with an average length of 815mm – quite a sight. The other clone, 'Howzatt', was also awarded an FCC last year in Brisbane with 85.8 points.

Cym. Black Stump, courtesy of Gary Sweikert.

These *atropurpureum* hybrids are much easier to grow than the species and are grown in my greenhouse with all the other Cyms and get no special treatment. They put up with temperatures down to zero in winter and up over 40°C in summer with no problems at all. They get normal watering and fertilizer on an irregular basis, and I have them all hanging up so the racemes and flowers are at eye level to be appreciated.

An Interview with Steve Thomas

Editor: *It is my hope to feature an interview with a grower, enthusiast, hybridiser, or nursery operator in each issue. For this issue, Steve has kindly agreed to share his story. All photos in this interview are of Steve's hybrids and were provided by Steve unless otherwise stated.*

I am a retired public servant and have lived in Western Australia since immigrating to Australia from England with my parents in 1953. I am currently living in the Perth suburb of Kalamunda, which is about 25 kilometres from the Perth C.B.D. I have a keen interest in hydroponic culture, and I also grow exhibition Chrysanthemums.

Cym. (Conqueso X Gwen Thomas) #1

Editor: *What started your interest in Cymbidiums and how long have you been growing them for?*

A friend invited me to see his orchid collection about thirty-five years ago. I expressed an interest in crowing Cymbidiums and he gifted me six plants. Now I have over 1,000 plants in varying stages of development.

Editor: *What type(s) of Cymbidiums are your favourite and what do you like about them in particular?*

I find the standard exhibition type flowers to be most appealing. To me, well grown and presented standard Cymbidiums exhibit a presence that makes them stand out.

Cym. Daniel Thomas #3

Cym. Mylie Thomas 'Virgo'

Editor: *What is the climate like where you live? Have you had to create any special microclimates in order to grow your preferred Cyms?*

Climatic conditions in my area are like most other southern states of Australia. Spring and autumn conditions are very good, summer is very hot with temperatures reaching 45°C, and winter is too cold (luckily no frosts). My plants are grown under 70% shade cloth and I have installed a misting system to keep the growing area cool during summer. I have a drip irrigation system for delivering nutrients to my plants. My main growing area is 100 square metres and I have a smaller area of 24 square metres for plants in flower that has a removable Solar Weave cover.

Cym. (Dural Dream X Valley Splash)

Cym. (Spring Flame X Vanity Fair)

Editor: *What challenges (pests, disease, culture, etc.) have you encountered whilst growing your Cyms and how did you overcome them?*

I have had a few occasions where red spider mite has appeared on my small plants and I have used Vertimec miticide to eradicate them. I have also had scale on plants from time to time and these plants are treated with Richgro Bug Killa Granular Garden Insecticide (the active constituent is imidacloprid). I never spray my whole collection but treat plants individually if they show signs of insect damage.

Editor: *What has been the easiest Cym for you to grow?*

I have never had problems growing Cymbidiums but flowering some cultivars has presented a few challenges. One plant – Amber Harvest 'Misty' – I have had to divide three times before it decided to flower.

Editor: *What prompted you to start making your own hybrids?*

After accumulating a very good collection of plants that I had purchased from three of the better growers in Australia – Bryant's Orchids, Kimberley Orchids and Guest Orchids – I came to the conclusion that I had enough good plants to make my own crosses. My first cross was Alexandra Beauty X So Bold and I was lucky enough to flower one nice plant. Its registered name is Obsessive Passion. Pauline's Laboratory Service has processed all my seed pods and she delivers very healthy flasks of seedlings.

Cym. Obsessive Passion 'Kalamunda'
(Steve's first cross)

Cym. West Coast 'Gold Fever'

Editor: *How do you go about choosing your crosses and what do you look for in the seedlings?*

Plants that I use for breeding need to have reasonably compact foliage and tall upright spikes with 12-20 well spaced flowers of solid clean colour. There is not a lot of science involved when choosing parents. On some occasions a cross can be made if the plants are next to each other in the flowering house – that's how easy it can be.

Cym. (Kirby Lesh 'Pink Ice' X Valley Splash 'Awesome')

Editor: *Is there anything you'd do differently if you were starting out in the hobby today, but knowing what you know now? Alternatively, if you were giving advice to a newcomer just*

starting out in the hobby, what key things would you want them to know?

There isn't anything I would do differently, as I've enjoyed the journey over the past 35 years. My advice to new growers would be to do some research on hydroponic culture, grow your plants in coco coir and perlite (hydroponic coco run to waste culture[1]) and create a growing environment for your plants with a focus on getting the right light, temperature, and relative humidity.

Cym. Daniel Thomas 'Taurus' AM/AOC and grand champion of the 2016 South Eastern Orchid Society of Western Australia Annual Show.

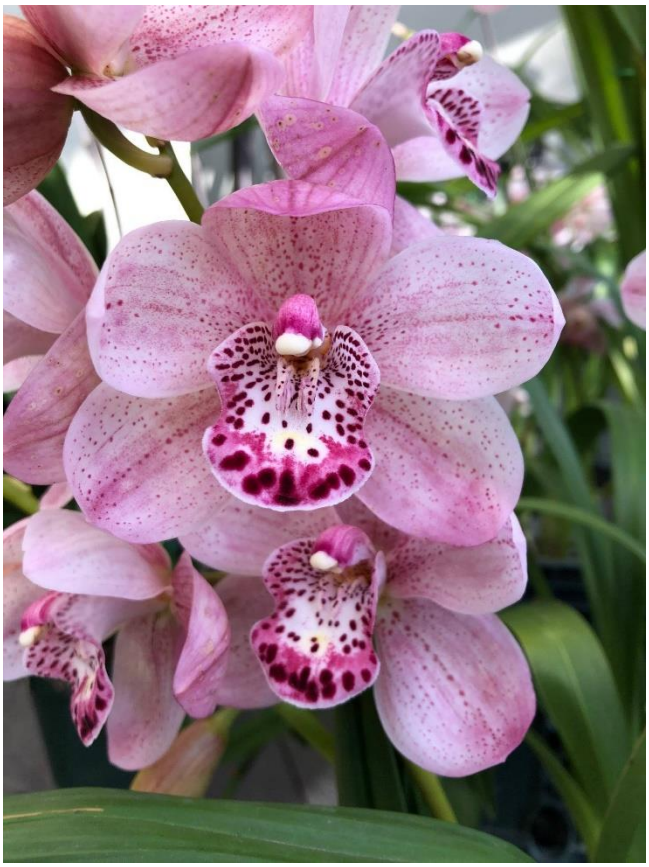
[1] Run-to-waste culture is where excess nutrients or run-off is not recirculated. Conventional gardens (e.g., soil) are a form of run-to-waste system. Media with a high water retention capacity are typically used.

Photos from Pierre Pujol

Pierre Pujol has again provided photos of his plants and some comments to accompany them. To start with are two different first-bloom seedlings of Cym. Annie Green, Pierre's cross of (Mistress Mine 'Stirling' X Kirby Lesh 'Cinnabar').

The first, shown left, is a "strong grower, very compact plant, [and has] three erect spikes. The color is vibrant and the lip surprising."

Below is another seedling of the same cross, which also has produced 3 spikes in a 5-inch pot. Pierre notes that the small size comes from *floribundum* (through Dolly as a grandparent) and that the flower shape is strongly influenced by Kirby Lesh. He believes that it if it were cloned, this plant could be a good commercial pot plant.



Seedlings of Cym. Annie Green, one of Pierre's own crosses.

The next two photos are Pierre's selected seedlings from two crosses made by the late Loren Bachman from Casa de la Orquideas. Maryse Pujol is (Ruby Lips 'Harlequin' X Kirby Lesh 'Cinnabar') and Pierre likes the captivating flower markings and the two spikes per bulb. The second, the unregistered (Speckles X Splatters), is an eye-catching novelty hybrid; despite reports of the Splatters line being poor growers, Pierre remarks that this cultivar is a "good grower [with] sequential spiking."

Cym. Maryse Pujol 'Woodside'
HCC/AOS, S/CSA

Cym. (Speckles 'Bold Vision' X Splatters 'Flamengo')
'Woodside'

Continuing the Kirby Lesh lineage is Cym. Gorgeous George 'Woodside' (Pink Champagne X Finger of Suspicion) hybridised by George Hatfield. Pierre reports that it is a large standard plant with "fifteen flowers well arranged on tall spikes. Pink Champagne and Kirby Lesh have proven to be good breeders, so I am looking forward to seeing the progeny of this plant."

Cym. Gorgeous George 'Woodside', which has Finger of Suspicion (George Formby X Kirby Lesh) as a parent.

Cym. Golden Valley 'Woodside'
(Valley Splash 'Awesome' X Tower of Fire 'Sunset Flame')

Shown left is the first flowering of a seedling of Golden Valley hybridised by Weegie Caughlan. Pierre bought this plant from her sales table and was thrilled when the buds opened. Like many Valley Splash crosses, the brushmarks have been inherited. Australian readers may be familiar with Kimberley Splash (Khan Flame X Valley Splash), regularly shown in Victoria.

Cym. Judith Woolridge 'Woodside'

Above is one of Pierre's late-flowering plants, Cym. Judith Wooldridge 'Woodside' (Forty Shades of Green X *devonianum*), hybridised by George Hatfield. He observes that "too much light turns some greens into yellow," something he also noted with two divisions of the same plant (Green Zenith X *tracyanum* 4n) that are shown below. Pierre notes that the strongly-marked one is "grown outdoors in my backyard, and the yellowish one is grown in more sun in my greenhouse in Half Moon Bay. Too much sun exposure wiped out the red pigments."

Cym. (Green Zenith X tracyanum *4n) – a cross by Kevin Hipkins that yields 17+ large flowers.*
Photos depict two divisions of the same plant grown under different conditions.

Hybridising for Late Season Cut Flowers by Bert Ruiter

Bert Ruiter has again kindly provided some photos from his nursery in the Netherlands, as well as some insight into breeding for late flowering hybrids.

Cym. Isabel Sander
(Ceres X Garnet) Reg. 1927

Cym. Frederick Sander, one of Bert's hybrids
(Isabel Sander X Cym. i'ansonii FCC/RHS) Reg. 2017

Hybridising for late season intermediate cut flowers is not as easy as it seems. Late season for us in Europe is the end of April/beginning of May, around Mother's Day.

There are two main issues. The first one is that the lateness very quickly disappears in the results of the cross; the seedlings tend to flower earlier in time. This is why Isabel Sander (Ceres X Garnet) is an interesting variety – it has been around forever and is still grown today for its lateness. In fact, it is nearly too late when grown in a late flowering greenhouse with other late varieties.

I don't have Ceres, but Isabel Sander flowers later than Garnet and also later than Regeneration Dance (Garnet X Minuet 'NH'). It must be the combination of *Cym. lowianum* and *i'ansonii* that

Cym. Regeneration Dance 4n

results in late flowering and breeding. This is why both Frederick Sander and (Frederick Sander X Chironla 'Tabasco') produce late and breed late.

Top: two selections of Cym. (Frederick Sander X Chironla 'Tabasco')
Bottom: two selections of Cym. (Isabel Sander X Falling Passion)

The cross of (Isabel Sander X Falling Passion) is made to build in the white alba gene for further use, mainly late flowering albas that keep well. In the hybrid Last Dance, I used the Street Tango influence for colour, productivity, and lateness.

Cym. Clockwork Orange, another of Bert's hybrids (Isabel Sander X Bluenose) Reg. 2020

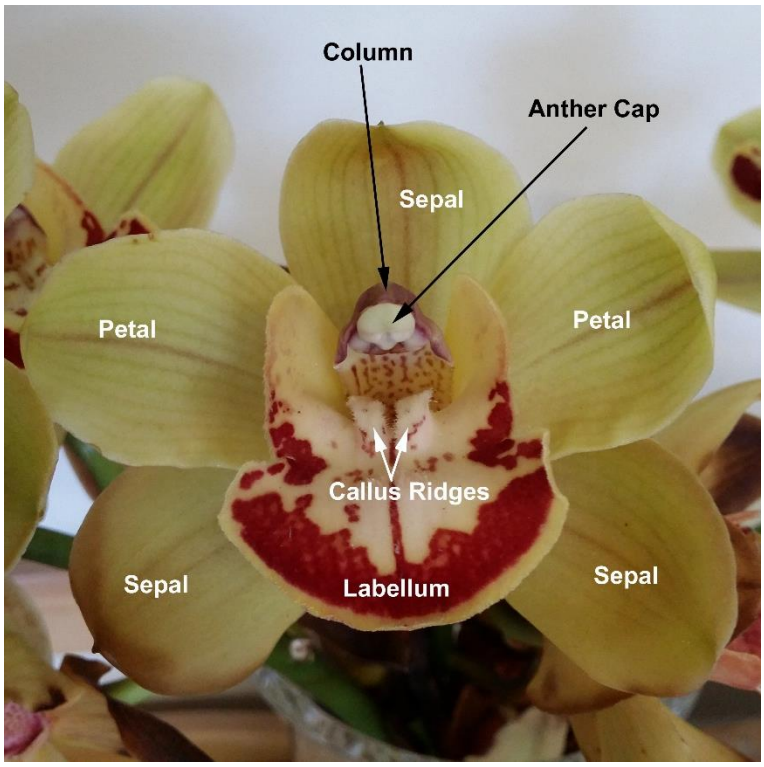
Cym. Last Dance (Isabel Sander X Street Tango) Reg. 2017

This brings me to the second issue in breeding cut flowers. Without productivity, a hybrid is not going to survive commercially. Commercial growers in the Netherlands talk about the number of spikes per square meter greenhouse space. Varieties like Rosanna Shaw, Showgirl or Mary Pinchess will easily give you 25-30 stems per square metre. On average, between all the varieties, one really needs 22 stems minimum per square metre for the mix boxes unless a variety can be sold in a mono colour box with a very good price. This is why some very nice varieties never make it commercially.

Making Your Own Crosses

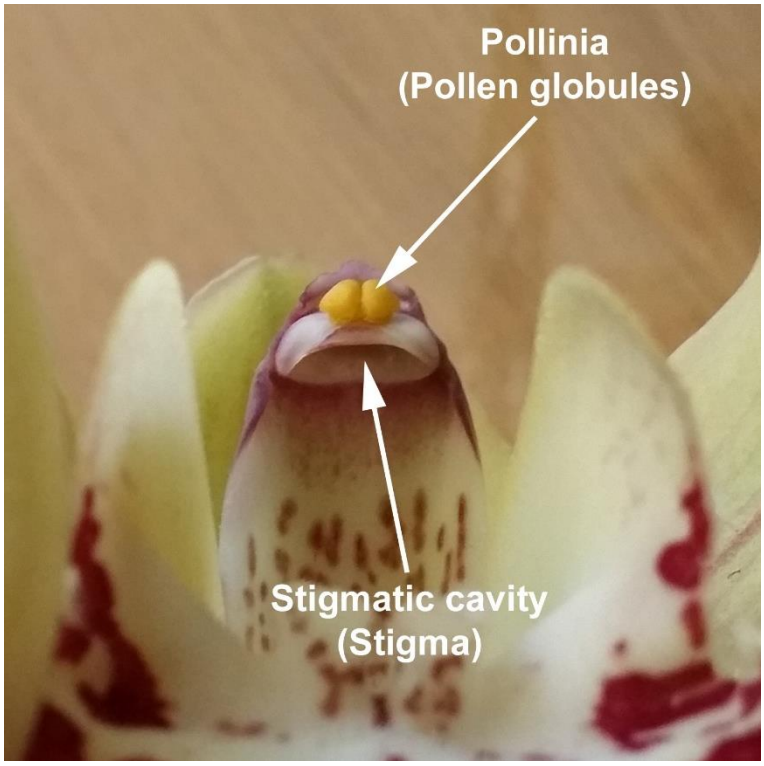
The Parts of a Cymbidium Flower

With the main flowering season for the southern hemisphere kicking into gear, it seems like a good time to cover the process of making Cymbidium crosses. This is something almost any grower can do and affords the opportunity for learning, making something new and having a bit of fun along the way.



Cymbidiums, like most orchids, are hermaphroditic – the flowers have both the male and female reproductive structures (an exception to this is *Catasetinae*). These are found on the column, the central structure opposite the lip (the labellum).

At the end of the column is the anther cap, which protects the pollen. Once the anther cap has been disturbed or removed (see photo), the flower usually starts to collapse. The pollen is in the form of two globules known as pollinia; each pollinium is a waxy mass of pollen grains. Depending on the size of the flower, these can be smaller than a pin head! Most intermediate and standard hybrids have large pollinia that are easy to handle with a pair of tweezers, however. Viable pollinia are typically green or yellow in colour, whereas grey or brown pollinia may not be.



Behind the pollen, facing towards the back of the column, is the stigmatic cavity. This is the female part of the flower and where pollinia must be placed for fertilisation to occur.

The plant that provides the pollen is called the pollen parent, whilst the plant that holds the seed pod is called the pod parent. The cross of the two is always written with the female (pod) parent first, with a multiplication sign in between:

Pod Parent × Pollen Parent

In nature, what normally happens is that the pollinator (such as an insect) will land on the labellum and crawl towards the back of the lip in search of nectar. They will disturb the anther cap and collect pollinia in the process (there is a small sticky tab at the base of the pollinia which gets caught on the insect's back). The pollinator then moves onto the next flower (sometimes on the same plant, sometimes on another plant) and repeats the process, this time with the pollinia getting caught in the stigmatic cavity as it backs out of the throat of the flower.

Some flowers can also self-pollinate in nature; the anther cap may be easily disturbed by the wind and the pollinia will swing around and into the stigmatic cavity, resulting in a "selfing". In cultivation this often done intentionally if one only has a single example of a species or to bring out recessive traits, such as albinism.

Compatibility and Fertility

It can be disappointing when you have a great idea for a cross and try it, only to find that it doesn't work! Unfortunately, not all pollinations will result in a seed pod forming. This is determined by compatibility (how compatible are the genes of your chosen parent plants) and fertility (the capacity to which your parent plants can generate viable gametes).

There is a spectrum of compatibility, ranging from an empty pod (if one forms) to a full pod. Many Cymbidium species can be self-pollinated (selfed), but some seem to have poor self-compatibility, such as *Cym. lowianum, i'ansonii* and *tracyanum*. Greig Russell discusses this subject in more detail in his article on self-incompatibility.

This issue of compatibility extends to hybrids as well. Some crosses simply fail to take, despite both parents being fertile. Sometimes a cross will only work in a certain order, i.e. (Plant A × Plant B) may be successful, but (Plant B × Plant A) may not be.

Cym. floribundum is interesting in that many of its genes do not line up well with those of other members of the genus (in other words, the chromosomes are not homologous with the majority of Cymbidium species). This mismatch results in limited or no fertility in many hybrids involving the species, particularly diploid primary hybrids (the cross of two species). Another example is my diploid plant of Cym. Memoria Geoff Laird (*madidum* X *lowianum*), which does not appear to produce viable pollen yet is pod fertile (though many crosses with it still fail or produce very little seed).

Ploidy

The next factor to consider is ploidy. This is the number of sets of chromosomes in a cell, typically referred to by the letter *n*. In nature, all Cymbidium species are diploids (2n); that is, they possess two sets of chromosomes, one from each parent. Occasionally higher ploidies (called polyploids) can occur naturally, as in the case of the famous Alexanderi 'Westonbirt' (a tetraploid, or 4n). Typically, though, polyploids must be created in the lab using mutagens such as colchicine or oryzalin to artificially double the number of sets of chromosomes. Most plants the average grower will encounter will be one of three ploidies:

- Diploid (2n)
- Triploid (3n)
- Tetraploid (4n)

Most modern hybrids are tetraploids, which are favoured due to their increased size and substance – they usually have larger and thicker flowers, foliage and roots, although there are exceptions to this

rule. Tetraploidy also has the advantage of restoring or improving fertility in otherwise incompatible crosses; hybrids that have poor fertility as diploids (e.g., Cym. Peter Pan) will successfully breed when converted to tetraploids.

Triploids, on the other hand, can be difficult to work with. They often have increased vigour and resilience but are almost always pollen sterile and have limited fertility as pod parents. The offspring can be a mixed bag, too, varying between diploids, triploids, tetraploids and aneuploids. Aneuploids have either missing or extra chromosomes and are often poor growers; few do well. Cym. Girrahween 'Enid' is one of the few known aneuploids to be awarded.

An example of a 2n (left) and 4n (right) seedling of the same cross. Note the thicker roots on the converted 4n seedling.

In general, it is advisable to keep ploidy consistent: cross diploids with diploids and tetraploids with tetraploids. Diploid crosses should be treated at the lab so that the grower has a range of diploid and tetraploid seedlings to choose from, as this offers flexibility in the next generation. Other approaches are possible, but that is outside of the scope of this article.

Choosing Parents

It is easy to get carried away and start making crosses between any two plants that you like – most growers that have dabbled with hybridising have probably done that early on and then realised later that their cross wasn't going to be as successful as they had hoped. Consider what traits you are looking for in the offspring, such as:

- Flower colour and patterns – do you want spots and stripes? Solid colours? Albas/pure colours? Splash or brushmark patterns?
- Flower count – how many flowers do you want on a spike?
- Flower life – how long should the flowers last?
- Flowering season – when do you want it to bloom?
- Cutting ability – do you want to be able to cut the spikes for floral displays?
- Spike habit – upright, arching or pendulous?
- Spiking behaviour – are you aiming for multiple spikes off a bulb at once, or repeat spiking where the same bulb produces spikes for 2-3 years in a row?

If you take a little bit of time to work out what you would like to create, then select your parent plants based on their potential to reach your goal, you will probably be a lot more satisfied with the outcome. It can be hard to assess what you might get from a given parent plant, so looking at other crosses involving it (or its parents) can help give you an idea of the traits it may pass on to its offspring.

Pollinating Flowers

Flower with the anther cap removed.

Pollinia removed and the stigmatic cavity visible.

Test tube with pollinia.

Once you have selected your two parents, the first step is to harvest the pollen from the intended pollen parent. Sometimes there is little choice as to which plant will be used as the pod or pollen parent due to different flowering times or limited access (for example, another grower may have shared pollen with you).

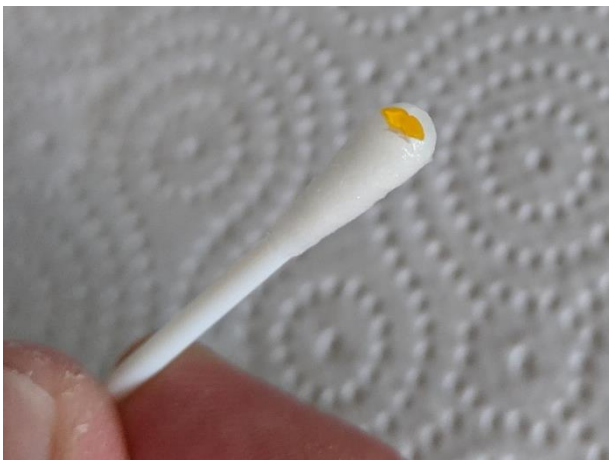
A pair of tweezers can be used to collect the pollen. First, sterilise them thoroughly (e.g., flaming and allowing them to cool). Afterwards, carefully pull the anther cap off to reveal the pollinia (note that for small blooms, sometimes the pollinia can detach with the anther cap, resulting in the fiddly job of extracting it!).

Gently pull the pollinia off the end of the column, taking care not to tear the stigmatic cavity in the process. Normally a small tab will accompany the pollinia, leaving a notch in the end of the column (as shown in the photo). Sometimes the pollinia will detach individually as well.

If the intended pod parent is not yet in bloom, pollen can be stored in the fridge (the crisper drawer is a good spot). A small test tube or similar container will do; just make sure it is easy to identify which plant it belongs to! Depending on the plant and storage conditions, pollen can last up to two years in the fridge. Smaller pollinia tend to lose viability sooner, especially as the outer casing of the pollinia hardens.

There are mixed views about whether to remove the pollinia from the intended pod parent. For plants where the anther cap is easily dislodged, it is certainly advisable to do so to avoid a self-pollination. However, there are reports of a few species (e.g., *Cym. devonianum*) that only work as pod parents if the anther cap remains undisturbed. It may also be beneficial to leave it where the pod parent is much larger than the pollen parent and additional time may be required for fertilisation to take place (as the flower will start to senesce, or rapidly age and collapse, once the anther cap is disturbed).

Some hybridisers will also remove all the tepals and labellum, leaving just the column on the blooms that they pollinate. However, others recommend leaving the labellum in place, as it may serve as a source of sucrose during its post-pollination senescence. My personal approach is to leave the flower alone until the tepals and labellum begin to die off.



Pollinia on the end of a cotton tip, normally available at chemists or in the toiletries aisle of a supermarket.

Once the pod parent flower is ready, prepare the pollen. Depending on the cross and the relative size of the parent plants, you may need to use multiple pairs of pollinia or just one pollinium. I use a cotton tip that has been moistened with room-temperature water to pick up the pollen; the moisture helps to keep it on the cotton tip after it has dried out somewhat in the fridge (fresh pollen is usually sticky enough that you can use a toothpick, although I am always careful to cup my other hand under it just in case I drop it!). For aged pollen, advice I have received is to try crushing the pollinia and use a small drop of honey on a toothpick to transfer it into the stigmatic cavity.

Pollinating a Cymbidium bloom.

Gently pull down the labellum enough to allow you access to the stigmatic cavity with the toothpick or cotton tip. Usually, you can gently press the pollinia into the cavity and it will stick, although if you are using honey, it may be easier to “wipe” the pollen off towards the side of the stigmatic cavity.

In the weeks following pollination, you should see some changes occur. The flower will start to turn downwards, although this is no guarantee of successful fertilisation. If the pollen successfully germinated, you should observe the column swelling as the pollen tubes makes their way to the ovary. Fertilisation then occurs and the ovary will start to swell to form a seed pod.

The column has swollen, indicating pollen germination.

It is important to keep the plant protected as the seed pods develop, as heat and direct sun can result in seed pods aborting. Some plants are more sensitive to environmental changes than others, too – for example, *Cym. changningense* ‘Annalie’ seems to be highly sensitive to temperature fluctuations during pod development.

It takes about a year for most Cymbidium seed pods to reach maturity and naturally split open (dehisce), although there are notable exceptions (such as *Cym. atropurpureum*). In most cases, the seed pods can be harvested at about 7 months (8 to 9 is recommended for *Cym. madidum* and its immediate progeny) and sent to a lab for processing. At this point, the seed has matured enough that

This seed pod is about ready to send to the lab.

An example of dried Cymbidium seed.

good germination is possible in the lab. Ideally seed pods should be sent before they dehisce, as this way they can be opened under sterile conditions in the lab. If working with a seed pod that has opened, allow the seed to dry and send it to the lab; it can be germinated, but often a percentage of seed will be destroyed by the sterilisation process required to prevent contamination of flasks.

Cymbidium seed is best raised in a sterile environment, as like most orchids it lacks endosperm (the food supply found in many seeds). This light weight enables seed to be carried by air currents and is why orchids generally produce thousands of seeds in nature, as only a few will find the right conditions to germinate and mature. Modern seed-raising processes use sterile flasks with a nutrient-rich medium for seed germination; it is important to keep these sterile, as fungi and other invaders also enjoy the nutrients and will out-compete the tiny Cymbidium protocorms.

Normally around 6 months after processing, the lab will be able to provide a report on how much seed germinated and an estimate of the number of seedlings. At this stage you will need to decide how many flasks of the cross you want and whether to have diploid crosses treated to induce tetraploidy. It can be another 6-9 months after germination before the seedlings are ready to deflask and send, depending on how vigorous the cross is. Additionally, treatment with colchicine slows the early development considerably, so you may be waiting 9-12 months from the germination report before receiving your seedlings. Finally, once you have your seedlings, you can expect to see flowers anywhere from 2 to 5 years later – it really depends on the cross and your growing conditions.

I hope that this article has been helpful and informative! I have only briefly touched on many of the aspects involved, particularly around genetics, and hope to expand on these in future. If you have feedback or would like to share how you make your crosses, please let me know.

Virus Update

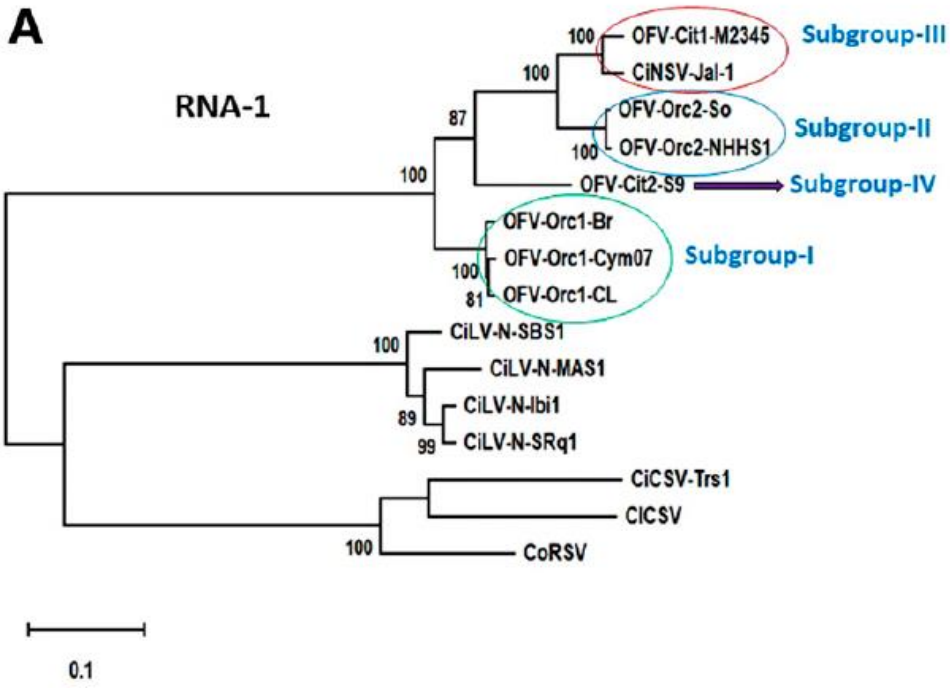
New Orchid Fleck Virus (OFV) Strains

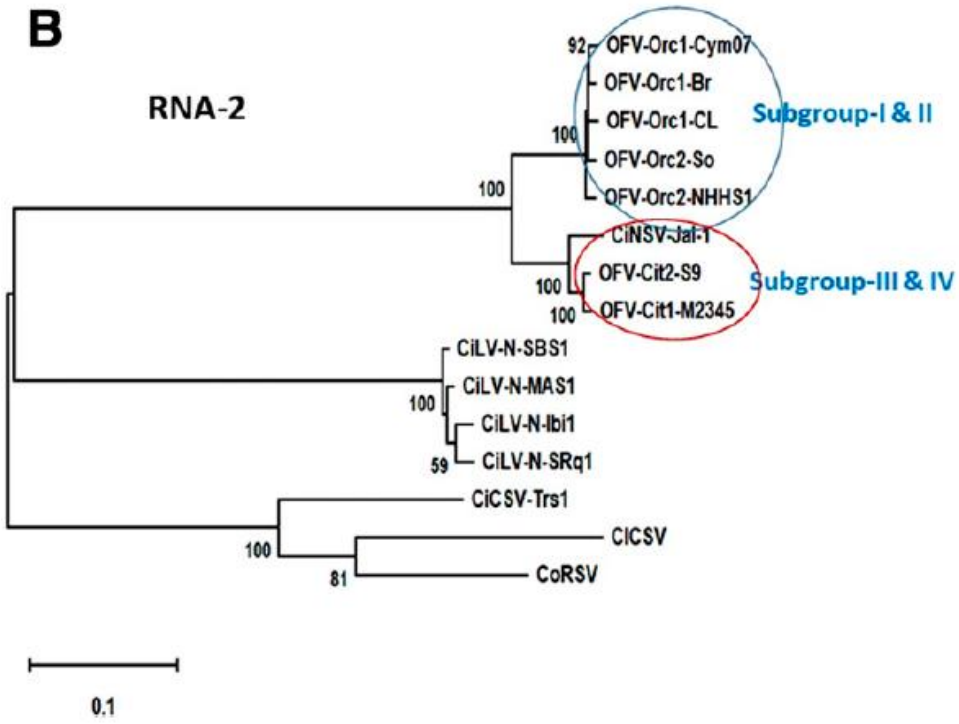
Earlier this year, the Australian Government released its draft report (Biosecurity Advice 2021/P06) identifying a new strain of Orchid Fleck Virus, OFV-Citrus, as a biosecurity risk, along with two pests capable of spreading it (*Brevipalpus californicus* and *Brevipalpus yothersi*). Previously known only to infect members of *Amaranthaceae*, *Solanaceae*, *Leguminosae* and *Aizoaceae* families, evidence gathered over the past few years demonstrates that it can also infect members of the *Citrus* genus within the *Rutaceae* family.

OFV symptoms on a Cymbidium.

Citrus leprosis has been known since the 1900s, but there has been a significant resurgence in Latin America in the past few decades. Until recently, three different viruses had been associated with the condition: Citrus leprosis virus nuclear type (CiLV-N), Citrus leprosis virus cytoplasmic type (CiLV-C) and Citrus leprosis virus cytoplasmic type 2 (CiLV-C2).

In 2013, the genome of CiLV-N was analysed, and it was determined to be closely related to OFV – so much so that it was proposed as the second member of the *Dichorhavirus* (initially *Dichorhabdovirus*) genus (Roy et al. 2013). Additional research published last year identified two citrus strains of OFV (OFV-Cit1 and OFV-Cit2, both distinct from CiLV-N) and compared them to the two known strains infecting orchids (OFV-Orc1, the original Orchid Fleck Virus, and OFV-Orc2), allowing the construction of a phylogenetic tree illustrating the relationships between the viruses (Roy et al. 2020).





Phylogenetic relationships among dichorhaviruses infecting citrus, orchids, coffee and the genus Clerodendrum, based on the nucleotide sequences of the two genome segments (RNA1 and RNA2). CiCSV = citrus chlorotic spot virus; ClCSV = Clerodendrum chlorotic spot virus; CoRSV = coffee ringspot virus. Taken from Roy et al. 2020.

The analysis indicated that the citrus strains of OFV very likely descend from the original orchid strain and that all the OFV strains share a common ancestor with CiLV-N. Further analysis carried out by Roy et al. found that OFV-Orc1 was also present in at least one citrus sample and that both citrus strains were widespread in citrus in Mexico. Pest Advisory No. 20-02 published by the Department of Agriculture in Hawaii in July 2020 reported the infection of lemon and mandarin trees by OFV-Orc2. Additionally, spill over from orchids to citrus has been theorised as the most likely cause of an OFV variant found in orange orchards in South Africa (Cook et al. 2019), highlighting the risk that infected orchids present to citrus and vice versa.

Given these recent findings, I would encourage anyone growing citrus and/or orchids to be vigilant about pests (particularly mites). Check your citrus plants for any signs of citrus leprosis, as well as take appropriate hygiene measures to avoid introducing OFV to from infected fruit you may obtain.

Cook, G. et al., 2019. Orchid fleck virus associated with the first case of citrus leprosis-N in South Africa. European Journal of Plant Pathology, 155(4), pp.1373–1379. Available at: http://dx.doi.org/10.1007/s10658-019-01854-4.

Roy, A. et al., 2013. Genome assembly of citrus leprosis virus nuclear type reveals a close association with orchid fleck virus. *Genome announcements, 1(4)*. Available at: http://dx.doi.org/10.1128/genomeA.00519-13.

Roy, A. et al., 2020. Reassortment of Genome Segments Creates Stable Lineages Among Strains of Orchid Fleck Virus Infecting Citrus in Mexico. *Phytopathology*, 110(1), pp.106–120. Available at: https://doi.org/10.1094/PHYTO-07-19-0253-FI.

Asymptomatic Plants

This year I have been reminded again that the common viruses (ORSV, CymMV and OFV) do not necessarily cause symptoms when plants are grown well. Early this year I acquired three plants, all beautifully grown, from a local grower. Of the three, two were virused – one plant had ORSV (with only one leaf showing a tell-tale linear marking… small enough that I missed it initially), whilst the other had both ORSV and CymMV. The poor grower was horrified when I shared the results, and I don't think they were even aware that they could have viruses in their collection.

Two plants just before being bagged and binned. The larger plant tested positive for both ORSV and CymMV!

More recently, I was given a division of another plant. Again, this was well-grown and only had minor cosmetic damage that appeared to be from a historical pest problem. Considering the genetic makeup of this plant usually results in leaf-tip dieback, it was very clean. Unfortunately, it tested positive for ORSV; I let the grower know and advised them to destroy their pieces of the plant.

Please be aware that your plant does not have to show leaf markings for it to be virused! Always sterilise your tools and change your gloves or wash your hands after working on each plant. Test anything that looks suspicious and be prepared to destroy infected plants. Finally, if you have a plant showing viral symptoms, please do **not** exhibit it, as it can pose a risk to other growers' plants.

For more information on orchid viruses, please read this article:

https://www.cosv.com.au/orchid-viruses

A healthy-looking division of a Cymbidium hybrid. Unfortunately, this plant was infected with ORSV and had to be destroyed.

Errata

Some eagle-eyed readers noted several minor errors in the previous issue, so in the interest of accuracy I have taken the opportunity to include corrections here. All three errors as noted below were in the article on *Cym. erythrostylum*:

Firstly, "Botrytis" should have been capitalised, as it is the name of the genus of fungus. The species most often encountered is *Botrytis cinerea*, although other species are also known to attack commonly grown plants.

I made a typo in the name of Osborn 'Sakura' (misspelt as 'Sakuka'), despite it being correctly labelled in my photo collection! My apologies to the owner of the plant, who explained that its name comes from the fact that in Japan, ornamental cherry trees are sometimes referred to as Sakura.

Finally, it was brought to my attention that *Cym. erythrostylum* 'Magnificum' predates any of the 4n strains and hence is almost certainly 2n (rather than the 4n I noted). There might be a 4n in existence, based on what I have read, but it is also possible that it was misidentified as a 4n.

Acknowledgements and Contributions

I hope you have enjoyed this issue. If you have any feedback or would like to contribute (whether it be just one or two photos, an idea for an article, or to volunteer for an interview), please get in touch! I can be reached at jwhite88@gmail.com.

Previous issues are available at https://www.cosv.com.au/publications-and-resources. Thanks to all those who have contributed to this issue, including Stephen Early, Andy Easton, Kobsukh Kaenratana, Justin Priddy, Pierre Pujol, Bert Ruiter, Gary Sweikert and Steve Thomas.

The next issue is planned for August 2021.