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ORCHIDS

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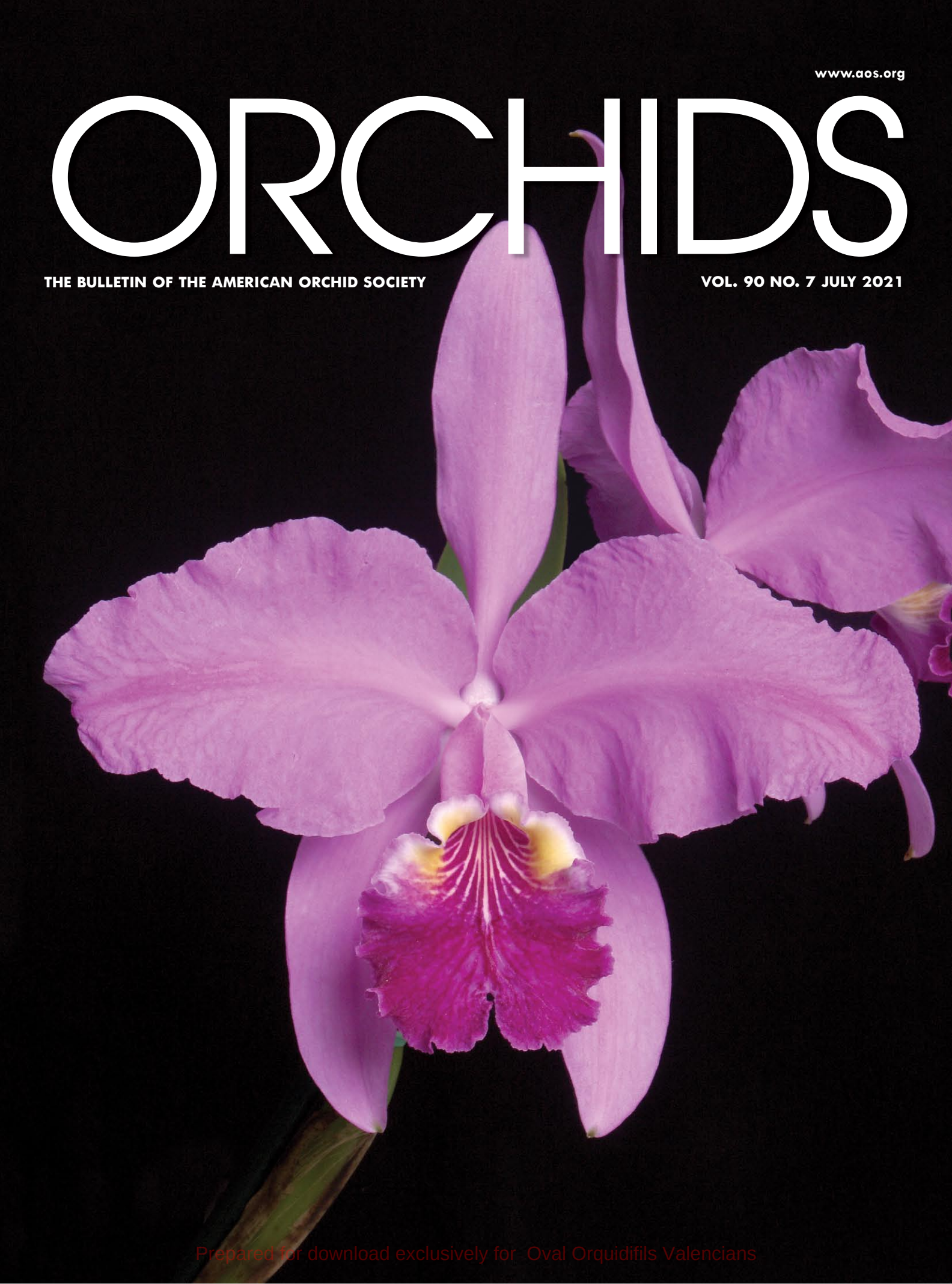

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FRONT COVER

Cattleya lueddemanniana ' Graf's Aquinii' HCC/AOS exhibited by Plantio La Orquidea and photographed by Greg Allikas.

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PRONUNCIATION GUIDE

Pronunciation of orchid names can be daunting for the novice and experienced grower alike. Presented below is a simplified pronunciation guide specific to the names found in this issue of *Orchids* magazine. An attempt has been made to represent each syllable using easily recognized sounds or words separated by hyphens and not standard phonetic symbols. Check out the Orchidist's Glossary on our website at https://www.aos.org/orchids/orchidists-glossary.aspx.

acaule (a-KAW-lee)
Aerides (ay-air-EE-deez)
Aeridovanda (ay-air-ee-do-VAN-da)
Alliaris (al-lee-AIR-iss)
arcisepala (are-kee-SEE-pa-la)
arcuata (are-kew-AY-ta)
aspericaulis (a-spear-ee-KAW-liss)
aspersum (a-SPER-sum)
atropogon (at-row-POH-gon)
aurantiaca (aw-ran-tee-AY-ka)
barbigerum (bar-BIJ-er-um)
bassetii (bas-SET-ee-eye)
bicolor (BYE-kuhl-ur)
Bifrenaria (bye-fren-AIR-ee-a)
Blephariglottis (blef-air-ih-GLOT-tiss)
calceolus (kal-see-OH-luss)
candidum (KAN-dee-dum)
capixaba (kap-ee-SHA-ba)
casei (KASE-eye)
Catasetum (kat-a-SEE-tum)
Cattleya (KAT-lee-a)
Celastrus (sel-AS-truss)
cernua (SER-new-a)
chaoi (CHOW-ee)
Chiloschista (kye-loh-SHIS-ta)
christae (KRIS-tee)
ciliaris (sil-ee-AIR-iss)
corinnae (kor-IN-ee)
costaricensis (kos-ta-ree-KEN-sis)
cribbiana (krib-ee-AY-na)
cristagalli (kris-ta-GALL-ee)
Cuitlauzina (kweet-law-ZEE-na)
Cymbidium (sim-BID-ee-um)
Cypripedium (sip-rih-PEED-ee-um)
dawsonii (daw-SON-ee-eye)
decesareae (deh-seh-SAR-ay-ee)
Dendrobium (den-DROH-bee-um)
denshikoira (den-she-ko-EAR-a)
densiflorum (den-see-FLOR-um)
dollii (DOLL-ee-eye)
Dracula (DRAK-yew-la)
dressleri (DRESS-ler-eye)
dubia (DOOB-ee-a)
dungsii (DUNGS-ee-eye)
elatus (ee-LAY-tus)
Encyclia (en-SIK-lee-a)
Epidendrum (ep-ih-DEN-drum)
espondae (es-PON-dee)
esquipulensis (es-kwip-yew-LEN-sis)
Euonymus (yew-ON-ee-mus)
fucatum (few-KAY-tum)
Galearis (gal-ee-AIR-iss)
gaskelliana (gas-kell-ee-AY-na)
Gelephuense (gel-ef-yew-EN-sis)
Geodorum (jee-oh-DORE-um)
Gerlachia (ger-LAHK-ee-a)
Goodyera (good-YEAR-a)
gouldii (GOOLD-ee-eye)
Grammatophyllum (gram-mat-oh-FILL-um)
grandiflora (grand-ee-FLOR-a)
gratrixianum (gray-triks-ee-AY-num)
Guarianthe (gwar-ee-AN-thee)
Guaritonia (gwar-ee-TONE-ee-a)
helenae (HELL-en-ee)
hennisiana (hen-niss-ee-AY-na)
henryanum (hen-ree-AY-num)
herrenhusana (hair-en-hoos-AY-na)
imbricata (im-bree-KAY-ta)
inodora (in-OH-dore-a)
javieri (hahv-ee-AIR-ee)
jenmanii (jen-MAN-ee-eye)
johannis (joe-HAN-iss)
karen-christianae (kair-en-krist-ee-AN-ee)
kentuckiense (ken-tuk-ee-EN-see)
labellopapillata (lah-bell-loh-pap-ill-LAY-ta)
labiatum (lah-bee-AY-tum)
Lacaena (lak-EYE-na)
langlasseana (lang-lass-AY-na)
lawrenceae (law-RENS-ee)
lawrenceana (law-rens-AY-na)
leucophaea (loo-koh-FAY-a)
lueddemanniana (loo-deh-man-ee-AY-na)
Lycaste (lye-KAS-tee)
marmoreisense (mar-more-ees-EN-see)
martinezii (mar-tee-NEZ-ee-eye)
Masdevallia (mas-deh-VAHL-ee-a)
Maxillaria (maks-ill-AIR-ee-a)
maxima (MAKS-ih-ma)
Microstegium (mye-kroh-STEJ-ee-um)
Miltoniopsis (mil-tone-ee-OP-sis)
mossiae (MOSS-ee-eye)
Myrmecophila (mir-meh-KOF-il-la)
norashikiniana (nore-a-she-kin-ee-AY-na)
ochroleuca (oh-kroh-LOO-ka)
Odocoileus (oh-doh-KOYL-ee-us)
Odontoglossum (oh-don-toh-GLOS-sum)
odorata (oh-dore-AY-ta)
Oncidium (on-SID-ee-um)
orbiculatus (ore-bik-yew-LAY-tus)
Orchis (ORE-kiss)
oroana (ORE-oh-AY-na)
Pabstia (PAB-stee-a)
paludosa (pal-oo-DOH-sa)
Paphiopedilum (paff-ee-oh-PED-ih-lum)
parviflorum (par-vee-FLORE-um)
paulista (paw-LISS-ta)
peramoena (per-a-MEE-na)
percivaliana (per-sih-vahl-ee-AY-na)
Pholidota (foh-lih-DOH-ta)
pittieri (pit-tee-AIR-ee)
planifolia (plan-ih-FOL-ee-a)
Platanthera (plat-AN-ther-a)
pleurothallid (plur-oh-THAL-lid)
pompona (pom-POH-na)
psycodes (sye-KOH-deez)
pubescens (pew-BESS-senz)
pulchella (pull-KELL-a)
raabii (RAHB-ee-eye)
rebecae (reh-BEK-ee)
reichenbachiana (rye-ken-bahk-ee-AY-na)
Rhyncattleanthe (rin-kat-lee-AN-thee)
rivasii (ree-VAHS-ee-eye)
roezlii (ROHZ-lee-ee)
Rudolfiella (roo-dolf-ELL-a)
sanjappae (san-JAP-ee)
sarapiquensis (sair-a-peek-yew-EN-sis)
sativa (sah-TEE-va)
sinovillosum (sye-no-vill-OH-sum)
sotoarenasii (soh-toh-a-rain-AHS-ee-eye)
speciosa (spee-see-OH-sa)
speciosissima (spee-see-oh-SISS-ih-ma)
spectabilis (spek-TAB-il-liss)
Spiranthes (spy-RAN-thees)
Stanhopea (stan-HOPE-a although most often mispronounced stan-HOPE-ee-a)
Stanhopeastum (stan-hope-AS-tum)
Stanhopeinae (stan-hope-EE-nee)
stenochila (sten-oh-KYE-la)
Tadeastrum (tayd-AS-trum)
tahitensis (ta-heet-EN-sis)
tesselata (tes-sell-AY-ta)
Tolumnia (toh-LUM-nee-a)
tricornis (try-KORE-niss)
trilora (try-LORE-a)
utteridgei (ut-ter-RIJ-eye or ut-ter-RIJ-ee)
Vanda (VAN-da)
Vanilla (van-ILL-la)
vietenryanum (veet-en-ree-AY-num)
villosum (vil-LOH-sum)
vimineum (vih-MIN-ee-um)
violacea (vye-oh-LAY-see-a)
virginianus (vir-jin-ee-AY-nus)
viridis (VIR-ih-dis)
Volkertara (vol-kert-ARE-a)
wallisii (wal-LIS-ee-eye)
wilsoniana (will-son-ee-AY-na)
yanesha (YAN-esh-a)

Gifts of Note

In addition to vital support through membership dues, the American Orchid Society relies on grants, bequests and other gifts to support its programs. We would like to thank the following donors for gifts received between May 1, 2021 and May 31, 2021.

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In the list of donors published in the June 2021 issue, a donation in memory of Gloria Streeter and Joseph Woods was erroneously credited to the Southern Tier Orchid Society. This donation was made by the **South Bay Orchid Society**. We sincerely regret this unfortunate error and it has been corrected in the AOS' records. — *Ron McHatton*

Webinars-Coming Attractions!




When	**July 06, 2021** 8:30pm EDT Tuesday	**July 12, 2021** 8:30pm EDT Monday	**July 15, 2021** 8:30pm EDT Thursday	**August 05, 2021** 8:30pm EDT Thursday
Topic	Greenhouse Chat (Orchid Q&A) *Send in your Questions!*	Judges Forum: Botanical Awards, CBM, CBR, CHM, What's the Difference?	Cyrtochilums: Dancing Ladies of The High Andes	Greenhouse Chat (Orchid Q&A) *Send in your Questions!*
Presenter	**Ron McHatton** Chief Education and Science Officer	**Jean Allen-Ikeson** National Education Coordinator for Judging (presented w/ Peter Poot)	**Dr. Leslie Ee, ND** Associate Judge President of COC	**Ron McHatton** Chief Education and Science Officer

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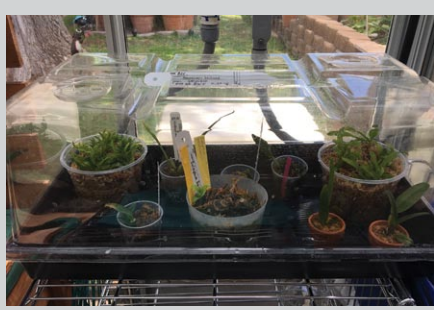
Vegetable Starter Trays for Orchid Seedlings

I USE SEEDLING starter trays with humidity domes in the fall and spring for my vegetables. It did not occur to me to use them in the greenhouse for my orchids but when I deflasked my first orchid seedlings a couple of months ago, I needed a place, protected from the elements, to put the fragile seedlings. I keep a small amount of water in the tray and the humidity dome on top with both vents open. It sits on a shelf in my Arizona greenhouse in the southeast corner. After the first month, my seedlings doubled in size (the seedlings are pictured in the larger containers). So, I decided to move a few of my more fragile orchid divisions into the tray to see if I could encourage strength and growth. After another month, I noticed new growth and better color on the leaves (the divisions are pictured in the smaller pots).

I feed them every other week with MSU high–potassium fertilizer. Once a week, I leave the lid off for several hours just to increase the airflow and prevent mold or fungi from growing. If you grow indoors, this would be a great place



for orchids needing higher humidity or those that are more fragile. We often get small divisions or purchase orchids in 2-inch (5-cm) pots because they are cheaper. This tray and dome will keep them protected as they grow. It fits well under a counter and you can even mount a grow light under the counter if you are growing in a more shaded environment. These seedling starter trays with humidity domes cost under $10. Be sure to get the heavy weight tray so that it will not collapse when moved.

— Cindy Jepsen (email: cindyjepsen@cox.net).

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THE HAZY, LAZY days of summer are here. It is a wonderful time of year, giving us later sunsets and more time to enjoy the things we love — family, friends, outdoor fun and of course, orchids. Well, these might be hazy days, but they certainly are not lazy days, especially where orchids are concerned. These are the times when we can take advantage of the longer days to work on our orchid collections — fertilizing, repotting, staking, treating… the list goes on.

Encyclias are perfect for this time of year. They will flourish in the summer months. *Prosthechea cochleata* thrives in temperatures in the low 80s F (26.7–28.9 C). It also likes higher humidity and being a species native to Florida, this is the exact environment for them. Other genera will do well in the summer also. Maybe the lazy part of summer is that we have more time and can take advantage of the time to work on our orchids.

Encyclia cordigera is another example of the perfect summer orchid. This beautiful species will thrive in temperatures reaching into the 90s F (>32.2 C) during the day and in the 60s F (15.6–20.7 C) at night. This is another orchid that is a friend to higher humidity, much like *Prosthechea cochleata*.

Starting in May, Florida lifted all COVID-19 restrictions, opening the doors for all activities. Florida joins many other states in this area, and it is a welcome relief. We learned a lot in 2020 about living and working through a pandemic, and it is clear most people are behaving responsibly. Getting vaccinated is a seamless process and life is leaning toward getting back to normal. For the AOS and the orchid world, we see that there are more orchid meetings, shows and judging events.

During the recent Virtual World Orchid Conference (WOC) in April, a marvelous event, the organizers engaged judges from around the world in a virtual judging. They really stepped up to the plate to bring amazing images and interactive technology to play that allowed judges to consider orchids for awards. The awards were not the same as those at a typical WOC, as judging can only be done in person, but the entire exercise was a marvel, and everyone spoke very highly of their efforts.

On a national front, Sergey Skoropad, has proven to be a real trailblazer in virtual judging programs for the AOS. When the world was in the grips of the pandemic, several forward-thinking individuals developed ideas to bring virtual judging to AOS judges who were hungry to judge. Understandably, the orchids poised for judging could not be officially awarded because judging cannot be done virtually. Nevertheless, it afforded students of judging an opportunity to hone their skills and maintain a practice for evaluating and considering orchids for awards.

Bob Fuchs with *Aeridovanda* Soroa Heartbreaker 'Crownfox Cupid' AM/AOS (*Aerides lawrenceae* × *Vanda* Gordon Dillon).

Sergey has maintained this program, even though in-person judging is back in many areas of the country, to this very day. He deserves a lot of credit for his work. He, himself, is in the judging program. He was elevated last year and is now a certified associate judge. He is committed to the study of orchids, being a member of the AOS for many, many years and married to another certified associate judge, Elena Skoropad. The AOS is very fortunate to have such a dedicated pair among its members.

As the Centennial draws closer, I am getting more excited. It is just a few months away now, and more and more is happening at a very rapid rate. The pinnacle of the Centennial Celebration is the gala, but in the days leading up to the gala, there is so much more happening. On the first day of the Members' Meeting, registrants will receive a commemorative goodie bag filled with samples, brochures and other items of interest. The evening of October 27 there will be a meet-and-greet to reconnect with other members and enjoy an evening among friends.

The entire week of the Members' Meeting, the East Everglades Orchid Society will be hosting a show and sale on the grounds of R.F. Orchids. There will be AOS judging there on Thursday. Judges who are registrants will enjoy complimentary transportation to and from the venue *and* lunch is included. As judges, we are excited to judge again, given the situation over the past year or so. At an event of this level, I am sure we will be seeing the best of the best.

The highlight on Friday will be the auction. Registrants will have preferred seating at the auction, allowing perhaps a better view of the auction items.

There will be many items from which to choose, and we will have a professional auctioneer, which should make the evening very lively and enjoyable! In addition to plants, there will also be fine jewelry and the original watercolor of the official AOS 100th Anniversary poster that will go up for auction. I cannot imagine anyone would want to miss this!

We have a group of speakers lined up for Saturday that are very knowledgeable and well-versed in orchid culture. They will be sharing their knowledge of orchids and orchid conservation with registrants. The talks will include the state of orchid conservation on a global scale, South Florida orchids, native orchid conservation projects and international orchid conservation projects. All these talks fall right in line with the goal of this Centennial Celebration. The proceeds from this event will go toward orchid conservation, something very important to me and the American Orchid Society. This is not something anyone can take lightly. What is happening with the eradication of orchids and their native habitats is simply a tragedy. With so many working toward conservation goals, we have seen some progress, but there is more work to be done.

As you can see, there are a great many perks to registering for the AOS Fall Members' Meeting. There is so much going on that week I am sure you will not want to miss. I urge you to register as soon as possible to enjoy the events and share in the camaraderie with fellow AOS members.

The evening of Saturday, October 30, the night of the gala, promises to be an evening befitting an organization so prestigious on such a momentous occasion. There will be live entertainment during the cocktail hour, a truly incredible dance show, a gourmet dinner and the final touch will be music and dancing. There will also be "living" trees and larger-than-life orchids escorting guests to their tables. With the American Orchid Society reaching such a milestone, this celebration will be amazing and will create cherished memories for many.

In the end, though, the true beneficiaries of all of this will be the orchids. Orchids are how all of this started, marched forward and will continue for generations to come. So do not delay…register today!

I hope to see many of you there.—*Robert Fuchs, President (email: bob@rforchids.com).*

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- Dr. Carlos E. Suárez Ponciano. Honorary President
- Ms.C. José Lázaro Bocourt Vigil, President of the Organizing Committee (bocourt@upr.edu.cu)
- Dr. Elaine González Hernández, Vice-president of the Organizing Committee (egh75@upr.edu.cu)
- Dr. Ernesto Mujica Benítez, Scientific Secretary of the Organizing Committee (emujica@upr.edu.cu)
- Ms. C. Esther Liliam Santa Cruz Cabrera, Executive Secretary of the Organizing Committee (lilyscruz@ecovida.cu)

For more information on the Conference, contact Dr. Lawrence W. Zettler (lwzettle@ic.edu) or Dr. Ernesto Mujica Benítez Scientific Secretary (emujica@upr.edu.cu).

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July: The Month of Patriots

By Thomas Mirenda

I AM WILLING to bet that every member of the American Orchid Society loves their country and believes they live in the best place on Earth. I know I do! While this does not mean we cannot be critical of our leaders and neighbors from time to time, our love of country stems muchly from our desire to see the places and peoples we love continue to flourish. It is unfortunate that our disagreements on a way forward can cause such dissention among people who really should be friends and allies. In microcosm, the world of orchids has its share of rivalries and conflicts, too. As I get older it becomes harder and harder to remember who is mad at whom at any given time. In fact, it changes rampantly over time. Might I suggest that none of that even matters?

Thomas Mirenda

What is it about the growing of plants that so engages us; so enamors us? Is not orchid horticulture something that transcends our petty differences and vanities? Personally, I am often jealous of the plants another grower might have but have come to see that their success is actually a triumph for us all, and especially for the orchids themselves. While many orchids can be difficult and challenging, the joy and satisfaction we get from figuring out and fulfilling their needs is something we should celebrate and share. Indeed, it is the knowledge of superb growers and horticulturists that will ensure the survival of orchids for generations. All of us orchid patriots need to put aside our petty differences and pledge allegiance to our plants.

Dendrobium Touch of Gold 'Fco Valentina' AM/AOS (*gouldii* × *johannis*) grown by Francisco Martinez Rivera. Antelope dendrobiums such as the one pictured here revel in the heat and humidity of the summer months.

THINGS HEATING UP? We all seem to get a little testier when the temperature outside is high. While some of us like heat better than others, for many of us, sizzling temperatures can be stressful and so we tend to stay indoors in the shade or air-conditioning where we are most comfortable. Orchids are similarly inclined and many genera (*Encyclia*, *Tolumnia*, *Myrmecophila*, most vandas, many dendrobiums, etc.) prefer intense heat during the growing season while others (*Miltoniopsis*, pleurothallids and cymbidiums) just languish. Personally, I was clearly a *Masdevallia* or *Dracula* in a former life and that is why I live in cool, wet place like Hilo.

SUSTAINABILITY Feeding and watering your plants during the growing season is important, though sometimes tricky. It might seem obvious that feeding plants that are in active growth, to build stronger canes on dendrobiums and epidendrums, and pseudobulbs on cattleyas, oncidiums and lycastes, is the right thing to do. But sometimes it can be a problem, particularly on extremely hot days. Even plants that love the heat should probably be kept out of direct sunlight on the hottest summer days. Best to find a place with dappled light and a cooling breeze for these until the dog days of summer have passed. Many find a cooling mist to be a way of keeping plants from burning up at midday. This can work, but you must be careful not to do this too often as it can sometimes influence stomata to open at midday, which can cause serious desiccation. Daytime misting on the hottest days was the secret of my success growing and blooming cymbidiums years ago. Just beware of overwatering by excessive misting. Plants should always dry off by sunset.

ALLIES Though we may not have been able to hang with many of our orchid buddies this past year, it seems that as more and more of us are getting vaccinated (a patriotic act) we can begin to feel safer about gatherings, travel and collaboration. As great as it was to stay connected by Zoom, there is no comparison to seeing your friends and their collections in person. So much we can learn from each other. This year many of us focused on our insular worlds and, I suspect, had many breakthroughs and successes. Now is the time to share these achievements. Although a little friendly competition is not a bad thing, sharing and cheering each other's victories is the best way to bond and learn. We all crave recognition and success. Sharing a division of your plants with an ally is also good practice. Sometimes the greatest

of plants end up in orchid heaven for no apparent reason. Sharing those special plants with your friends is like having insurance that those truly special and remarkable plants survive a heatwave, a freeze or infestation.

ROOM FOR US ALL In the end, we need to come together and help each other win; yes, even those we compete against and might be jealous of. The world is vast and there is room for everyone to succeed. When I look at the awards in the back of each issue of *Orchids* magazine, there are lots of plants I wish I owned and grew to such perfection. But none of us can do it all. Let us revel in each other's achievements and enjoy the beauty a cohesive orchid world creates. That is the true meaning of glory. Orchid patriots unite!

— *Tom Mirenda has been working professionally with orchids for over three decades and is the past chair of the AOS Conservation Committee. He is an AOS accredited judge in the Hawaii Center (email: biophiliak@gmail.com).*

ORCHIATA, KIWI, REXIUS AN OTHER BARK MATERIALS

QUESTION

What are the differences between Orchiata and Kiwi brand orchid bark?

ANSWER

Both Orchiata and Kiwi bark are made from the bark of *pinus radiata* trees more commonly known as Monterey or insignis pine. This differs from most other bark-based media such as Rexius bark which come from fir trees. The specific differences between Orchiata and Kiwi products and their performance are proprietary to the processes by which they are made. According to the manufacturer of Orchiata bark, the product claims include:

- pH balanced to eliminate the natural acidity of bark media.
- Contains beneficial micro-organisms for protection against plant pathogens.
- Does not accumulate salts reducing the need for flushing.
- Aged, not composted, allowing water and nutrients to be held while retaining hard structure.
- Does not break down minimizing the need for repotting.

Rexius bark comes in three grades — fine, medium and coarse while Orchiata and Kiwi bark are produced in five different grades potentially allowing for better fine-tuning of watering frequency.

The real "claim to fame" for these pine bark products is that they are reported to be more stable than typical fir bark media. This comes from the way the products are made leading to apparently slower decomposition in the pot. Because these products last longer, they apparently change their water holding characteristics less over time leading to less repotting; always a good thing for both you and the plant!

That said, they are different and they behave differently. Those who use Orchiata or Kiwi swear by that specific brand and dislike the other and growers who use pine bark media (either brand) often dislike the performance fir bark. All these products break down at different rates that are affected by the users entire growing environment resulting in changes in the pH profile of the potting material over time and I think it is this pH change that influences whether a particular grower prefers Orchiata, Kiwi or neither of them. In essence, the answer to the question "What can you grow orchids in?" is almost anything as long as you match it to your other growing conditions. I know many who swear by sphagnum moss and as many who believe sphagnum to be the worst thing perpetrated on the orchid growing hobby. It does a great job in warm climates under cover and can be abysmal in cold, wet climates where it never dries out. The best approach to any question about potting medium, is to try it if you are interested in it but do so with a plant or two and give it time. Few orchids will survive for long being repotted into a new type of potting medium every six months to a year.

QUESTION

I see that bark media come in multiple sizes. Do these require different watering cycles?

ANSWER

Finely chopped bark without amendments does stay wetter longer just as coarsely chopped bark may allow water to move more freely through it. This is because there are more spaces between fine bark particles to hold water than there are with coarse chunks. One ideally wants a medium which dries out in 3–5 days; a shorter time period makes it difficult to water often enough and a longer period often reduces gas exchange in the medium, although for every "rule" there are myriad exceptions so those growers who use a medium that has to be watered every day aren't wrong. They have just adapted their medium choice to the rest of their growing conditions and their personal habits.

As a general rule, use finer material for small pots and orchids with fine root systems, coarse material for large pots and medium grades for intermediate sized pots. With careful choice of potting medium grade and amendments, it is possible to have a wide range of plants that can be watered more or less on the same schedule.

QUESTION

Do these bark materials hold fertilizer?

ANSWER

If you mean holding on to fertilizer ions in the way that sphagnum moss does making it difficult to leach effectively, no. In this respect, I know of no definitive data that shows one bark type is worse than another when it comes to fertilizer build-up. The pH of the potting medium can, however, affect the way that fertilizers react to the potting medium so it is important to monitor the effects of your fertilizer program over time.

QUESTION

Can you add amendments such as sphagnum moss to pine and fir bark media and would you consider adding sphagnum moss if you had an orchid that previously grew well in that medium.

ANSWER

Pine and fir bark media can certainly be amended and many growers purchase such mixes or blend their own to get what they consider the "perfect" medium for a particular genus. Added sphagnum moss will increase the water-holding capacity of the mix and also supply additional organic material which improves the buffering capacity of the medium. Perlite will increase the water holding capacity and simultaneously improve the drainage through the material and, the list goes on. Keep in mind that sphagnum moss is very efficient at taking up fertilizer salts so medium blends that are high in moss content should be fertilized at lower concentration that less moss-rich media.

CYMBIDIUM ROOTS

QUESTION

I am trying to repot this cymbidium. I had to cut the pot to get it out of the pot. Then I tried soaking it in water to loosen the roots. Slightly looser but not

These questions were part of one or more recent monthly webinar Q&As and compiled by Larry Sexton for inclusion here. Each month, a Q&A webinar is held during the first two weeks of the month. To view recorded Greenhouse Chats (Q&A webinars) or register for a future one, see https://www. aos.org/orchids/webinars.aspx. Send questions to greenhousechat@aos.org — *Ron McHatton, AOS Chief Education and Science Officer.*

enough to move the roots. They are stuck together. I am afraid of cutting the good roots. How do I free the roots? I cannot get to the middle to get rid of old media or cut old growth.

ANSWER

If you do not want to cut into the root mass or break them apart, the easiest solution is to use water to do it. Get a nozzle attachment for a hose that includes a "jet" setting, turn the water on full force and, using the jet of water, begin to work in an around the roots from several inches away. It make take a bit of time but you can remove much of the old potting medium that way. This can also be used for plants in a basket.

That said, cymbidiums are really strong plants and produce, as you've seen, a copious root system. This makes them much less sensitive to root disturbance and you can simply cut through the roots with a knife. When I lived in cymbidium country, everyone had a machete.

There's an excellent webinar presented by George Hatfield, Hatfield Orchids, on growing cymbidiums that you might want to watch. You can find it at https://www.aos.org/All-About-Orchids/Webinars/member-only/Growing-Cymbidiums.aspx

DIATOMACEOUS EARTH

QUESTION

I have read that diatomaceous earth discourages ants and slugs. As I put most of my orchids outside for the summer, would it hurt the plants if I were to sprinkle some on the surface of the medium in order to thwart some of these pests?

ANSWER

Diatomaceous earth works because the dry particles act like tiny razors and grinders and as they run against the insect's exoskeleton, wear through it dehydrating the insect (in the case of slugs, it just tears up the skin of the foot leaving the slug to dehydrate). Unfortunately because of this, it isn't really effective in an outdoor environment or on the potting mix surface where it gets repeatedly wet. To help control ants, you can make a 50/50 mixture of powdered sugar and baking soda and put that where the ants visit but protected so it can't get wet. The ants eat the sugar and in the process also eat some of the baking soda. The baking soda reacts with the insect's digestive system and kills them. One of the best "green" controls for slugs is a slug bait that uses iron phosphate such as Garden Safe Slug & Snail bait. Iron is toxic to slugs but they cannot resist it and the iron phosphate form used is not soluble so it does not dissolve when it is wet. The snails and slugs eat it and the iron disrupts their central nervous system. It takes a couple of days but they quit feeding followed by death.

CORRIGENDA

In the May Q&A section, an error was made regarding the mouthparts of thrips insects. It is true that the mouthparts of thrips are oddly shaped however, they do not piece tissue and suck out the plants juices. Rather, the mouthparts are used to rasp the plant tissue much like sandpapering a surface.

Also, the caption to the first image indicates the red arrow points to an adult thrip. Although the lip is covered in thrips visible on microscopic examination, the red arrow actually points to frass — the excrement of thrips. The presence of frass on flowers or leaves gives an indication of the severity of the thrips infestation.

We thank our attentive members who brought these issues to our attention.

ARE YOU REALLY DOING THAT?

IN THIS PIECE, the question is intended to make one question if "what they are doing" really has the outcome you are expecting. In the world of orchid growing, evaluating our actions can lead to a great many examples where the answer is a firm "No."

A great example is disinfecting ex-flask seedlings before potting them up. Why? In-vitro culture is inherently sterile, so application of a fungicide or disinfectant treats nothing, imparts no immunity going forward and may negatively affect the plants. If you want to give those seedlings every opportunity, consider the application of a good probiotic like Quantum-Total instead, which can reduce or prevent future infections.

Another example is misting orchid leaves to boost the humidity. Humidity, by definition, is water vapor in the air, not wet leaves. Water on leaves does not evaporate readily, orchids are poor at foliar absorption of water, and pockets of water sitting on the plant make great little incubators for bacteria and fungi

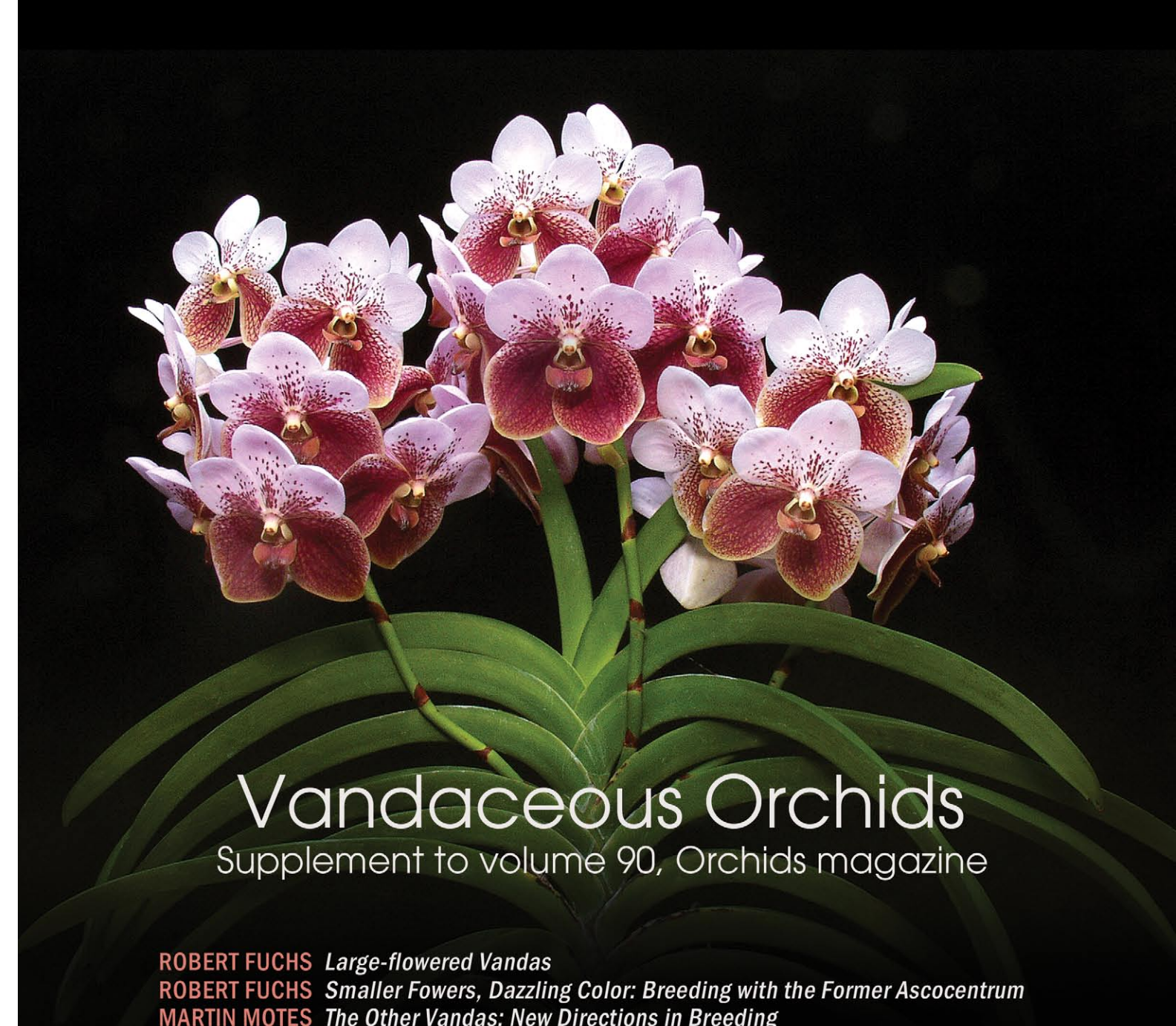
A third is the removal of kiekis from some plants to conserve their resources. The plant has already expended some resources growing what it has, so removing them and throwing them away is a waste, right from the start. Plus, a keiki photosynthesizes, incorporates nutrients, and produces fuel, storing them and water that is shared with the mother plant it is attached to. Removing them may prevent the further commitment of resources, but it also takes away the plants' ability to produce them at a greater rate.

Another common mistake is the use of the wrong pesticide. There is no use applying an insecticide to a mite infestation, for example. Likewise, the use of a disinfectant is of no value when dealing with insects or mites. Match the weapon to the prey.

Those are examples of actions that are more a waste of time and maybe money than anything else, but there is a common one that is potentially quite harmful — incomplete pesticide treatment. It is common for folks who have identified a pest to treat their plants once and assume they have gotten them all, especially when using systemic or translaminar pesticides. Unfortunately, that is not the case at all.

First, we must recognize that pest infestations likely involve eggs, larvae and adults, and that most pesticides only kill adults of the targeted species. When we treat a plant, it is likely that our pesticide will not kill 100% of the adults, allowing the survivors to reproduce and carry on the infestation, adding to the other eggs and immature "critters" that were not affected. Considering the rapid reproduction and maturation rates of most orchid pests, it is usually a good idea to perform complete treatments a total of three times at one-week intervals, greatly increasing the odds of eradicating the entire infestation.

So, the recommendation is that we had better take a moment to evaluate our actions before doing something, rather than relying on "collective knowledge" ("myths" or "old wives' tales") at face value. — *Ray Barkalow (email: raybark@firstrays.com)*



Vandaceous Orchids

Supplement to volume 90, Orchids magazine

ROBERT FUCHS *Large-flowered Vandas*
ROBERT FUCHS *Smaller Fowers, Dazzling Color: Breeding with the Former Ascocentrum*
MARTIN MOTES *The Other Vandas: New Directions in Breeding*
JIM COOTES *Philippine Renanthera Species*
PATRICK VUURMAN *Rhynchostylis and its Hybrids*
GARY YONG GEE *Aerides*
STIG DALSTÖM *Cool-growing Vandaceous Orchids of Bhutan*
KEN JACOBSEN *Growing Award-winning Sarcochilus*
JASON FISCHER *Influenced by the Wind Orchids: Hybrids of the Former Neofinetia*
SYNEA TAN *Growing Award Winning Vandas in My Basement*

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The Usual Suspects

Common Orchid Pests

Text by Sue Bottom/Photographs by Terry Bottom

CERTAIN PLANTS JUST seem to be prone to attack by certain pests. If you grow cattleyas, you battle scale infestations. Grammatophyllums are mite magnets. This article highlights the most common pests and their favorite orchids, along with some tips for eliminating them.

SCALE Every cattleya grower must be on the lookout for scale, particularly Boisduval scale. Mature males are cottony white masses, and the mature females lay their eggs under whitish circular shields. The crawlers are the nymph state that emerge from under the shield until they find their new home.

The females love to find hiding places so they can attach themselves and suck the sap and vitality out of the plant. The leaf axil and base of the pseudobulb are favorite hiding places. They can grow and multiply unseen under the papery sheaths until they do such damage that the tissue becomes chlorotic and ultimately necrotic and dies. They can ruin the developing eyes on new growths.

Vigilance is critical to catching the problem early. If you see yellowing on leaves and pseudobulbs, start investigating. Pull down the papery sheaths on your cattleya pseudobulbs and look underneath. Look at the undersides of leaves with chlorotic spotting. If you find scale, prepare for war.

If you have just a few plants, you can water-jet away the majority of the scale with a hose end sprayer set on flat. Then get to work with some isopropyl alcohol and a cotton swab to wipe away what remains. Some growers mix up a home brew concoction of one part isopropyl alcohol, one part Formula 409 or Fantastik cleaning solution and two parts water, and spray that on their orchids. There are also some pesticides available at nurseries and big box stores that can be used, such as malathion or one of the products containing the active ingredient imidacloprid. Imidacloprid products can be applied as a drench, poured through the pot with your fertilizer, where it is absorbed through the roots to protect the plant from the inside out. All of these techniques will require reapplication several times at two-week intervals.


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If you grow many cattleyas and really want to eradicate scale from your collection, invest in the broad-spectrum pesticide Safari and the insect growth regulator Distance. Safari will kill the live adult scale and Distance will prevent any juveniles that survive the Safari from maturing. You may have to reapply this combo at six-month intervals, but your cattleyas will thank you with a profusion of blooms.

Of course, there are other types of scale, including the soft brown scale that often appears on phalaenopsis and phalaenopsis flowers, or the armored scale that can appear on different varieties of orchids. If you see an unusual, raised spot on your orchids, try rubbing it off with a soft cloth or cotton swab. If you confirm that it is one of the scale insects, your treatment options are the same as for the troublesome Boisduval scale on cattleyas.

MEALYBUGS These are close relatives of scale insects that seem to gravitate to hiding places on phalaenopsis and paphiopedilums. They can be found at the junction of the leaf and stem, crawling up the inflorescence, on flowers and even on the roots. They are very difficult to eradicate once they are in your growing area. If they have infested the roots, remove the plant from the pot, spray the roots and repot in fresh medium. The treatment options are basically the same as scale. You will have the greatest success with systemic products that protect the plant from the inside out, in that mealybugs find obscure crevices difficult to reach with topical pesticides.

Mealybugs will attack other genera, not to mention many of your landscape plants. During the growing season, mealybugs seem to come into the greenhouse from the outside environment and settle on the tender new cattleya growths.

MITES AND MITE MAGNETS Mites seem to gravitate to certain types of orchids such as grammatophyllums, dendrobiums, catasetums and many of the thin-leaved orchids. Thin or soft-leaved orchids are more susceptible to mite damage than those with thicker leaves, but no genus is immune. There are several kinds of mites, the most common being red spider mites that typically feed on the underside of the leaves. A hand lens may be needed to see the mites as small, red to brown pests scurrying around on leaf undersurfaces. The upper surface of a damaged leaf may have a silvery sheen that eventually becomes sunken and turns brown. Leaves may be streaked, stippled or spotted because of a lack of chlorophyll. A diagnostic test is rubbing a white nasal tissue along the leaf undersides, and finding reddish brown splotches from the mites.

Mites are not insects, they are members of the arachnid (spider) family, so most insecticides are ineffective. There are home cures, typically involving some combination of water, dish soap and isopropyl alcohol or water and vegetable or light summer oil. Effective miticides for ornamental use include those containing the active ingredients abamectin (Avid), bifenthrin (Talstar), dienochlor (Pentac), fenbutatin-oxide (Vendex) and fluvalinate (Mavrik).

There are also the less common flat or false spider mites in the Tenuipalpidae family that often feed on the upper surfaces of leaves, creating a pockmarked appearance from empty and collapsed leaf cells. Flat mite feeding on thin leaves, especially the underside, is similar to the stippling caused by spider mites, but there is no webbing. Broad mites in the Tarsonemidae are microscopic in


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[1] The area in and under the leaf axil is a favorite hiding place.
[2] Once you remove the papery sheath hiding the scale, the damage becomes obvious.
[3] Scale on the base of a cattleya pseudobulb.
[4] If you see chlorotic spotting on the upper leaf surface, your first reaction should be to turn the leaf over.
[5] You can see the scale on the leaf undersides, at the exact location of the chlorotic spotting on the upper surfaces.
[6] Mealybug crawling on a paphiopedilum.
[7] Mealybugs dine on roots too, so beware!
[8] Mealybugs feeding on a tender psychopsis flower.
[9] Red spider mites are much easier to see if you are looking through a microscope.
[10] Characteristic stippling on a dendrobium leaf lower surface from red spider mite.
[11] Flat mites leave pockmarked leaves on phalaenopsis and oncidium orchids.

size and the initial symptom is chlorotic discoloration. These types of mites seem to gravitate to phalaenopsis. They are virtually impossible to see and only certain miticides are effective against them.

DEMON THRIPS Unlike the other pests that seem to have favorite host plants, thrips are indiscriminate feeders, attracted to the tender new leaves, buds and flowers of your orchids as well as landscape plants such gardenias, citrus, roses, vegetables and flowering plants. Infested buds can become dried and blast; flowers can be deformed, exhibiting burnt or water-soaked spots; leaves can be stippled and roots girdled.

Thrips are the most difficult to control of all the pests because they can fly from plant to plant and hide within flower parts, making them hard to see or reach with pesticides. Orchids and landscape plants can be sprayed with pesticides such as Orthene or malathion and the stronger chemicals such as Talstar, Avid, or one of the imidacloprid products, rotating products and applying them in accordance with label instructions. Conserve is another alternative that can be sprayed directly on the flowers, as can Orthene. If you are prone to thrips, you can spray just the buds and flowers twice a week using a pump sprayer or spray bottle. In my greenhouse, an Orthene drench at the label rate suppresses thrips for about six weeks.

Except possibly for thrips, preventative spraying for your typical orchid pests is unnecessary. Learn to recognize the signs of damage they cause to your plants. Keep a loupe or magnifier handy in your growing area. If you see something that does not look right, inspect the plant, looking at both sides of the leaf. If you find a problem, treat it quickly using your poison of choice, and never forget to protect yourself from the chemicals you keep in your arsenal.

— Sue Bottom started growing orchids in Houston in the mid-1990s after her husband Terry built her first greenhouse. They settled into St. Augustine, Florida, Sue with her orchids and Terry with his camera and are active in the St. Augustine Orchid Society, maintaining the Society's website and publishing its monthly newsletter. Sue is also a member of the AOS Editorial Board (email: sbottom15@gmail.com).


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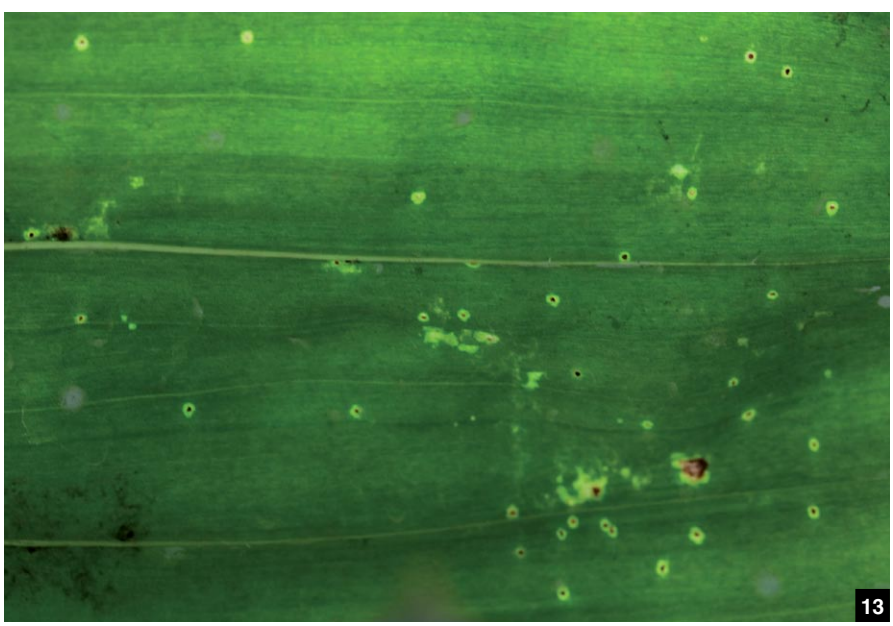
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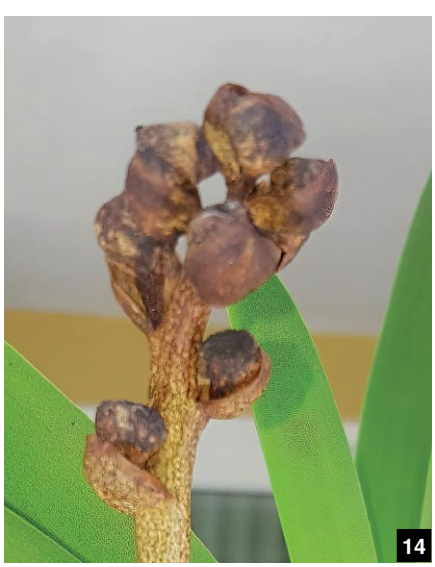
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[12] It is easier to see the thrips damage where the leaf is burned than the many thrips crawling around on this flower.

[13] The stippling with a bull's eye in the center is characteristic of thrips damage on this tender young catasetum leaf.

[14] Thrips have been feeding on these flower buds, ruining them before they have a chance to open.

The 2021 Fall Members Meeting will be held in conjunction with the AOS Centennial Celebration.

We are looking forward to welcoming all AOS Members and Friends to our first "in-person" meeting since 2019! Help us celebrate 100 years of Orchids in Coral Gables, Florida this October.

All manner of activities are planned for the Members Meeting - AOS Judging, Orchid Conservation speakers, a Live Auction, and more!

To Commemorate our Centennial, a special Celebration Gala* will be held on Saturday, October 30th at the historic Biltmore Hotel.

Your Registration fee includes:

- Goodie bag
- Exclusive Meet & Greet Reception - Wednesday, October 27th @ 6:00 PM
- Complimentary transportation to and from East Everglades OS show (including box lunch) on Thursday, October 28th
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*Gala tickets sold separately

Native Orchid Conservation at

By Peter J. Zale

EARLY IN THE development of Longwood Gardens, founder Pierre S. du Pont and his wife, Alice B. du Pont, developed an interest in orchids that inspired them to become founding members of the American Orchid Society. Although most know the orchid collection at Longwood for the tropical taxa rotating through the conservatory orchid display room, a recent effort, known as the Hagley Project, resulted in a compilation of all the invoices, notes and letters detailing all the plant purchases, trades and gifts that the du Ponts ever received, and revealed an interesting piece of information about the orchid savvy of the founders. One of the first orchids they purchased was the locally abundant, well-known native showy orchis *Galearis spectabilis*, indicating an early interest not only in the tropical orchids known from the conservatory, but also in the orchids found in adjacent Chester County, Pennsylvania, countryside. To build upon the du Pont's orchid legacy and initial interest in native orchids, a native orchid conservation program was initiated in the Horticulture Research and Conservation division at Longwood Gardens in 2015.

Native orchids represent some of the most charismatic, intriguing, popular and perplexing members of the US native flora. Historically, Pennsylvania has circa 59 taxa of orchids, nearly half of which are of conservation concern, and at least two species are extirpated. Many genera contain ornamental species, yet successful seed propagation and cultivation techniques have yet to be established. This hampers both augmentation and restoration of natural orchid populations, collections development at public gardens and offerings of sustainably propagated plants for sale to the public. In recognition of the need for conservation horticulture research on native orchids, the research team at Longwood Gardens has developed a multidisciplinary conservation program with focuses on fieldwork to assess orchid species population viability, sustainable seed collection, in vitro seed propagation, cultivation and ex situ collections development of native orchids. We are seeking to answer fundamental research questions about seed germination and seedling growth, build a collection of known-provenance native orchids to supplement and increase the conservation value of our world-renowned orchid collection, and engage in restoration efforts by providing seedlings back to the partners managing and restoring natural lands where the original seed was collected. We are working broadly within multiple


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[1] The author and a colleague planting *Goodyera tesselata* seedlings into an experimental population augmentation planting.

[2] *Goodyera tesselata* in Tioga County, Pennsylvania.

[3] Developing seedlings of *Goodyera tesselata* grown from seeds collected in Huntington County, Pennsylvania.

Longwood Gardens

genera, including *Cypripedium*, *Goodyera*, *Platanthera*, *Spiranthes* and more. To help achieve these goals, we are collaborating with multiple institutions with expertise regarding various aspects of native orchid biology, horticulture and management, including the Pennsylvania Department of Conservation and Natural Resources Bureau of Forestry, the Pennsylvania Natural Heritage Program, the US Forest Service, the Brandywine Conservancy, The Nature Conservancy, the North American Orchid Conservation Center and many amateur and professional naturalists with an interest in orchids. Initially, the project started with efforts to identify locally rare orchid species with ornamental value and propagate them from seed but has since grown into multiple genus-level initiatives to fully understand the conservation horticulture of dozens of native orchids species found locally, as well as across the country and the world. This article will broadly discuss the orchid genera and categories where most of the research is happening, the work performed thus far including notable successes, and future program directions. Future articles will delve into more in-depth reviews of each project detailing the fieldwork, research and outcomes of major projects.

The initial concept for the program was inspired by the desire to propagate one of the last remaining populations of the large yellow lady's slipper (*Cypripedium parviflorum* var. *pubescens*) in Chester County, Pennsylvania, near Longwood Gardens. Although it can be locally abundant in Pennsylvania and other places through its range (G5/S4), it is still considered a threatened species in Pennsylvania and herbarium records indicate that many historic populations, especially in southeastern Pennsylvania, have been extirpated in the last 80–100 years due to habitat loss. Because of its large stature, showy flowers and broad distribution it is familiar to many native plant enthusiasts and serves as an iconic species for native orchid conservation (Case 1984, Stone 1945). Despite popularity with native plant enthusiasts, this species remains rare in public garden collections, and the origin of these

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[4] Colleagues from the Pennsylvania DCNR and Natural Heritage program measuring transects for a *Goodyera tesselata* population augmentation study.

[5] A pale-flowered *Platanthera grandiflora* in Schuykill County, Pennsylvania.

[6] *Cypripedium parviflorum* var. *pubescens* in Chester County, Pennsylvania.

collections is mostly unknown, thus undermining the conservation value of current collections (Krupnick et al. 2014). They also make ideal subjects for ex situ conservation since, in the right growing conditions, they can be extremely long-lived; a single clone of *Cyp. parviflorum* var. *pubescens* 1963-1258 has survived and flourished at Longwood Gardens for nearly 60 years and one study of the European *Cypripedium calceolus* estimated generation times to be 210 to 380 years (Nicolè et al. 2005)! With this in mind, a small population on local conservancy property not far from Longwood Gardens provided a unique opportunity to propagate a local genotype of this species that would be ideal for establishing an ex situ population at Longwood Gardens. Only a small number of individuals occur here (approximately 15 genets and 30 flowering stems yearly) and the habitat is severely threatened by invasive plant species, including winged burning bush (*Euonymus alatus*), garlic mustard (*Alliaria sativa*) and Asian bittersweet (*Celastrus orbiculatus*). Additionally, white-tailed deer (*Odocoileus virginianus*) pressure in the area is exceptionally high and represents another potential hurdle to long-term population persistence. Propagation efforts began in 2016, when we began hand-pollinating flowers to ensure seed production, since anecdotal

information from the preserve managers indicated that seed formation in previous years was rare.

Efficient *Cypripedium* propagation protocols have been developed and streamlined in the last 25 years; both species and hybrids are now readily available as sustainably propagated. However, propagation success may vary; genotypes or species and may still require tweaking of established protocols, including *Cyp*. *parviflorum* var. *pubescens* (Steele 1996). While most published research refers to propagating mature seeds, using "green capsule" sowing of immature seeds has been highly successful in promoting germination of many *Cypripedium* species, and in some cases, is the only method in which certain species can be successfully propagated from seed (Malmgren 2016). Our research has shown that harvesting immature seed 45–50 days after pollination is ideal for achieving high germination rates in *Cyp*. *parviflorum* var. *pubescens*, and other native species, including *Cypripedium acaule*, *Cypripedium candidum*, *Cypripedium kentuckiense* and various taxa from the *Cyp*. *parviflorum* complex. We have now propagated hundreds of seedlings from the local population, in addition to a larger population subsequently found in northern Chester County. Seedlings from these efforts have been used to create ex situ collections at the Longwood Gardens Research Nursery and started to flower in 2020. Ultimately these will make their way into the gardens for display and education purposes and be used to augment the seed source populations. Using information from the initial efforts with *Cyp. parviflorum* var. *pubescens*, we have greatly expanded efforts to propagate not only native *Cypripedium* species from across the United States, but also Asian species, and have even made some of our own hybrids.

In October 2015, work with the genus *Spiranthes* began when we were contacted by state ecologists who expressed concern over populations of the state-endangered *Spiranthes casei* var. *casei*, Case's ladies' tresses (G4/S1, PE) that had been destroyed during fracking mitigation. We collected seeds in November 2015 and set out to learn how to propagate the species for augmentation of extant populations.

Information regarding germination of *Spiranthes* seeds is variable and incomplete; seed germination of *Spir. casei*, and many other eastern North American species, has not been reported

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[7] *Platanthera blephariglottis* and *Platanthera ciliaris* growing side by side at Valmont Bog.

[8] *Platanthera peramoena* in New Castle County, Delaware. Note the abundance of Japanese stilt grass in the background.

[9] *Spiranthes arcisepala* on the border of Elk and McKean Counties, Pennsylvania.

Long-time friend and mentor Dr. Warren Stoutamire mentioned that *Spiranthes* species have "fragile" seed coats that are rapidly denatured by chemicals traditionally used for surface sterilization of orchid seeds and suggested using sterilization times less than the standard 10 minutes. This is also supported by Zettler and colleagues (Zettler and McInnis 1993, Zettler et al. 1995), who indicated seed sterilization–scarification times of one to three minutes resulted in successful germination of *Spiranthes cernua* and *Spiranthes odorata*. At the beginning of our experiments, we surface-sterilized for 10 and three minutes using a 9:1 v/v H_2O:Chlorox solution. Embryos in the 10-minute treatment were translucent and dead, whereas those sterilized for three minutes were opaque, white and viable. Seeds from this treatment germinated well on three different media (Phytotech P723, M551, and Knudson C) after four to six weeks. The highest germination and most rapid seedling development occurred on Phytotech Labs P723 medium. Preliminary results suggested that seed sterilization–scarification time is the critical component for successful germination of *Spiranthes* seeds, but there were still questions about the best methods for growing the seedlings.

There is little published information about the optimal conditions for the continued development of seedlings and steps for acclimatizing them to greenhouse and nursery conditions. To test for optimal conditions, 400 individual seedlings were transferred to individual test tubes and a photoperiod experiment was established in which seedlings were given constant (24-hour) light, 18 hours light:6 hours dark, and total darkness. Unlike other native orchids such as cypripediums, which need to be incubated in total darkness, results indicated that light is essential for continued, healthy development of *Spiranthes* seedlings. Seedlings were harvested after 20 weeks and the fresh weight, number of leaves, number of roots, mean root length, etc. were recorded. Although survival and growth rates were high for all treatments, the seedlings in the lighted treatments

produced the largest seedlings. Seedlings were deflasked and used in a greenhouse acclimatization and substrate adaptability study which indicated that the seedlings are readily transferred to ex vitro conditions and are adaptable to a variety of commercially available substrates. Most seedlings flowered 18 months after sowing and provided the biggest surprise of the entire experiment — they were *Spiranthes ochroleuca*, not *Spir. casei*! In September 2016, I visited these populations again while they were flowering and realized that the situation in the field was more complex than originally known. This prompted botanists across the state of Pennsylvania to take closer stock of the *Spiranthes* in their regions. Further observation and inspection of the plants initially thought to be *Spir. casei* were in fact sympatric populations of *Spir. casei* (which is much rarer in Pennsylvania than previously thought), *Spir. ochroleuca* and another confusing taxon resembling the recently described *Spiranthes arcisepala*. It turns out that the already taxonomically difficult genus is even more complex than previously thought and provides a good lesson on the importance of thorough fieldwork as a prerequisite for conservation horticulture.

The majority of our research efforts have focused on the genus *Platanthera*. It is the largest genus of orchids native to North America and includes many well-known species of conservation concern with significant ornamental value. Of all the species observed during fieldwork, platantheras are especially adversely affected by invasive species (primarily Japanese stilt grass [*Microstegium vimineum*]) and deer browsing, suggesting that more knowledge about the conservation horticulture of the genus is urgently needed. Species such as *Platanthera ciliaris* and *Platanthera leucophaea* have received a considerable amount of attention regarding seed propagation research, but most species have not been reported on, and at least anecdotally, some species, such as *Platanthera peramoena* and its allies are considered extremely difficult to propagate from mature seeds. Given this and the large number of species found in Pennsylvania and the mid-Atlantic, *Platanthera* is an ideal candidate for research that characterizes horticultural needs of the species.

Platanthera research started at the suggestion of Pennsylvania native orchid enthusiast Bob Sprague, who is a conservation steward of the well-known Valmont Bog in Luzerne County, Pennsylvania. Situated in the middle of an industrial park and bisected by power line right-of-ways, Valmont Bog is unique in being one of the last of formerly more common seepage bogs found in the anthracite regions of northeastern Pennsylvania. Most were destroyed to harvest anthracite. Valmont Bog is rich in orchid species, but is noteworthy for its populations of *Platanthera blephariglottis*, *Platanthera ciliaris* and their hybrid, *Platanthera* × *bicolor*. This population of *P.* × *bicolor* represents one of the rarest orchid occurrences in the state yet receives no protection status because of its hybrid origin. Not only do there appear to be F_1 hybrids in this population, but the range of flower colors and patterns suggest introgression from parental taxa and other hybrids, underscoring the rarity and unique nature of Valmont Bog. At least one study of terrestrial orchid hybrid zones of *Orchis* species indicated that they may be important in the evolution of new species and should be of high conservation concern (Cozzolini et al 2006). This highlights the potential scientific importance of the hybrid *Platanthera* in Valmont Bog, and suggests that state botanical agencies should prioritize the conservation status of this unique population (Catling 2013).

From a horticultural perspective, the considerable beauty of these plants lends them to display purposes at a time of year when many greenhouse orchids in the Longwood Gardens collection are not flowering (July–August). Since 2015, we have had permission to not only collect seeds from this site, but also to support several experiments and studies such as yearly inventorying of *Platanthera* hybrids, controlled pollination, development of an orchid fungal bank, asymbiotic and symbiotic orchid *Platanthera* seed germination experiments and in situ fungus baiting using orchid seeds.

Like other *Platanthera*, the purple fringeless orchid, *Platanthera peramoena*, has become increasingly rare in Pennsylvania. In addition to conservation concerns, it also has considerable ornamental potential and preliminary information suggests that it is easy to grow in a bog garden setting (Rasmussen 1995, Tullock 2005). Anecdotal information has indicated that *P. peramoena* is difficult to germinate, and published reports of successful symbiotic or asymbiotic germination do not exist in the scientific literature. We obtained permission to collect seeds from the last known population of *P. peramoena* in New Castle County, Delaware (G5/S1). This species is also rare in Pennsylvania

PETER J. ZALE, PhD

MOST EVERY PLANT lover living in the Mid-Atlantic region has found their way to the incredible Longwood Gardens. They are blessed with plentiful resources and a mission to create a resplendent spectacle through ornamental horticulture. The gardens, and especially the conservatory, never fail to impress anyone and everyone who discovers them. The fact that the Gardens have a wonderfully curated and cultivated orchid collection adds to the appeal for many of us. As Longwood Gardens is also a training ground for horticulture professionals, many of their alumni hold leadership positions at botanic gardens across our continent and world, influencing trends in horticulture and gardening for us all. During my last year at the Smithsonian, when the North American Orchid Conservation Center (NAOCC) was getting its start, I was very pleased to meet Dr. Peter Zale, who had just been hired as Longwood's Associate Director for Conservation, Plant Breeding and Collections.

I dare say Longwood hit the jackpot with Dr. Zale, as he demonstrates knowledge, passion and skill: a trifecta of qualities that should be, but are not always, present in every plant devotee. I knew Peter would be a great addition to Longwood and to the NAOCC when he disclosed that rather than filled with boring documents, all the file cabinets in his new office were filled with seedlings of plants that needed darkness to germinate! I could not be more excited to see what marvels Peter will bring to an already exceptional garden and that such a brilliant and earnest plant enthusiast is guiding future direction at Longwood. As you can see, his focus on native orchids will likely enhance the collections and the gardens equally and gloriously in the coming decades. Indeed, a garden full of American native orchids is greatly needed and will inspire their preservation and conservation with a circa situm strategy. — *Thomas Mirenda (email: biophiliak@gmail.com).*

(S2). Despite sowing more than 60 replications testing different media and seed sterilization techniques, a single seed has yet to germinate in any treatments using mature seeds. Out of frustration, we implemented a second series of studies to investigate if we could determine the optimal timing for harvest and propagation of immature seeds of *P. peramoena*, like previously described work with *Cypripedium*. Using a population in Dauphin County, Pennsylvania, we successively harvested capsules from six *P. peramoena* individuals over a 4-week period in the summer of 2019. Not only did we discover that seeds could be germinated if capsules were harvested 16–25 days after pollination, but we obtained germination percentages as high as 91 percent! Further experimentation with *Platanthera grandiflora* and *Platanthera psycodes* indicated that this timing works for these species as well. Seed germination appears to be the main obstacle for propagating these *Platanthera* species. Seedlings grow very well on a variety of orchid media as long as they are incubated in the dark. We expect some of these seedlings to flower for the first time this summer and look forward to expanding this work.

One of the early success stories of the program has involved the Pennsylvania state-endangered *Goodyera tesselata* (G5/S1). This northern species reaches the southern limit of its geographic range in northern Pennsylvania and is under threat from climate change and invasive species pressure. In a collaborative project with the Pennsylvania Department of Conservation and Natural Resources, a population of the species growing in Huntingdon County was identified as a candidate for seed collection and propagation trials. Seed propagation research with this and other *Goodyera* species indicated that they are easy to germinate via typical asymbiotic sowing practices on a variety of media. Although research is still needed to tweak the seedling production phase of growing *Goodyera*, we were able to raise 80 greenhouse-acclimated seedlings that were planted back into the wild as part of an experiment designed to help provide information on the best practices for reestablishing orchids in their natural settings. At 2.5 years after planting, 18 of the plants are still alive and two have flowered and set seed even though the site has changed rapidly due to tree fall, increased sunlight and an explosion of invasive species. This work will be continued with experimental outplantings of *G. tesselata* in Tioga County, Pennsylvania, this fall.

The program continues to grow rapidly in size and scope. We are now working on propagation protocols for most of the orchids native to the eastern United States, which has also expanded to temperate terrestrial orchids worldwide, including species from Australia, China, Japan, South Africa and Vietnam. From this we are developing comprehensive data about seed germination that can be shared to support conservation efforts locally, regionally and worldwide. Out of necessity, we have also initiated a fungal bank to support asymbiotic seed germination studies but also to support experiments with different methods of inoculating asymbiotically propagated seedlings once they have been planted into ex vitro conditions. Mature specimens of native orchids are also beginning to be planted throughout Longwood Gardens so that garden guests can appreciate and learn about these remarkable plants, and hopefully develop a deeper appreciation for the native flora and the need to conserve it.

THE LONGWOOD SCIENTISTS Peter Zale, PhD, earned his doctorate from The Ohio State University where he studied germplasm collection development, genetic characterization and breeding of the genus *Phlox*. He first developed an interest in native orchids after visiting the Holden Arboretum as a teenager and learning about the large yellow lady's slipper for the first time. Immediately after starting at Longwood, he initiated the native orchid conservation program and plays a leading role in shaping its research activities and future initiatives.

Ashley Clayton earned her Bachelor of Science degree in biological science with a minor in horticulture from Clemson University. She developed an interest in native orchids as an intern at Longwood Gardens where she studied asymbiotic in vitro germination of *P. blephariglottis*, *P. ciliaris* and *P.* × *bicolor*. Since returning to Longwood Gardens as a research specialist, she has become a specialist in orchid fungal culture with exemplary skills in peloton isolation, fungal banking and symbiotic seed sowing. She also leads conservation efforts related to Valmont Bog where current efforts revolve around fungus baiting using seed packets.

Will Hembree, MS, earned his degree from North Carolina State University where he studied cytogenetics and plant breeding. He manages the research nursery where we hold our ex situ native orchid collections. A first-rate botanist with a deep understanding of orchid flower structure and pollination syndromes, he also helps scout the region for new populations of native orchids and hand-pollinates orchids to support seed germination efforts.

Ed Leinbach, PhD, earned his doctorate from Michigan State University in the field of biochemistry. One of the longest tenured and most dedicated volunteers in the history of Longwood Gardens, Ed has refined and mastered asymbiotic and symbiotic methods of orchid seed sowing. He developed and perfected a unique method of sowing very small seed samples without loss of seeds and minimal contamination issues. He leads a team of volunteers that support his seed sowing and data collection efforts.

— Peter J. Zale is the Associate Director, Conservation, Plant Breeding, and Collections at Longwood Gardens (email: pzale@longwoodgardens.org).

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Sylvia Strigari

Mormolyca ringens

Text by Grettel Salguero and Franco Pupulin/Watercolor by Sylvia Strigari

Tribe Cymbidieae
Sutribe Maxillariinae
Genus Mormolyca *Fenzl*

Mormolyca ringens (Lindl.) Schltr., *Orchideen* 436. 1914. *Trigonidium ringens* (Lindl.) Schltr., *Edwards's Botanical Register* 26: misc. 57-58. 1840. *Maxillaria kellyana* Mayta and Molinari, *Richardiana* 15:299–300. 2014[2015], *nom. nov*. TYPE: Mexico, *K. T. Hartweg s.n*. [holotype, K (microfiche, SEL)]. *Mormolyca lineolata* Fenzl, *Nov. Gen. Sp. Pl. Vasc*. 1–3, t. 2. 1849. *Maxillaria lineolata* (Fenzl) Molinari, *Richardiana* 15:299. 2014[2015]. TYPE: Mexico. "Hab. in terra mexicana tropica prope Mirador," *C. Heller* s.n. (W).

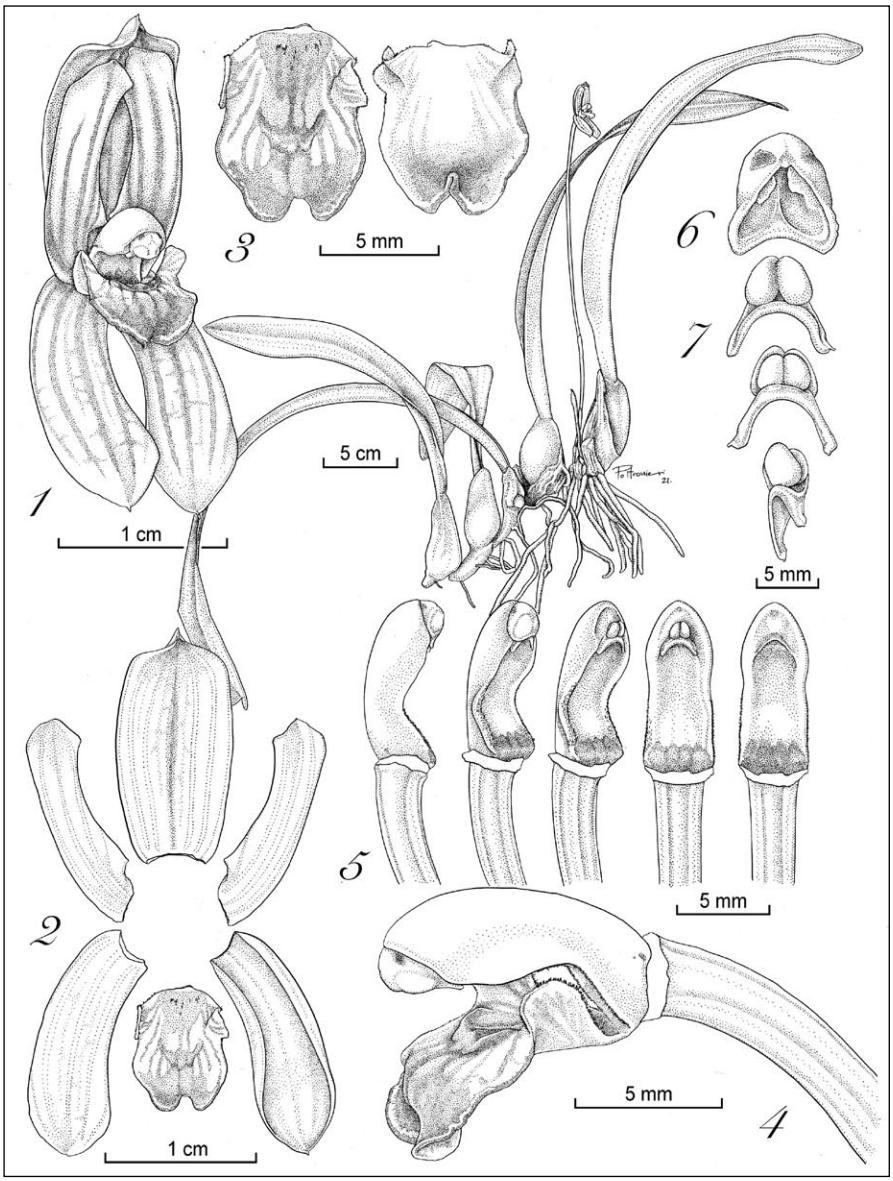
Plant epiphytic, caespitose herb, often growing in dense masses, to about 40 cm tall. Rhizome short. *Roots*, smooth, white to reddish brown or purple, arising from the rhizome or new pseudobulbs, to 3.5 mm in diameter. *Pseudobulbs* ovoid-ellipsoid, unifoliate, loosely spaced along the creeping rhizome, 5–7 cm long and 1.5–4.0 cm wide, smooth when turgid, rugose if dehydrated, somewhat compressed, subtended by scarious, nonfoliaceous distichous bracts 3–7 cm long. *Leaves* sessile, conduplicate at the base, coriaceous, linear-ligulate to narrowly lanceolate, obtuse to acute, strongly veined above, 9.0–35 cm long and 1.5–5.5 cm wide. *Inflorescence* single-flowered, erect, emerging from between older pseudobulbs, one or more per shoot, lateral; peduncles slender, elongated, 6.0–35 cm long, often equaling the leaf, provided with 5–7 appressed bracts at the nodes; bracts ovate-lanceolate, brownish, scarious, acute, 1.0–1.5 cm long, the internodes conspicuously exposed. *Pedicel* 2.5–4.5 cm long, subtended by a floral bract 7–15 mm long, similar to those of the peduncle. *Ovary* cylindrical and channeled. *Flowers* resupinate, spreading, greenish yellow with garnet longitudinal stripes, the petals pointing upward and parallel with the dorsal sepal, the lateral sepals pointing downward and parallel to each other. *Sepals* free; *dorsal sepal* concave, elliptic, acute to shortly acuminate, 1.4–1.6 cm long and 7–8 mm wide; *lateral sepals* convex, elliptic-falcate, 1.5–1.7 cm long,d 4.5–7.0 mm wide. *Petals* similar to the lateral sepals but smaller, convex, elliptic-falcate, obtuse, shortly acuminate, 1.3–1.5 cm long, 3–5 mm wide. *Lip* articulate with the base of the column, porrect, velvety, trilobate, elliptic-rhombic in outline, 7–8 mm long, 5–6 mm wide; the lateral lobes short, triangular, acute; the midlobe recurved apically; calli two, the first at the base, triangular, hairy, and the second at the middle, elevated, hyoid in front. *Column* semiterete, arcuate, clavate, without foot, downy-puberulent, somewhat sulcate on the anterior face, 7.5–8.5 mm long; the stigmatic surface broad and concave. *Anther cap*, incumbent, cucullate, incompletely bilocular, 1.8–2.0 mm long and 1.5–1.7 mm wide. *Pollinia* four, ovoid in two subequal pairs, yellow, on a short subtriangular stipe and a hyoid, yellowish-white viscidium. *Fruit* an ellipsoid, glabrous capsule.

Mormolyca is a genus of epiphytic orchids described by Eduard Fenzl (1808–1879) as a monotypic genus in 1849, based on the type species *Mormolyca lineolata*. The plant that served as the type of the new species and the new genus was collected in Mexico by Carl Bartholomäus Heller (1824–1880). Both, Fenzl and Heller were Austrian botanists and naturalists. The type specimen of *Mormolyca lineolata* was collected during an expedition to Mexico carried out between 1845 and 1848 by Heller and the German botanist Karl Theodor Hartweg (1812–1871), who found the plant at the Hacienda "El Mirador" in Veracruz, property of the German Carl Christian Sartorius (1796–1872) (Ossenbach 2009). Sartorius arrived in the region of Veracruz shortly after the independence of Mexico. He had been in jail for political reasons and lost his position as a teacher so he decided to emigrate to Mexico. Sartorius established his residence in a place called "El Mirador" (the lookout point), which soon became a place of refuge for all the naturalists who visited the area (Ossenbach 2009). It is perhaps the most frequently cited Mexican locality of collection during the whole 19th century. Sartorius herbarium is now at the Smithsonian Institution and contains specimens collected mainly at El Mirador (Ossenbach 2009). *Mormolyca lineolata*, however, proved to be identical with *Trigonidium ringens*, previously described by John Lindley in 1840. The first who recognized this affinity was the French naturalist Ambroise Gentil (1842–1929), who annotated the name "Mormolyca ringens" in his *Liste des Plantes Cultivees dans les Serres Chaudes et Coloniales du Jardin Botanique de l'Etat a Bruxelles* (1907). However, as his text (on p.24) made neither explicit nor indirect reference to Lindley's name, it has to be treated as a *nomen nudum*, not acceptable as a new combination. This was validly made by the great German orchidologist Rudolf Schlechter (1872–1925), who also reduced *Mormolyca lineolata* under the synonymy of *Mormolyca ringens*.

The name *Mormolyca* comes from the Greek word Μορμών, *Mormon*, a female spirit in Greek folklore, an ugly and grotesque spirit that is mischievous and sometimes evil and malicious. According to Alrich (2008), the etymology is an illusion to the appearance of the flower when viewed from the side.

Pridgeon and collaborators (2009), report 25 species of *Mormolyca* ranging from North America (Mexico), through Central America and the Caribbean (Cuba, Jamaica and Puerto Rico) to South America (Bolivia, Venezuela, Brasil). Since then, two new species have been described from Costa Rica and Panama (Bogarin and Pupulin 2010), and an additional three species from Colombia and Ecuador (Arevalo, et al 2015). *Mormolyca* species are usually epiphytic on larger branches of trees in semi-deciduous to wet montane forests from sea level to 2,000 m, depending on the species. *Mormolyca ringens* often form large clumps and often produce inflorescence over a long period (Singer, et al. 2004, Pridgeon, et al. 2009).

The genus as originally circumscribed by Garay and Wirth (1959) was differentiated from *Maxillaria* based on morphological characters: the long inflorescence, the absence of a column foot, and a lunate viscidium. However, species of the *Maxillaria rufescens* complex are vegetatively similar to *Mormolyca s.s.* in their shortly creeping rhizomes with unifoliate pseudobulbs subtended by papery bracts, although the inflorescences are much shorter (Carnevali, et al. 2001). For this reasons, Atwood and Mora de Retana (1999) had suggested a close relationship between the two genera and this supposition was confirmed by



Mormolyca ringens. The plant.

1. Flower.
2. Dissected perianth.
3. Lip, ventral and dorsal view.
4. Column and lip, lateral view.
5. Column, lateral, three quarters, and ventral views.
6. Anther cap and pollinarium (three view

All drawn from *JBL-08325* by Sara Poltronieri.

molecular studies performed by Whitten, et al. (2007). As a result, Mario Blanco and collaborators (2007) transferred the species of the former groups into a broad concept of *Mormolyca*. Recently *Mormolyca* was included within a broadly circumscribed *Maxillaria* and treated within this genus at a sectional rank (Schuiteman and Chase 2015). When included in *Maxillaria*, *Mormolyca ringens* has to be treated as *Max. lineolata*, as the name *Max. ringens* is already occupied by a Central American species described by Reichenbach in 1863. The treatment of *Mormolyca* as a valid genus is not in contradiction with either data from molecular phylogenies or with morphological information, and we favor retaining this genus as circumscribed in *Genera Orchidacearum* (Pridgeon, et al. 2009) for the practicality of identification, particularly when the material is only identified to the genus level.

In terms of pollination syndrome, there is a clear difference between *Mormolyca s.s*, and the species transferred from the *Maxillaria rufescens* complex. The species of *Mormolyca* in the strict sense have a floral morphology, like flat open flowers with a tomentose, insectlike labellum and arcuate column, which are normally associated with deceit pseudocopulation or sexual mimicry (Singer 2004, Arévalo and Cameron 2013). In this pollination strategy, sexually excited male insects arrive at flowers and attempt copulation (normally with the lip), and during the sexual "maneuvers" the pollinarium sticks to the insect's body surface. The pollination strategies of these plants are closely related with the seasonal biology of the insects.

They flower only when female insects are not around, and, consequently, the males mistake the flowers for females. When females finally emerge, males become able to recognize "true females" and avoid the flowers. Consequently, pollination in these orchids is usually low (Flach, et al 2006). This syndrome was documented in *Mormolyca ringens*, where bees of *Nanotrigona* and *Scaptotrigona* (Apidae: Meliponini) attempted copulation with the dorsal surface of the lip. Pollinarium removal occurs when the bees back out of the flowers and the viscidium firmly adheres on the bee scutellum (Singer, et al. 2004). Also, it was shown that flowers of *Mormolyca ringens* had chemical compositions similar to virgin queen bees of *Scaptotrigona* (Flach, et al 2006). In contrast to the species considered as *Mormolyca s.s.*, some of the *Mormolyca* species transferred from the Rufescens complex have semi-open flowers with a labellum pad of short, glandular trichomes, and exhibit a conspicuous diversity of pleasant floral scents (Singer, et al. 2004). However, pollinators have not been documented in these species (Pridgeon, et al. 2009).

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Yellow Sticky Traps

YELLOW STICKY CARDS are widely used to attract and capture the adult life stage (winged) insect pests including fungus gnats, leafminers, shore flies, thrips, winged aphids and whiteflies. If you don't have a ready source of these cards, you can easily make yellow sticky traps using readily available materials. Simply take a yellow plastic cup, cover the outside with Vaseline or Tanglefoot® (sold in most garden centers and big-box stores) and place the cup upside down on a stake tall enough to put the cup opening at just above foliage level. The cups should be replaced periodically because of either trapped insects in the coating or loss of stickiness over time.

Thank you to Laura Newton, AOS Awards Registrar, for bringing this homemade alternative to my attention. — *Ron McHatton (rmchatton@aos.org).*

Selected Botanical Terms

appressed – pressed against a surface
acuminate – tapering to a long point
acute – pointed
anisic – a chemical compound (acid) relating to, or resulting from, anise
apical – at or from the top
arcuate – bow-shaped; curved
articulate – having a clear joint between two separable parts
bilocular – having two chambers
bract – modified or specialized leaf
caespitose – clumped or clumping
clavate – club-shaped
concave – curved inward like the inside of a sphere
conduplicate – folded lengthwise with upper surfaces facing each other
convex – shaped like the outside of a sphere
coriaceous – leathery; tough
cucullate – hooded
distichous – arranged in two rows
ellipsoid – resembling an oval
elliptic – oval
epiphyte – a plant that uses another plant as a means of support
falcate – sickle-shaped
gallery forest – a stretch of forest along the banks of a river flowing in open country such as deserts, grasslands or savannas. Open country can either be treeless or sparsely treed
glabrous – smooth
hyoid – U-shaped, similar to a horseshoe
incumbent – lying on a surface
internode – interval between nodes or bracts
lanceolate – narrow oval tapering to a point at each end
ligulate – tongue-shaped
mesophytic – growing in or adapted to a moderately moist environment
nonfoliaceous – not leaflike
obtuse – blunt
ombrophilous – plants that are able to withstand prolonged rainfall
ovoid – egg-shaped
paludose – growing or living in marshes; requiring a marshy habitat
peduncle – the part of an inflorescence before the rachis or section to which the flowers are attached
porrect – held forward more or less parallel to the column
puberulent – finely pubescent
recurved – curved backward
resupinate – rotated lip lowermost
rugose – wrinkled; corrugated
scarious – dry and membranous
sessile – attached directly without a stalk
stipe – the stalk holding the pollinia
sub – somewhat less than; i.e., subsperical would refer to almost but not quite a sphere
subtended – covered
sulcate – marked with parallel grooves
sympatry – occurring in the same area; occupying the same geographical range without loss of identity from interbreeding
terete - cylindrical or pencil-shaped
thermophilous – warmth-loving
transverse – across the main axis
trilobate – three-lobed
trullate – angled; like a brick-layer's trowel; inverse kite-shaped
unifoliate – one leaf
venation – an arrangement or system of veins
viscidium – sticky pad to which the stipe is connectedor
Xerophytic – adapted to surviving with little water

COLLECTOR'S ITEM

Cattleya lueddemanniana Rchb. f. 1854

Gerardo A. Castiglione Gómez and Enmanuel Durán Gallego
Photographs by Gerardo Castiglione unless otherwise noted

VENEZUELA IS KNOWN as a country of orchids, because of the orchid diversity and richness in different geographic areas. *Cattleya* in Venezuela has seven species, four of them endemic: *gaskelliana*, *lueddemanniana*, *mossiae* and *percivaliana* (Romero and Carnevali, 2000), all of great beauty and undeniable ornamental value. *Cattleya lueddemanniana* has a unique beauty that has had a large impact on Venezuelan floriculture. It is even more valued by Venezuelan growers than *Cattleya mossiae*, the national flower. There are about 1,142 species of orchids in about 200 genera in the country, creating considerable diversity of species in the Neotropics.

The genus *Cattleya* was described by John Lindley in 1824 and named in honor of William Cattley, an English orchidologist of that time. *Cattleya* currently contains about 260 species distributed throughout the tropical American continent (Van den Berg, 2009). Brazil is considered the center of distribution for the genus, and more than half of the species are Brazilian endemics. Venezuela has eight species of *Cattleya*, if you include *Guarianthe hennisiana* separated from the genus *Cattleya* by Dressler and Higgins in 2003. Of the remaining seven species, six unifoliate species have been reported: *jenmanii*, *gaskelliana*, *lawrenceana*, *lueddemanniana*, *mossiae* and *percivaliana,* and one bifoliate, *Cattleya violacea*.

The status of natural populations of the endemic cattleyas in Venezuela is uncertain, but the populations are certainly in decline because of overcollection. Surveys to determine their status are required. Also in recent years, progress in the cultivation of orchids in Venezuela has been limited due to economic problems.

CATTLEYA LUEDDEMANNIANA This species, part of the group of unifoliate cattleyas, also sometimes said to be of the labiata group, is characterized by having a single leaf on the apex of the pseudobulb and large flowers with a big round lip with lateral edges that curl over the column.

HISTORY In 1854, in the collection of the renowned French orchidologist M. Pescatore located in Chateau Celle St. Cloud, near Paris, H. G. Reichenbach identified *Cattleya lueddemanniana* from a plant thought to be *Cattleya maxima*. He published the name *Cattleya lueddemanniana* the same year in *Xenia Orchidacea*, honoring Mr. Lueddemann, a French naturalist of Alsace, who was the head gardener of M. Pescatore. About

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10 years later, this species was taken to England, and it was given the name *Cattleya speciosissima* Hort. (*Gardeners' Chronicle*, 1868). This horticultural name became so popular that many still use it or they use a shortened version of the name, even in Venezuela, *Cattleya speciosa*.

The species has been known by other names over the years. It was known as *Epidendrum labiatum* var. *lueddemannianum* in 1862, and *Cattleya labiata* var. *wilsoniana* in 1887 in the *Annals Botanices Systematicae*; in *Gardeners' Chronicle*, both described by Reichenbach f. Other synonyms are *Cattleya dawsonii* R. Warner (1862) in *Select Orchidaceous Plants* in 1862; *Cattleya roezlii* Rchb. f. in *Gardeners Chronicle* in 1882; and *Cattleya bassetii* H J Veitch in *Manual of Orchidaceous Plants* in 1887.

[1] *Cattleya lueddemanniana* 'Arianna'
[2] *Cattleya lueddemanniana* 'Centellas' JC/AOS
[3] *Cattleya lueddemanniana 'Contraste'* is an example of the coastal biotype.

Cattleya lueddemanniana has a creeping rhizome, usually with two internodes between each pseudobulb covered by scarious sheaths that disintegrate with age. The pseudobulbs are narrow, oval, almost cylindrical,

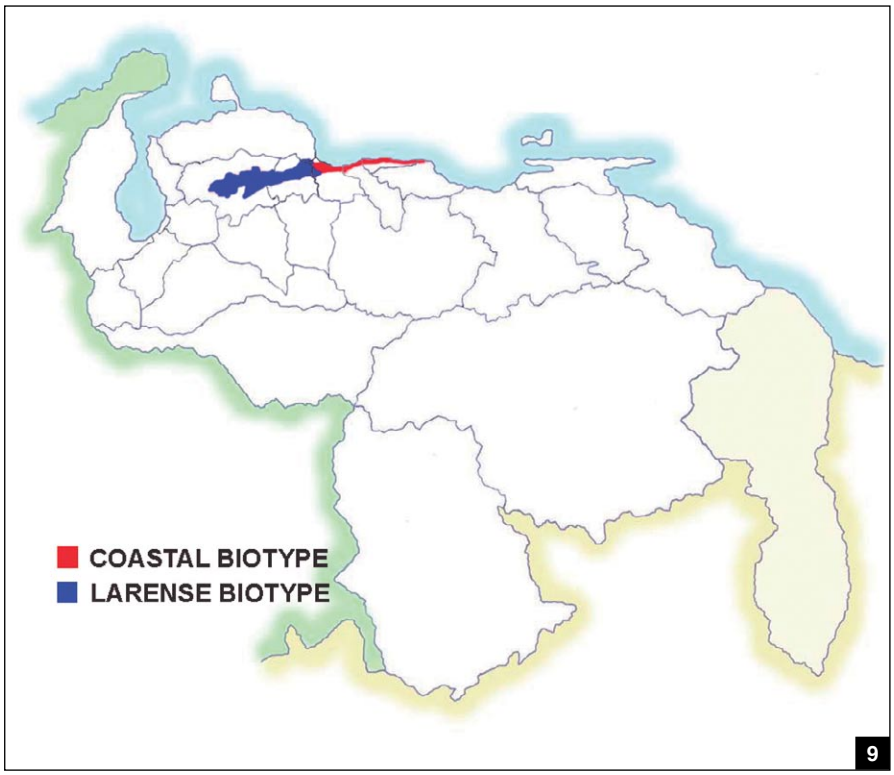
[4] ***Cattleya lueddemanniana*** **'Guarimba'**
[5] ***Cattleya lueddemanniana*** **'Oscura' is an example of the Larense biotype.**
[6] ***Cattleya lueddemanniana*** **f.** ***alba*** **'Luna LLana'**
[7] A fine example of the caerulean forms of ***Cattleya lueddemanniana.***
[8] ***Cattleya lueddemanniana*** **'Costanara' exemplifies the semialba forms of the species.**

attenuated toward the base, about 3–11 inches (8–25 cm) long, and about 0.4–1 inch (1–2.5 cm) wide. The leaves are rigid, concave or flat, obtuse or rounded at the apex, measuring from 3 to 8 inches (8–20 cm) long and 1.2 to 2.4 inches (3–6 cm) wide. Young leaves show purple spots that fade with age. The peduncle (3–13 cm long) emerges through the green spathe (4–5 cm long) with up to four pedicels (1.8–2.4 inches [4.5–6 cm] long), always from a new pseudobulb without roots. There are up to five flowers, the most common occurrence being two. The pedicellate ovary is almost cylindrical, straight or curved, 1.8–2.4 inches (4.5–6 cm) long. The dorsal sepal is oblong–lanceolate, subacute measuring up to 2.4–4 inches (6–10 cm) long and about 0.6–1.2 inches (1.4–3 cm) wide. The lateral sepals have the same proportions as the dorsal sepal. The petals are ovate, rounded or widely obtuse at the apex, measuring up to 2.4–4 inches (6–10 cm) long and 2–3.1 cm (5–8 cm) wide. The lip is elliptical, emarginate, 2–4 inches (5–10 cm) long, up to about 2 inches (5 cm) in width; the edges of the lip are wavy and delicately curly. The column is about 1.1–1.4 inches (2.8–3.6 cm) long.

The flowers give us a sweet and penetrating fragrance; they are between 5.1 and 6.7 inches (13–17 cm). Their color is highly variable, although the sepals and petals are almost always of the same color. The lip is decorated in its distal half with a color pattern that can be solid, striped or finely stippled, ranging from amethyst or dark red. On the lateral margins of the lip, just at the opening to the area of the lip that covers the column, there are bilateral "eyes" that can be variable in color from cream to deep yellow. From the base of the throat come fine stripes of white or cream color; these stripes end abruptly in front of the showy distal portion of the lip, except in the semialba form, where the stripes occupy the entire purple spot on the lip disc. This color combination is what is known as a typical or like the type of the species, but there are also lovely albas, semialbas, concolor and coeruleas, and some nice flowers with stripes or spots on the sepals and petals called "aquinii" forms.

The flowering season runs from late December to mid-March. However, it is not difficult to see flowering plants in September and October.

DISTRIBUTION BY BIOTYPES *Cattleya lueddemanniana* is present throughout the Cordillera of the Costa (Coastal Mountains), from Cabo Codera in Miranda State, to the outskirts of Puerto Cabello in Carabobo State, passing through the states of Vargas, Aragua and Yaracuy. The habitat extends on the mainland covering the states of Lara and Falcón. Venezuelans separate the species into two biotypes, Coastal and Larense biotypes.



[9] Distribution map of the two biotypes of *Cattleya lueddemanniana* in Venezuela.

In the Cordillera de la Costa, the species is always found growing on the north side, that is, the face of the mountains facing the Caribbean Sea, from sea level to about 1,640 feet (500 m) in elevation in areas of low annual rainfall (15.7–74.2 inches [40–120 cm]) in xerophytic-to-moderately humid gallery forests where they take moisture from the sea breeze. In this area, they grow as epiphytes on trees of various sizes and also on the shrubs and cacti.

The Larense biotype plants that inhabit the Yaracuy, Lara and Falcón states are found at higher elevation than the coastal plants, between 1,312 and 2,953 feet (400–900 m) in areas where the temperature difference between day and night can be great, reaching over 104 F (40 C) during the day and down to 68 F (20 C) at night. Plants are found in completely xerophytic areas in Lara and Falcón states or moderately moist forests with an annual rainfall of 47.2–63 inches (120–160 cm) in Yaracuy state. Although these two areas are not completely isolated, despite remarkable geographical and existing ecological differences, generally, the coastal biotype plants are characterized by larger and rounder flowers, being mostly pale colored with a wide and highly colored lip with creamy-white-to-pale-yellow eyes. The Larense biotype flowers tend to be smaller, with thinner segments but darker in color, with a somewhat narrow lip and bright-to-dark-yellow eyes.

CULTURE *Cattleya lueddemanniana* prefers bright environments with moderate humidity around 60–70% relative humidity (RH). However, this species will tolerate a wide range of temperatures and conditions. When the humidity is high, this species prefers to be mounted on logs, so the roots dry. If grown in pots, plants prefer a wide-open substrate that allows rapid evacuation of water. In Venezuela, we use a mixture of equal parts of charcoal, tree fern and expanded clay pellets. We recommend watering twice a week and early in the morning because plants do not like to spend the night wet.

IDENTIFICATION *Cattleya lueddemanniana* has certain characteristics that make it easily distinguishable from her labiata sisters. The most consistent characteristic is the "little bits" in the column, which are nothing more than a slight hypertrophy of the clinandrium that holds the anther, which has the appearance of a triangular tooth. The side

lobes of the lip always completely cover the column. The lip extends apically at the length of the column apex to reveal the "eyes," and rolls back on itself slightly, making a concave portion that pushes down on the tip of the column. This characteristic is only shared with *Cattleya lawrenceana*. Another characteristic for the species is that the amethyst-purple stripes coming from the base of the lip abruptly stop when reaching the apical edge of the disc; only the semialbas extend the stripes of the throat to the lower part of the lip disc.

— Gerardo Castiglione is a Venezuelan civil engineer and has been growing orchids for over 35 years. He is a member of the Sociedad Merideña de Orquideología and President of the Federación Venezolana de Orquideología. Enmanuel Durán Gallego is a Venezuelan agricultural engineer and Neotropical orchid conservation researcher. He is the Director of Horticulture at the Jardín Botánico de Cali, Cali, Colombia.

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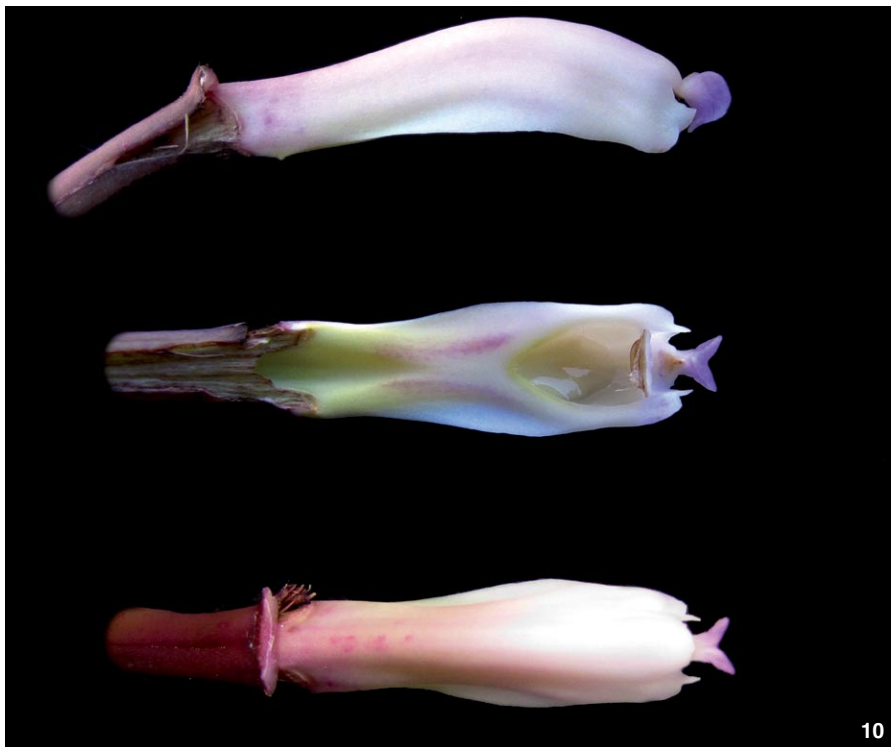
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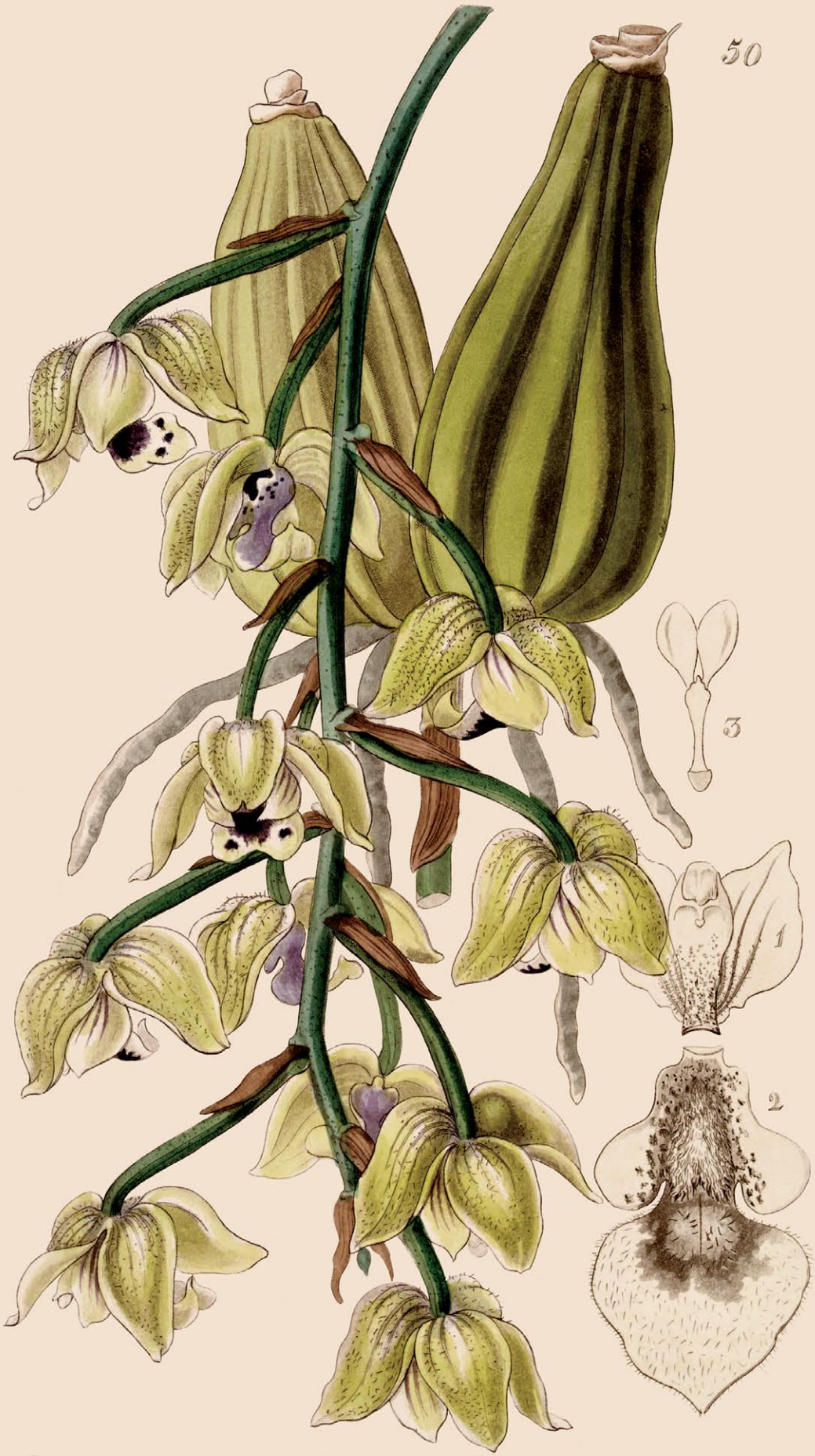
[10] *Cattleya lueddemanniana* can be distinguished by the extensions of the clinandrium at the apex of the column.

[11] The side lobes of the lip always completely cover the column and the lip apex reflexes slightly as seen here.

[12] Comparison of the lip striations between the colored forms of the species and a semialba form. Only the semialba forms extend the stripes of the lip throat out over the entire lip disc.



Miss Drake del. Pub.d by J. Ridgway 169 Piccadilly Sep.r 1.1844 G. Barclay sc.

Women Illustrators: Ducky Drake

By Wesley Higgins and Peggy Alrich

SARAH ANNE DRAKE (1803–1857) was born in Skeyton, Norfolk, England, on July 24, 1803, the daughter of John Drake, a farmer, and his wife, Sarah Forman. She grew up in Norfolk, where she formed a school friendship with Anne Lindley, John Lindley's sister. Through this family friendship, she was brought into the London household of John and Sarah Lindley, around 1830 (possibly to act as a children's governess). She appears to have had a number of roles in the Lindley home.

As a young woman, Drake had studied in Paris, where it is likely she practiced activities expected of her gender, including painting and drawing. While residing in Acton Green at the Lindley home, she trained to specialize as a botanical artist. Lindley soon recognized that Sarah was an extremely talented artist and a keen botanist; within a few years she had been commissioned to illustrate his publication *Sertum Orchidaceum* (1837–1841). She drew from living plants, pressed botanical specimens, and sketches that had been sent to Lindley. Her illustrations appeared in *Plantæ Asiaticæ Rariores* (1830–1832), *Ladies' Botany* (1834–1837), *The Botany of the Voyage of H.M.S. Sulphur* (1844–1846), and the largest lithographic book of its day, James Bateman's *Orchidaceæ of Mexico and Guatemala* (1837–1843).

The quality of her paintings for Bateman's *Orchidaceæ* is considered to be extraordinary, yet she did not receive the same recognition as her co-illustrator, Augusta Innes Withers, who was appointed Flower Painter to the Queen. Drake was extremely prolific, creating well over 1,000 illustrations for the *Botanical Register* alone. In acknowledgement of her contribution to his work, Lindley named the Western Australian orchid genus *Drakea* for her. Drake's career as a botanical illustrator was notable but only lasted 16 years. Her career ended when the *Botanical Register* ceased publication in 1847.

She lived with the Lindley family until 1847, when she returned to Norfolk to live with her uncle, Daniel Drake, to be able to care for her elderly relatives. Five years later, she married John Sutton Hastings, a wealthy farmer. She died on July 9, 1857, supposedly from diabetes, but it has been speculated that she may have suffered from an accumulation of toxins acquired from her various painting materials. There is a memorial plaque located inside St. Andrew and St. Peter's Church in Longham, Norfolk where she was buried.

ANTIQUE PLATES

[1] *Lacaena bicolor*, *Botanical Register,* 30:t.50 (1844).

[2] *Rudolfiella aurantiaca* as *Bifrenaria aurantiaca*, *Botanical Register,* 22: t.1875 (1836).

[3] *Geodorum densiflorum* as *Geodorum fucatum*, *Botanical Register,* 20:t.1687 (1834).

[4] *Pabstia viridis* as *Maxillaria viridis*, *Botanical Register,* 18:t.1510 (1832).

[5] *Cuitlauzina pulchella* as *Odontoglossum pulchellum*, *Botanical Register,* 27:t.48 (1841).

[6] *Pholidota imbricata*, *Botanical Register*, 21:t.1777 (1835).

An Introduction to PAR

Why You Should Forget Lumens

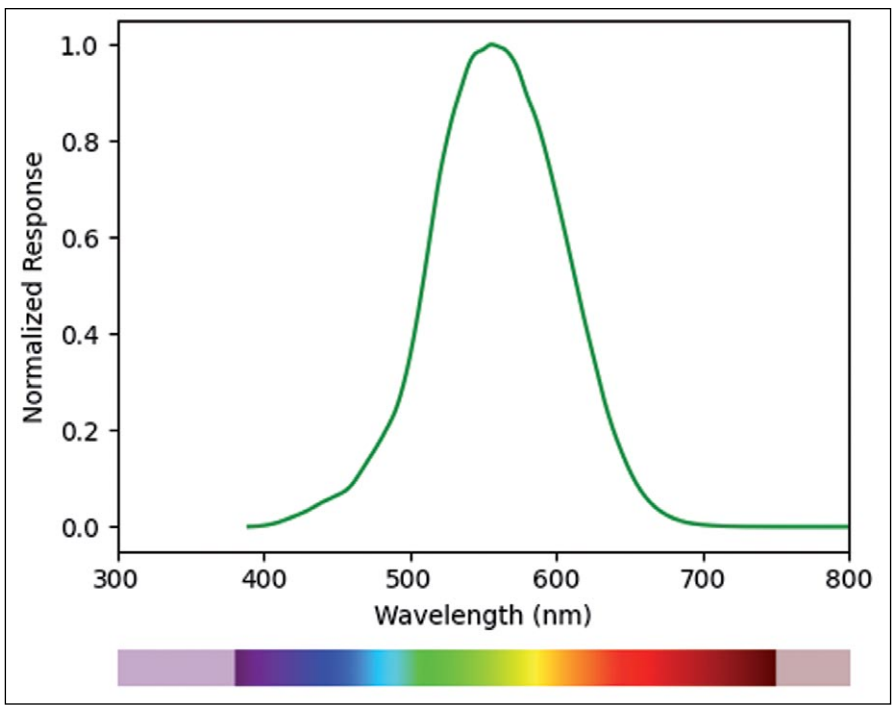
BY KELLY MCCRACKEN

THIS INTRODUCTION IS the first of a five-part series on growing orchids under artificial lights. Growing houseplants and orchids this way has opened up an incredible world of potential plants to growers that previously were just stuck with the windowsills that came with their home or apartment. The decreased cost and increased availability of an incredible variety of grow-light fixtures has led to an explosion of new houseplant growers. Unfortunately, the research about how to grow houseplants under lights has not quite kept up with how fast the technology is advancing. Simple questions about artificial-light growing have gone largely unanswered by the scientific community and lighting companies as a whole.

One question I hear all the time is, "How much light do my plants need?" Turns out this is not so simple to answer. Most light bulbs and lower-end grow lights that are available on the market today will give you their brightness values in lux, lumens, foot-candles, and sometimes even just watts (not even a brightness measure! Yikes!). The problem with these measurements is that they are measurements of how our *human* eyes see light. Plants "see" light a little differently than we do. Lux, lumens, and foot candles all measure light in a way that weights it towards the wavelengths that human eyes see best. This is called luminous flux.

Notice in this depicted above that the x-axis is the visible light spectrum, 400–700 nm. You will notice the single peak in the green–yellow range. Those wavelengths happen to be the colors that we see best. Lights and light meters that advertise their brightness by using luminous flux are essentially advertising their brightness weighted in the way that a human eye would interpret it.

As I mentioned earlier, plants see light differently. Rather than looking for a bulb with a high lumen value, which would appeal well to a human eye, I recommend buying a bulb that advertises its output in terms of photosynthetically active radiation (PAR). PAR gives us much more information about light that plants can actually use for photosynthesis. PAR is measured in terms of photosynthetic photon flux density (PPFD). PPFD and luminous flux both measure the incoming intensity, but in different ways. PPFD measures the amount of photons that land on a given area per each second, while Luminous Flux measures power. Also, PPFD gives equal weights to all photons in the 400–700-nm spectrum and does not favor the green and yellow range. PPFD is measured in micromoles per square meter per second (µmol/m^2/s). To summarize, PAR is the type of light plants can use for photosynthesis. PAR is measured in PPFD. The unit used for PPFD is µmol/m^2/s.

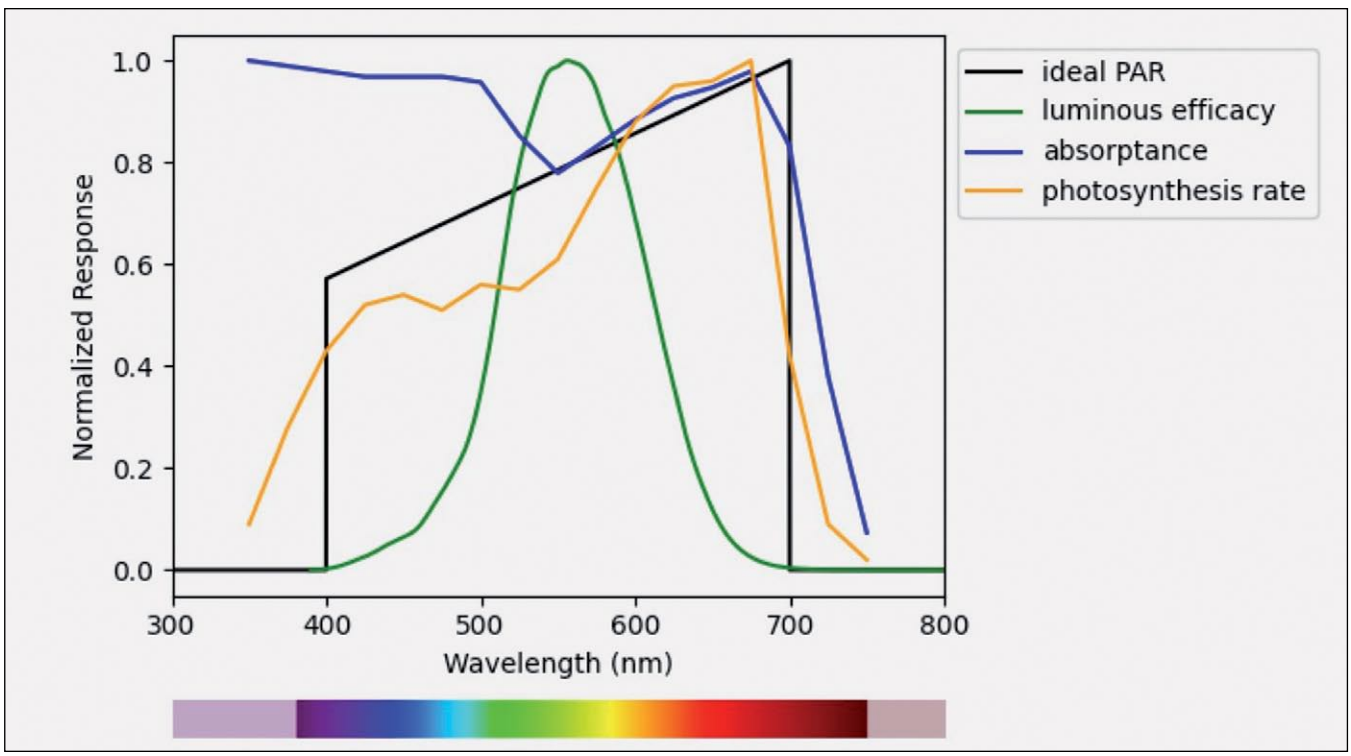


In the curve on the next page, you can see the curve for ideal PAR plotted in black. (This curve has a peak in the red spectrum; this is because red photons are less energetic than blue ones, so it takes more of them to give the same amount of power.) Unlike the luminous flux efficacy, plotted in green, PAR measures the *entire* spectrum.

The third line that I would like to point out is the absorptance, plotted in blue. This line is based on a classic study by McCree (1971), which measured the light absorbed by leaves of various crop plants, such as those of beans, corn and potatoes. The authors used an apparatus that shot specific wavelengths of light into a spherical cavity and measured the intensity of the reflected light. They performed this measurement twice: once with the cavity empty (to get a baseline value), and once with a leaf present in the cavity. The difference in the measurements told them how much light the leaf had absorbed.

Their experiment produced two notable results. First, plants are *good* at absorbing light; over the 400–700-nm range, they absorb between 74% and 93% of the light they are given. Second, they absorb *slightly* less light in the green and yellow spectrum (525–575 nm). This is the reason that plants appear green. They are absorbing more blue and red light, and they reflect back the green and yellow light to our eyes. And this is also why we

And PPFD



see green and yellow so well. We evolved to search forests full of leaves looking for predators. You can see this visible dip in the absorptance line around the green and yellow wavelengths. If we go back to the green luminous efficacy line for just a moment, you will notice that that line happens to peak in the 500–550-nm range. In conclusion, by using lumens, lux, and foot-candles to measure the light your plants are getting, you are ignoring a huge fraction of the photosynthetic light, and only looking at light that humans see best.

The last line on the graph (yellow) is looking at the actual photosynthesis rate of plants in response to different wavelengths of light. This is based on the same 1971 study by McCree. They calculated the photosynthesis rate by illuminating leaves inside a chamber with air flowing through it and measuring the difference in CO_2 concentration between the incoming and outgoing air. As you can see, the rate of photosynthesis over the 400–700-nm wavelength range closely tracks the original ideal PAR line. Therefore, we believe PAR to be an excellent measure of how much "plant light" your plants are getting. Forget lumens; buy a bulb that will tell you its brightness in PPFD.

So, after all that, I still have not told you how much light you need. Here are the PPFD values we have our LED bulbs set to:

- Low-light plants (phalaenopsis, begonias, ferns, jewel orchids, some paphiopedilums, African violets) 40–60 µmol/m²/s
- Medium-light plants (oncidiums, phragmipediums, some dendrobiums, pothos foliage plants) 100–150 µmol/m²/s
- High-light plants (cattleyas, brassavolas, rupiculous cattleyas, some brighter-growing aroids) 200–250 µmol/m²/s

We use a 12-hour light cycle with these intensity values. The recommended values may change if the photoperiod is longer or shorter.

Coming next month: Target PPFD for Orchids and Tropical Plants Part 2

— Kelly McCracken is the owner of High Desert Orchids in Albuquerque, New Mexico. She is an avid grower, breeder and seller of orchids. Currently, she is growing in a 3,000-ft² (278.7 m²), high-bay warehouse space under artificial light. Kelly also does orchid society talks on lighting and other orchid-related topics. You can email her at kelly@highdesertorchids.com, visit her website highdesertorchids.com or follow her on Instagram at @hdorchids.

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Paphiopedilum henryanum

Jewels of the Genus *Paphiopedilum* from Southeast Asia

BY OLAF GRUSS

IN 1987, A new species of the genus *Paphiopedilum* was described by two authors almost simultaneously. Dr. Guido Braem described this species as *Paphiopedilum henryanum* in the first issue of his new journal *Schlechteriana*, and Emil Lückel described it as *Paphiopedilum dollii* in *Die Orchidee.* According to Braem, this species was found by Henry Azadehdel in the border region between the People's Republic of China and Vietnam.

Braem's portrayal in his article published on September 3, 1987 contained only the description. Copies were distributed to the botanical institutes of Giessen, Göttingen, Harvard and Beijing, as well as to the libraries of the botanical gardens in Kew and Edinburgh. On the other hand, the publication of the second description was completed on September 18, 1987 and delivered by September 28th. The dispute over the validity of the descriptions was less about the date than it was the question whether a publication, in the first issue of a magazine, containing only a description, should be regarded as a valid publication, rather than in the globally recognized magazine of the German Orchid Society. The dispute continued over the course of several years but ultimately, the first name published was determined to be validly published and established the priority of *Paphiopedilum henryanum* Braem.

SYNONYMS *Paphiopedilum dollii* Lückel, 1987; *Paphiopedilum chaoi* Hua, 1999.

ETYMOLOGY *henryanum* after the discoverer of the species, Henry Azadehdel. The synonym *chaoi* was coined to honor M.H. Chao, who discovered the plants described by Hua, and *dollii* honors Hilmar Doll, a German orchid lover, who provided plants of this species for the description by Lückel.

DISTRIBUTION Border area between Vietnam and China.

HABITAT Plants grow at elevations of 3,280–3,940 feet (1,000–1,200 m) on steep north-facing slopes and rocks. Although it is quite cool and dry from November to March, the temperatures rise slowly from April to May. From May to August, it is warm with heavy rainfall. The bulk of the annual rainfall (75%) occurs during this time of year. From September to October, temperatures and precipitation decrease significantly. Summer daytime highs are over 86 F (30 C), with nighttime lows to 68 F (20 C). Winter highs average 61–70 F (16–21 C) during the day and lows drop to 48 F (9 C) at night.

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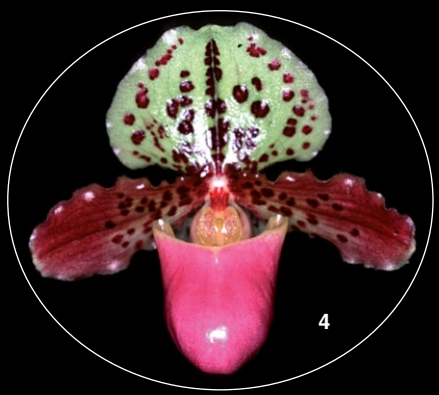
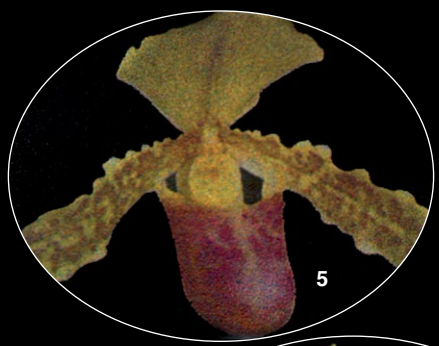
VARIABILITY The species is quite variable in the coloring of the flower and the spotting of the dorsal sepal. In 1999, Hu Song Hua described *Paphiopedilum chaoi* from plants flowered by Hua in August 1998 at Chao's Orchid Garden. Originally the plant came from Na-po County in Guangxi Province in China and was collected by Chao on May 10, 1998. According to Hua, the flower of this supposedly new species was yellow-brown with deep purple spotty stripes on the lip and with brown spots on the petals. The staminode was round with three teeth at the tip. In a comment on the description, this author wrote for the editorial team of *Die Orchidee*: "Upon inquiry, the author Hu Song Hua explained that the occurrence of the new species is in an area in which no *Paphiopedilum helenae* or *Paphiopedilum henryanum* occur, so that it is highly unlikely to be a natural hybrid. The suspicion that it is the similarly colored *Paph*. *henryanum* f. *christae* was also

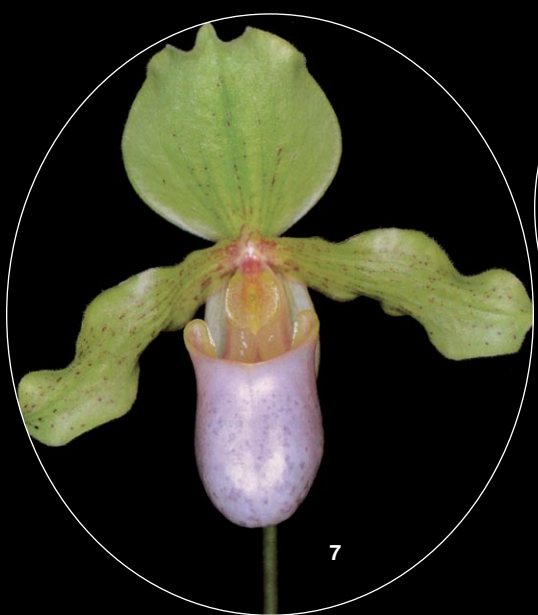
[1] *Paphiopedilum henryanum* 'Howard P. Martin' CCM/AOS; exhibitor: Howard P. Martin; photographer: Cheryl Belczak.

[2] The species photographed in situ by Canh.

[3] Side view of the staminode and column. Insert photograph is a close-up of the face of the staminode.







[4] A dark form of *Paphiopedilum henryanum*.

[5] *Paphiopedilum henryanum f. chaoi*

[6] *Paphiopedilum henryanum* f. *chaoi* 'Big Fan #1'.

[7] *Paphiopedilum henryanum* f. *christae* Braem.

[8] Another example of f. *christae*

[9] A nearly albinistic example of the species.

[10] Albinistic forms of *henryanum* exist that cover the spectrum from albescent forms to this fully albinistic example consistent with the description of *henryanum* f. *album* Tanaka.

[11–12] Two examples illustrating the range expected for the natural hybrid × *aspersum* (*barbigerum* × *henryanum*).

[13–14] Two examples of the natural hybrid × *vietenryanum* (*gratrixianum* × *henryanum*).

[15] *Paphiopedilum* × *sinovillosum*, the natural hybrid between *villosum* and *henryanum*.

excluded by the author. Despite doubts that this is a new, independent species that is clearly different from all previously known species, the editors decided to publish the description. However, detailed investigation ultimately showed that it was only an exceptional color form of *Paph. henryanum*. In 2007, it was classified as *Paphiopedilum henryanum* f. *chao* by Olaf Gruss and Manfred Wolff. In 1991, Guido Braem described a striking color form with vermilion sepals and petals and a purplish pouch as *Paphiopedilum henryanum* var. *christae*. In 1999, it was sensibly reclassifed as f. *christae* by Olaf Gruss and Jürgen Röth.

Around 2000, white and green clones sparsely spotted red-brown on the petals appeared on the market, and in 2002 one of the plants devoid of all red pigmentation appeared, which Olaf Gruss described in 2002 in *Caesiana* as *Paphiopedilum henryanum* f. *album*.

So far, three natural hybrids of *Paph. henryanum* have been found and officially described. In 2002, Leonid Averyanov described a natural hybrid with *Paphiopedilum barbigerum* var. *lockianum* (AVER.) as *Paphiopedilum* × *aspersum* from a site where *Paph. barbigerum* var. *coccineum* and *Paph. henryanum* are found together. In 2002, Olaf Gruss and Aree Petchleung described the natural hybrid between *Paphiopedilum gratrixianum* and *Paph. henryanum* as *Paphiopedilum* × *vietenryanum* O. Gruss and Petchl. The type specimen originated from Yunnan Province; however, it cannot be ruled out that this plant originated in Vietnam and was brought to Yunnan. Lastly, Liu and Chen described, in 2004, *Paphiopedilum* × *sinovillosum* Liu and Chen as a natural hybrid between *Paph. henryanum* and *Paphiopedilum villosum*, found in China and Vietnam where the two ranges overlap.

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Acknowledgments

I thank the many photographers who have made their material available to me, and the gardeners and orchid friends who gave me the opportunity to take photographs of their collections. My thanks to Judith Rapacz-Hasler for the German-to-English translation of this article.


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—Olaf Gruss is internationally recognized for his work with paphiopedilums, phragmipediums and phalaenopsis. He has written books about the genus Phalaenopsis *and the albino forms of the genus* Paphiopedilum*, as well as a booklet about the genus* Phragmipedium*. He has been a member of the editorial board of the journal of the German Orchid Society,* Die Orchidee*. Gruss resides in Germany and lectures throughout Europe, Japan, Taiwan, China, and the U.S. In der Au 48, 83224 Grassau, Germany (email: a-o.gruss@t-online.de).*

“New” *Vanilla* Species

The last 20 years

BY T.J. HARTUNG

THE GENUS *VANILLA* is probably the most economically important orchid species in the world. However, despite its economic importance, it appears to be one of the most poorly studied of all large orchid genera. That is, until recent years.

In the past 20 years, 32 ½ *Vanilla* species have been accepted, bringing the total for this genus to 132 ½ accepted species (WCSP 2020). The ½ will be explained later.

NEW SPECIES

***Vanilla arcuata* (Pansarin and Miranda 2016)** Native to the coastal plain of the Atlantic rainforests in the State of São Paulo, Brazil. Additional information and research paper not available.

***Vanilla aspericaulis* (Sambin and Chiron 2015)** Known only in French Guiana at elevations between 100 and 260 feet (30–80 m), it grows on the banks of rivers, often near granite islets. The species blooms from April to September with 2–11 flowers opening successively. The sepals and petals are greenish yellow, and the lip is yellowish with darker yellowish venation. The species name refers to the rough appearance of the stem.

***Vanilla atropogon* (Schuiteman et al. 2013)** This is the sixth species of *Vanilla* known in Vietnam. The species name refers to the dark, hairy lip ("atro-," dark**,** and "pogon," beard). Flowers are around 2 ½ inches (4.5 cm) wide, and the sepals are yellowish green with white at the base, the petals are a paler green, the lip is reddish brown, tinged with pale green, and the flowers are foul smelling. The unusual color of the lip, in combination with the bad smell suggests it may be pollinated by flies.

***Vanilla capixaba* (Nicoletti De Fraga et al. 2017)** This new species resembles *Vanilla cristagalli* and *Vanilla dubia*, but may be easily distinguished by its smaller sepals and wider petals and a lip that is smaller but with a larger midlobe. It is endemic to the Atlantic Forest of Espírito Santo State, Brazil, and is only known from the type and a few other specimens observed during fieldwork. It is restricted to an area where the forests are being replaced by pasture or managed forests with no conservation efforts in the area. The species name refers to the Brazilian Portuguese name "capixaba," of indigenous origin, meaning "fertile land" and it is used to refer to people born in the state of Espîrito Santo.

***Vanilla corinnae* (Sambin and Chiron 2017)** The only known population of this orchid is in a transitional forest on rocky outcroppings located in the town of Kourou, between the Savane de Matiti and the Kourou River, at an elevation of 100 feet (30 m) in French Guiana. Researchers found only a small number of plants. The species name is dedicated to Corinne Sambin, codiscoverer of the species and manager of the Botanical Garden of Guiana.

D.R. COUTO

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[1] *Vanilla atropogon; photograph by Romana Rybková.*

[2] *Vanilla capixaba*

***Vanilla costaricensis* (Soto Arenas and Dressler 2010)** Known only from a lowland rainforest between Los Chiles and Venecia in northern Costa Rica, at an elevation of 650 feet (200 m). It flowers in February. The lip is white, and the sepals and petals are the same green shade as the leaves.

***Vanilla cribbiana* (Soto Arenas and Dressler 2010)** Found in Mexico (Oaxaca and Chiapas states), Guatemala, Belize and Honduras at 500–1,100 feet (150–350 m) altitude. It is the most common vanilla in the tropical rainforests of Selva Lacandona (Chiapas, Mexico) and Petén (Guatemala). The flowers have spreading segments, and are showy, with white-cream sepals and petals, sepals externally cream-greenish and a lip that is deep yellow with orange stripes. It has a strong fragrance of mentholate and citrus.

***Vanilla decesareae* (Ormerod and Cootes 2013)** Found on the island of Mindanao in the Philippines, this species is named after Lisa de Cesare of the Botany Libraries, Harvard University. This species is easily distinguished from other Philippine *Vanilla* species by its relatively small leaves, which are less than 6 inches (15 cm) long and 2 inches (5 cm) wide.

***Vanilla denshikoira* (Flanagan et al. 2018)** Known from only a single locality in northwest Amazon, Colombia, within the Guiana Shield region, where only two plants were found by researchers. Sepals and petals are greenish-cream and the lip is a creamy yellow. The lip is slightly smaller, and the dorsal sepal is slightly larger. The species name refers to the name of a female figure in the mythology of the Puinave indigenous community, native to the department of Guainía, Colombia. The name "denshikoira" translates in English to "perfumed woman." Her myth represents freedom and equality of women.

***Vanilla dressleri* (Soto Arenas and Dressler 2010)** Known from Costa Rica, Panama and Colombia, in lowland to

submontane wet forests at 65–3,300 feet (20–1,000 m). This species seems to be fairly common, at least in the Río Savagre area of western Costa Rica. It flowers from March to early June with clove-scented flowers that suggest a male euglossine bee as its pollinator. The species name is dedicated to Robert L. Dressler, PhD, authority in orchid biology.

***Vanilla espondae* (Soto Arenas 2010)** A single specimen found near the basin of the Río Magdalena in northern Colombia is the only known existence of this orchid. It has flowers that are showy and large, perhaps 5–6 inches (12–15 cm) in diameter when spread out; sepals and petals ivory white, basal surface of the lip ivory-white, midlobe and throat ivory-white lined with yellow-ochre. The species name is dedicated to Mrs. Nora Esponda, administrative assistant at the Herbario AMO.

***Vanilla esquipulensis* (Archila and Chiron 2012)** One of six species of *Vanilla* found in Guatemala, it has been found growing near the Mirador de Esquipulas, a tributary of Río Jocotan Chiquimula. It is typically a xerophytic orchid found below 3,000 feet (900 m) above sea level. The species name refers to the municipality of Esquipulas, Guatemala, where this species grows.

***Vanilla javieri* (Barona-Colmenares 2018)** The species name is dedicated to local Amazonian *Vanilla* coresearcher Javier Pineda Ferreira, who located the only known individual plant, found in a secondary forest on the road from Leticia to Tarapacá, Columbia. The only known individual of this species has been observed in flower in January, April, May and September, with small greenish cream-colored flowers and highly aromatic, rather stout fruits. Because of the highly aromatic fruits, this species could be potentially sought after by vanilla growers.

***Vanilla karen-christianae* (Karremans and Lehmann 2018)** Found in the southeastern tip of Costa Rica, close to the border with Panama, plants were discovered growing on trees along a small creek and main highway in an area that is seeing agricultural and developmental activity. It is easily distinguished from all other Central American species by the combination of narrow leaves and the significantly smaller green-and-white flowers, and blooms from February to April. It is known only from a few locations near the southeastern municipality of Corredores, close to the border with Panama. The species name honors Karen Christiana Figueres Olsen, an internationally recognized Costa Rican leader on global climate change. *Vanilla karen-christianae* is now considered by the World Checklist to be a synonym of *Vanilla ensifolia* Rolfe, a widely distributed species found as far north as Mexico and as far south as Peru and northern Brazil (WCSPF 2021).

GUY CHIRON

FREDY ARCHILA

A.A. BARONA-COLMENARES

ADAM P. KARREMANS

[3] *Vanilla corinnae*
[4] *Vanilla dressleri* from Flanagan, et al. 2018.
[5] *Vanilla esquipulensis*
[6] *Vanilla javieri*
[7] *Vanilla ensifolia* as *Van. karen-christianae*
[8] *Vanilla labellopapillata* from Molineros-Hurtado, et al. 2014.
[9] *Vanilla marmoreisense* from Nicoletti De Fraga, 2017.
[10] *Vanilla norashikiniana*
[11] *Vanilla oroana*

***Vanilla labellopapillata* (Koch et al. 2013)** Found in the floodplain forest of Caxiuana National Forest, in the northeastern Brazilian Amazon, it is similar to *Vanilla insignis* and *Vanilla odorata,* but flower, leaf sizes and internode distances are different. Apparently, only two specimens were found.

***Vanilla marmoreisense* (Soto Calvo et al. 2019)** Found in Cuba, Isla de la Juventud, at Sierra Las Casas. It is lithophytic on marble outcroppings with vines up to 25 feet (8 m) long. Flowers are brown to light greenish-cream. This species is named for the marble outcroppings on which it occurs.

***Vanilla martinezii* (Soto Arenas and Dressler 2010)** Known only from eastern Guatemala but may also be found in adjacent wet areas of Belize and Honduras and possibly into Mexico. The locality is known to have populations of thermophilous plants, which are rare in other rainforest areas of Mexico. The substrates in this area are partially flooded and have peatlike soils. This *Vanilla* grows only on islets in the delta of the Polochic River into Lake Izabal and similar habitats near the coast in an area known as Golfete. Its habitat could be specific, since these islets have an unusual peat-like soil. It flowers in February and July with yellow-green sepals and petals and a white lip.

***Vanilla norashikiniana* (Raffi et al. 2017)** This new species was first collected in Hutan Simpan Semangkok, Selangor,

near streams in 2011. In April 2015, the same species was found in Hutan Lipur Chemerong, Hulu Dungun, Terengganu, Malaysia. The species has distinct flower characteristics including a brilliantly colored lip, which is widely trullate. Flowers do not fully open and have yellowish-green sepals and petals, which are faintly fragrant. This species is named after Her Majesty Tengku Permaisuri Selangor, Tengku Permaisuri Norashikin.

***Vanilla oroana* (Pérez et al. 2020)** Rediscovered after 30 years of being collected for the first time. The rediscovery significantly broadens the range of the species, which is between 3,000 and 5,600 feet (1,000–1,700 m) in the provinces of El Oro, Imbabura and Pichincha in Ecuador. Its inflorescence can be up to 1 ½ feet (45 cm) long. It flowers between April and December with sepals and petals that are green, and a white lip. The species is endemic to Ecuador and, in recent years, has been found in a number of forests, but is not common in any of these locations. Only a few isolated, flowering individuals have been found. It is probable that this species could be found as far north as Colombia. To the south, the province of El Oro is apparently the natural limit of distribution because this is where the humid bioregion of Chocó ends and the dry Tumbesina region begins.

***Vanilla paludosa* (Pansarin et al. 2012)** Known from the interior of the state of São Paulo, near the municipalities of São Simão, Brotas and Luiz Antônio, Brazil. In all three localities, it occurs in marshy forests. Plants were found growing on marshy soils, at about 2,800 feet (850 m). It flowers from June to September, with predominantly yellowish-green sepals and petals, and a predominantly white lip with three centrally and longitudinally disposed yellow keels. The paludose habit of this orchid is uncommon in *Vanilla*. Most species exhibit a terrestrial and hemi-epiphytic habit. The species name refers to the marshy habitat in which this species occurs (from the Latin "paludosus," meaning "swampy, marshy, boggy"). Much of the interior of the state of São Paulo has been converted to sugarcane cultivation, and thus *Vl. paludosa* can be considered an endangered species.

***Vanilla paulista* (Nicoletti De Fraga et al. 2017)** This species inhabits the mesophytic semideciduous forests of the municipalities of Jundiaí (in the Serra do Japi nature reserve), and Pradópolis, both in São Paulo State, Brazil. It is only known from the type specimens found by researchers. One or, rarely, two


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OMEROD AND COOTES

flowers open each morning. Each flower remains open for only about 12 hours. It is closely related to both *Vanilla dubia* and *Vanilla dungsii*, due to the shape and ornamentation of the lip. *Vanilla dungsii* is endemic to the dense ombrophilous forest of Rio de Janeiro, whereas *Vl. dubia* is restricted to the Atlantic Forest in the states of Espírito Santo, Rio de Janeiro and probably Minas Gerais. Their geographic distributions do not overlap.

***Vanilla pompona* subsp. *grandiflora* (Soto Arenas and Dressler 2010)** Originally identified and accepted as *Vanilla grandiflora* (WCSP 2020), it has been studied in conjunction with euglossine bees as pollinators and gatherers of vanilla scent. It is quite possible that euglossine bees may play a role in the dispersal of vanilla seeds (Lubinsky et al. 2006).

***Vanilla pompona* subsp. *pittieri* (Soto Arenas and Dressler 2010)** Originally identified and accepted as *Vanilla pittieri* (WCSP 2020), it can be found in Honduras, Nicaragua, western Costa Rica and the Pacific side of Panama. The flowers are large with light yellow sepals and petals, and a yellow-orange lip. The fragrant flowers are a favorite of euglossine bees.

***Vanilla pompona* subsp. *pompona* (Soto Arenas and Dressler 2010)** Found in the Mexican states of Nayarit, Jalisco, Colima, Michoacán, Guerrero, Oaxaca and Veracruz, it blooms from April to early June with showy pale-yellow sepals and petals


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and an orange-yellow lip. It has a strong, spicy, mint-like fragrance. It can be found from sea level up to 4,000 feet (1,200 m), but is more common at 1,000–3,000 feet (300–900 m) in several types of tropical forests: deciduous, subdeciduous, evergreen, and lower mountain forests, as well as gallery forests, savannas or warm pine–oak forests.

***Vanilla raabii* (Ormerod and Cootes 2013)** Found in the Philippines, it is easily distinguished from the other Philippine vanillas by the lip appearing to have only a single brush. Another unique characteristic is that the inflorescence bears three to four flowers open at once. The flowers, odorless or only slightly fragrant, have greenish, yellowish-green or green sepals and petals, and a white lip with purple lines and a pink throat.

***Vanilla rebecae* (Archila Morales et al. 2019)** Found near Municipio de Cobán, Alta Verapaz, Guatemala, at about 2,600 feet (800 m), it is somewhat similar to *Vanilla inodora*, with similar leaves and flowers of similar color, but can be differentiated by some features: the flower

is smaller, up to 1.5 inches (3.7 cm) long versus 1.7–2.0 inches (4.5–5 cm), sepals and petals are flat (vs. twisted), dorsal sepal elliptic (vs. linear-lanceolate), lateral sepals much wider and strongly veined (vs. almost without veins), petals rounded at the apex (vs. subobtuse) and lip slightly trilobed (vs. deeply trilobed). Moreover, *Vl. rebecae* is known only from Alta Verapaz in the center of the country whereas *Vl. inodora* is present in Guatemala in the departments of the southern coast. The species name is in honor of Rebeca Menchaca, PhD, researcher in the genus *Vanilla*.

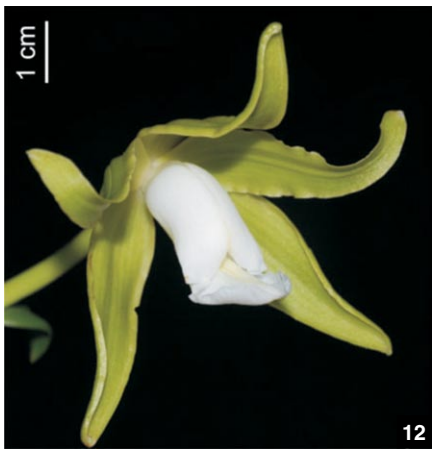
***Vanilla rivasii* (Molineros-Hurtado et al. 2014)** A fragrant vanilla from the Chocó biogeographic region of western (Pacific Coast) Colombia, named in honor of Luis Álvaro Rivas, a local farmer committed to sustainable agricultural practices and biodiversity preservation, who drew this orchid to the attention of the researchers. It has a long racemose inflorescence up to 2 feet (60 cm) in length, carrying up to 150 yellow flowers, with two to four flowers open simultaneously. The petals are pale yellow to cream in color. The sepals are yellowish-green outer, whitish-yellow inside. The lip is yellow, and the throat is yellow lined with dark yellow-ochre. The blossoms have a strong rose fragrance.

***Vanilla sanjappae* (Karthigeyan et al. 2014)** Found on Little Andaman Island (India), this rare orchid has flowers that are yellow, flushed with green, an epichile that is densely hairy and a hypochile with five pinkish lines on both sides. It blooms in April and May.

***Vanilla sarapiquensis* (Soto Arenas and Dressler 2010)** Known only from northern Costa Rica in the Llanura de San Carlos (Plain of San Carlos); it is possible that it might also be found in adjacent Nicaragua. It is known from a single collection from northern Costa Rica. The flowers are showy, ca. 3 inches (7 cm) in diameter; with sepals and petals that are green-cream and a lip that is white. *Vanilla costaricensis* is known from the same geographic area, but *Vl. sarapiquensis* is distinct in its much shorter inflorescences and larger flowers with much broader sepals and petals.

***Vanilla sotoarenasii* (Azofeifa-Bolaños, et al. 2017)** Found growing in sympatry with *Vanilla planifolia* in the province of Limón, Caribbean coast of Costa Rica, it is distinguished from *Vl. planifolia* by a reduction by about 30 percent of the size of the fruits and flowers and by the presence of anisic compounds and low content of phenolic compounds (including vanillin) in the fruits. The species name is dedicated to Miguel Angel Soto Arenas, (1963–2009), authority in orchid floristics and ecology, particularly in the *Vanilla* genus.

***Vanilla* × *tahitensis* (Lubinsky et al. 2008)** This hybrid *Vanilla* has puzzled researchers for years, because it does not exist in the wild. For a long time, it was thought to be a mutation that occurred when *Vl. planifolia* was taken from Mexico to the Philippines when both countries were ruled by the Spanish crown and subject to a large commercial exchange. Plants from the Philippines were subsequently taken to Tahiti where they thrived. The hybrid origin of *Vl. tahitensis* was suspected by Portères (1954) and Pétard (1986), each positing *Vl. planifolia* and possible hybridization with either *Vanilla pompona* or *Vanilla odorata*. Both *Vl. pompona* and *Vl. odorata*, native to the Neotropics (as is *Vl. planifolia)*, can be found growing in the same area and are in bloom at the same time. Both possess



PANSARIN AND MIRANDA

RAAB BUSTAMANTE

FRANCISCO MOLINEROS-HURTADO

E.R. PANSARIN

FREDY ARCHILA MORALES

SAMBIN AND CHIRON

[12] *Vanilla paludosa*
[13] *Vanilla paulista*
[14] *Vanilla raabii*
[15] *Vanilla rebecae*
[16] *Vanilla rivasii*
[17] *Vanilla sotoarenasii*

characteristics making them similar to *Vl. Tahitensis*; i.e., aroma of the fruit (a cinnamonlike aroma) and some vegetative characteristics. Lubinsky et al. (2008) provided strong support for the hybrid origin of *Vl. tahitensis* through extensive DNA analysis. This was recognized by Soto Arenas and Dressler (2010). Since then, Tahitian vanilla has been called *Vanilla × tahitensis*, the "×" referring to its hybrid nature. *Vanilla × tahitensis* is the only *Vanilla* "species" from which there are reports of diploid and tetraploid chromosome counts (another enigma).

Vanilla × tahitensis is listed on WCSP (2020) as a synonym, but it is listed as a synonym of itself, along with the hybrid formula of *Vl*. (*odorata × planifolia*). This is an artifact due to the fact that the checklist does not handle artificial hybrids. Although the hybrid nature is accepted by Soto Arenas and Dressler, it is not accepted by Margonska and Szlachetko (2010). Therefore, I consider this to have a "half-accepted" status — that is, at least for now.

***Vanilla utteridgei* (Soto Arenas and Cribb 2010)** Found in New Guinea, it has flowers that are 2 ½ inches (6 cm) across and are strongly fragrant. Blooming in November, the sepals and petals are 11-nerved and pale green. The lip is white and stained pale lilac-pink along either side. In lowland rainforests, this orchid is known to climb up to 165 feet (50 m).

***Vanilla yanesha* (Damián Parizaca 2019)** Known only from the district of Palcazu in the province of Oxapampa in the region of Pasco, close to the Cacazu River and from a single collection made on the limit of two protected natural areas, the Yanachaga Chemillen National Park and the San Matias San Carlos Protected Forest. It blooms in February with flowers that are predominantly greenish; sepals and petals are pale green, and the trilobed lip is white. The species name honors the Yanesha people, an ethnic group from the central rainforest of Peru. *Vanilla yanesha*, along with *Vl. oroana,* have perhaps the largest leaves in the genus, up to 12 inches (30 cm) long and 5 inches (12.4 cm) wide)

The efforts of researchers, those cited herein and others currently in progress, has given us much more information and insight into the genus *Vanilla* over the past 20 years. It is possible that in future years, one or more of these species will be proven to be of hybrid origin. Time and further research will only tell.

As may have been noted, many of the species mentioned above have very limited distribution, and in some cases only a few plants were ever found within a small area. A simple act as seemingly innocuous as a peasant clearing a small plot of land to build a house or a pen for his animals could render one of these species extinct. Forest fires or other natural disasters could do the same; all reasons for serious conservation actions. Because most species of *Vanilla* are considered rare and endangered, this only emphasizes the urgent need to conserve them through genetic analysis, propagation and conservation studies.

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—T.J. Hartung is a retired computer systems specialist and systems analyst. He designed computers and wrote computer software to manage hotels. His love for orchids began when he lived in southern California and started growing cymbidiums in his yard. For quite a few years, every secretary in the company where he worked received, anonymously, a cymbidium blossom on Valentine's Day.

Since retiring to Mexico, he has been rescuing orchids from downed trees and broken limbs before they are eaten by animals or washed down the streams and rivers into the sea. Much of what he knows about orchids he has learned in the laboratory of the great outdoors. The rest comes from online research and numerous books on the subject. He is on the board of directors of the Vallarta Botanical Garden and the International Friendship Club. In recent years he has given talks to orchid societies in the USA, Canada, England and Scotland (email: tjhartung@gmail.com).

Stanhopea tricornis

and Eugene Langlassé

BY RUDOLF JENNY

1

Stanhopea tricornis Lindley, *Journal of the Horticultural Society* 4:263.1849

SYNONYMS *Gerlachia tricornis* (Lindl.) D.L.Szlachetko, *Richardiana* 7:49.2007; *Gerlachia tricornis* var. *stenochila* (F.Lehmann and Kränzlin) D.L.Szlachetko, *Richardiana* 7:49.2007; *Stanhopea convoluta* Rolfe, *Bulletin of Miscellaneous Information Kew* 366.1909; *Stanhopea langlasseana* Cogniaux, *Gardeners' Chronicle ser. 3* 30:426.1901; *Stanhopea stenochila* Lehmann and Kraenzlin, *Gardeners' Chronicle ser. 3* 28:369.1900; *Stanhopea tricornis* subsp. *stenochila* (Lehmann and Kraenzlin) Dodson, *Orquideologia* 2:25.1967; *Stanhopea trilora* hort. ex McDowell, *The Orchid Picture Book* 33.1995 (nomen nudum or sphalm); *Stanhopea wallisii* Rchb.f., *Linnaea* 41:109.1877.

The basis of the first description of *Stanhopea tricornis* by John Lindley in 1849 in the *Journal of the Horticultural Society* was a plant that had been collected in Peru by Joseph von Warscewicz and then sent to George Ure Skinner in England. Lindley noted in his first description the position of the petals, this being unique within the genus *Stanhopea* and making this one of the more easily recognizable species. The petals are positioned forward parallel to the lip and the column, and with them form a channel instead of being folded backwards, as is the case in most other species. Lindley added a very exact drawing of the flower and the lip to the type specimen which is in Kew.

In 1877, Heinrich Gustav Reichenbach published *Stanhopea wallisii* in the journal *Linnaea*, this in connection with the treatment of a larger shipment of plants collected by Gustav Wallis in Colombia. The type material in the Reichenbach herbarium in Vienna shows clearly that *Stanhopea wallisii* is a synonym of *Stanhopea tricornis*. The type (no. 23052) consists of a single flower with the note "*Stanhopea wallisii*, Medellin, Wallis 72."

In 1909 Robert Allen Rolfe received flowers of a *Stanhopea* for determination from the collection of Florent Claes in Etterbeek, Belgium, which had originated from the Colombian department Antioquia. Rolfe described it in the same year in *Bulletin of Miscellaneous Information* (later *Kew Bulletin*) as *Stanhopea convoluta*, where he mentioned the close relationship with *Stanhopea tricornis*, but decided to keep *Stanhopea convoluta* as its own species based on larger flowers with blunter horns and an epichile only half as large as in *Stanhopea tricornis*.

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The colored illustration of *Stanhopea convoluta*, published in 1913 in *Curtis's Botanical Magazine*, shows that the differences mentioned by Rolfe in the first description are within the normal variability of *Stanhopea tricornis* and that *Stanhopea convoluta* is just another synonym of Lindley's taxon.

In 2007 Dariusz L. Szlachetko divided the genus *Stanhopea* by describing two new genera — *Gerlachia* and *Tadeastrum* — and reactivated the old genus *Stanhopeastrum* Rchb.f. He renamed *Stanhopea tricornis* Lindl. as *Gerlachia tricornis* (Lindl.) Szlachetko. In 1999 Günter Gerlach established a new intrageneric system for *Stanhopea*, where he described together with M.W. Whitten the new section *Tricornis* within the subgenus *Stanhopea* and moved *Stanhopea tricornis* Lindl. into this section. Both authors (Gerlach and Szlachetko) had the same idea, but realized it on different taxonomic levels.

Like many other species of the genus, *Stanhopea tricornis* appears to be very variable in coloration — the extreme forms with more or less dense and dark red spots have already been described twice as their own species, and also as varieties or subspecies of *Stanhopea tricornis*.

Alfred Celestin Cogniaux, Belgian botanist and editor of the famous *Dictionnaire Iconographique des Orchidées*, described in 1901 in the *Gardeners' Chronicle Stanhopea langlasseana*, from a plant collected by Eugéne Langlassé in the Rio Mir valley,


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[1] Flower of *Stanhopea tricornis*, courtesy of G. Angulo.
[2] Type of *Stanhopea langlasseana* from the herbarium of the National Botanic Garden of Belgium.
[3] Type of *Stanhopea tricornis* from the herbarium Kew. Photograph by R. Jenny, with the kind permission of the Director and Trustees of the Royal Botanic Gardens, Kew. ©Royal Botanic Gardens, Kew.
[4] Type of *Stanhopea convoluta* from the herbarium Kew.

Colombia, at 5,600 feet (1,700 m). The first illustration of this very decorative taxon was made by Alphonse Goossens and was then published shortly afterwards in the above-mentioned *Dictionnaire*. The plate shows without any doubt a red-spotted form of the already known *Stahopea tricornis* Lindl. The typical position of the sepals of *Stanhopea tricornis* is very clearly visible. The same coloration is mentioned in 1900 by F.C. Lehmann and F. Kränzlin in their description of *Stanhopea stenochila* in the *Gardeners' Chronicle*.

The description was based on a plant collected by F.C. Lehmann in Colombia; unfortunately, the type of this plant has been lost.

In a revision of the *Stanhopea* species of Colombia in the journal *Orquideologia* in 1972, Calaway Dodson reduced *Stanhopea stenochila* to *Stanhopea tricornis* subsp. *stenochila*, and gave the taxon of Lehmann and Kränzlin the rank of a subspecies declaring simultaneously that *Stanhopea langlasseana* from 1901 was a synonym. Based on the plants that have shown up in collections over recent years, it seems clear that all the spotted forms labeled as *Stanhopea stenochila*, *Stanhopea tricornis* var. *stenochila*, *Stanhopea tricornis* subsp. *stenochila* or *Stanhopea langlasseana* are, in fact, only spotted forms of Lindley's concept of *Stanhopea tricornis.*

Two different chemotypes of *Stanhopea tricornis* are known. The populations in Ecuador differ in their fragrance composition from those in Colombia. In both populations the main component is the same, but there is a different second compound. Therefore, the relatively contradictory results of the fragrance analysis of *Stanhopea tricornis* is to be considered on the basis of the two chemotypes.

Stanhopea tricornis Lindley and *Stanhopea reichenbachiana* Roezl ex Rchb.f. are both distributed in Colombia in the same areas and in a common elevational range and produce a very similar fragrance composition. So it was to be expected that, sooner or later, natural hybrids would show up. Actually a first proof of such an expected hybrid was found in 1981 in the collection of Robert Dressler at the Smithsonian Tropical Research Institute in Panama. The preserved flowers originated from a plant collected in Colombia by Alvaro Mejia. In the following years, several plants of this hybrid showed up in European collections. The hybrid was described in 1989 in *Die Orchidee* as *Stanhopea* × *herrenhusana.* The plant was cultivated in the collection of the Herrenhäuser Gärten in Hannover, Germany, a place with a great reputation for being very rich in seldom-seen orchid species, especially of the Stanhopeinae.

Comparison with the flowers of the two parent species clearly show that the hybrid, morphologically speaking, lies exactly in the middle, the flowers of the hybrid showing characteristics of both parents. The third horn, which gave rise to the name *Stanhopea tricornis*, is also visible in the hybrid. *Stanhopea*

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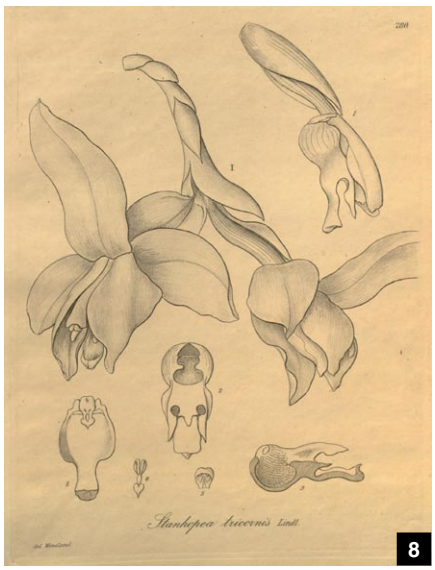
× *herrenhusana* has a much bigger and bulgier hypochile than *Stanhopea tricornis*, strongly reminiscent of the other parent, *Stanhopea reichenbachiana*. Both parents, within the expected individual variability and excluding a few secondary components, have the same fragrance composition. The two parents are known to have different pollinators; however, the similarity of the fragrances *and* the existence of a natural hybrid that is clearly intermediary would indicate that possibly not all active pollinators of both parents are known, and that there exists at least one common pollinator. The hybrid is fertile; cultivated clones have been successfully pollinated and produced seed.

Eugéne Langlassé was the son of a gardener living near Paris, his birth date is unknown but was most probably either 1864 or 1865. Nothing is known about his youth and education. Under the sponsorship of Alexandre Godefroy-Lebeuf, a horticulturist in Paris interested in ornamental and economically important tropical plants, Langlassé traveled to Cochinchina (today southern Vietnam); the dates of this first trip are not known. In 1894 he started a second trip to East Asia, this time at his own expense. Langlassé traveled via Sri Lanka and Singapore to Borneo. From October 1894 to January 1895, he visited the Philippines. In late spring or early summer 1895, Langlassé returned to Paris, together with a collection of about 600 dried specimens. In the *Revue Horticole* he published a series of articles about his travels, for example, about Bambus and Palms. One of those papers was about the *Phalaenopsis* of the Philippines (1995), where Langlassé gave detailed information about the climate of regions where he had found *Phalaenopsis* species.

To study the horticultural possibilities in Guerrero and Michoacan, Mexico, Langlassé left Europe in February 1898 for Mexico. He was chosen for this task following a proposal by Edouard Andre; the travel was sponsored by Marc Micheli, botanist and horticulturist in Geneva, Switzerland, and Paul Mirabaud, president of the Compagnie d'Inguaran, a French mining company. Mirabaud was interested in the mineral resources of Michoacan and Guerrero. In May 1899 Langlassé sent a first shipment of dried plants to Europe. He stayed in Mexico until July 1899; then, based on a suggestion by Edouard Andre, he left via Panama for Colombia. In August 1899 he reached Tumaco in Colombia. Langlassé had traveled to



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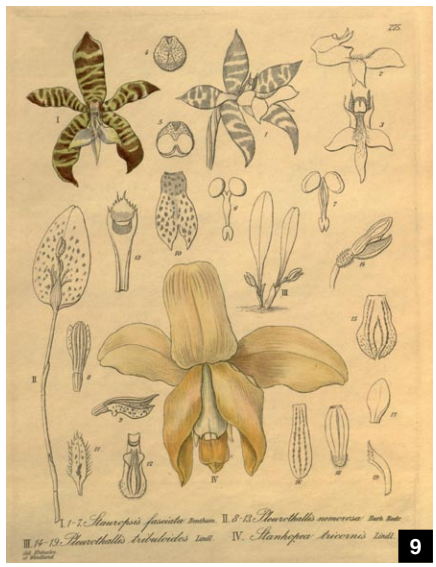

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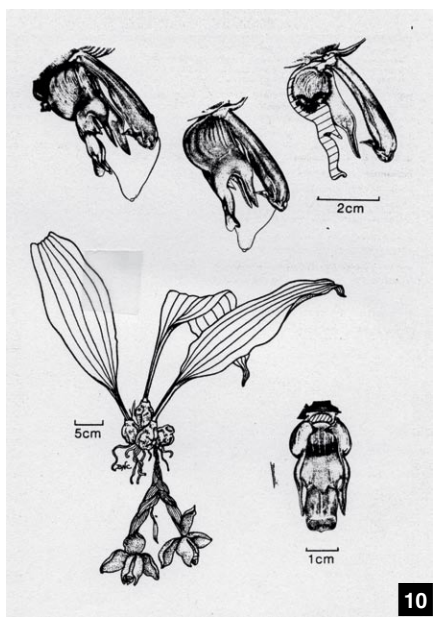
Tumaco under the erroneous assumption that he would find a French consulate in the village. Thus, he had to arrange to have his funds sent from France through the Chilean consul in Barbacoas, about 103 miles (165 km) away, a complicated process that hindered him throughout his stay in Colombia.

Langlassé began his exploration of Colombia with a trip to Barbaroas, continuing then to Altaquer. From there he explored the mountains to the southwest, at elevations between 4,600 and 5,600 feet (1,400–1,700 m), close to the Ecuadorean boundary. As he wrote to Micheli from Tumaco on September 14, 1899, he collected in these mountains 33 living plants that he shipped via Panama — mostly orchids, aroids and bromeliads. Most probably the type of *Stanhopea langlasseana* (collection number 23) was part of this shipment. The plant was collected in September 1899 on a mountain southeast of Altaquezo, Rio Mira valley, at about 5,600 feet (1,700 m). After exploring the rivers Mira and Nulpe, Langlassé traveled west over the mountains to Cali and Popayán. It was there that he collected most of the over 100 herbarium specimens known from his Colombian expedition. A letter to Micheli written from Popayán and dated November 16th was Langlassé's last communication before his death. By the beginning of 1900 he planned to return to Europe, but in Buenaventura he suffered an attack of yellow fever and died on either January 16 or 19, 1900.



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[5] Plate of *Stanhopea tricornis* as *Stanhopea convoluta* from *Curtis's Botanical Magazine*, 1913.
[6] Plate of *Stanhopea tricornis* as *Stanhopea langlasseana* from *Cogniaux' Dictionnaire Iconographique des Orchidées*, 1903.
[7] Plate of *Stanhopea tricornis* from *Floral Magazine*, 1881.
[8–9] Drawings of *Stanhopea tricornis* from *Xenia Orchidacea*, 1894.
[10] *Stanhopea tricornis* from *Icones Plantarum Tropicarum*, 1980, courtesy of C.H. Dodson.

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[11] *Stanhopea reichenbachiana*, courtesy of Dick Hartley. Close-up inset photograph of *Stanhopea reichenbachiana* and pollinator courtesy of G. Angulo.
[12] *Stanhopea* × *herrenhusana*, the natural hybrid between *Stanhopea tricornis* and *Stanhopea reichenbachiana*, courtesy of Dick Hartley.

Orchids of Bhutan

The Bhutan Thunder Dragon Orchid Team Gets a New Member

BY PEM ZAM/PHOTOGRAPHS, UNLESS OTHERWISED CREDITED BY THE AUTHOR

MY NAME IS Pem Zam and I was born 26 years ago in the small village of Ngyachegyelkha, under the Rubesa Geog, which is located just across the confluence of Puna Tsangchu and Dangchu rivers, opposite the Wangdue Phodrang "Dzong" (traditional temple, fortress and judicial center). I have been very fond of plants and wildlife in general since my high school days, and I remember wanting to dissect any flower that I could find to study the different parts. Thanks to my interest in the field of biology I was fortunate to receive a scholarship to study for a bachelor's of science in forestry (honors) at the Sam Higginbottom University of Agriculture, Technology and Sciences in Allahabad (now Prayagraj), Uttar Pradesh, India. I graduated college in 2018 and began preparing for the Royal Civil Service Examination. I cleared the exam and was then given the opportunity to select the placement for my job. On my list of preferred placements, my first choice was the National Biodiversity Centre (NBC), a nondepartmental branch of the Ministry of Agriculture and Forests, Royal Government of Bhutan, followed by the Royal Manas National Park. I sought guidance from the seniors at the NBC, because I had an internship there during my final year of college and that helped in making up my mind. So, I joined the staff of the NBC and was placed at the Royal Botanical Garden (RBG), which is a part of the NBC and located in Serbithang, just south of the capital city of Thimphu. Back before I joined the NBC, I was always intrigued by the new species of flora and fauna that were continually being discovered in our small kingdom of just under 15,000 mi² (38,394 km²). It was amazing to learn how rich our biodiversity was and that we had so many endemic and endangered plants and animals. The discovery of the new orchid species (*Spathoglottis jetsuniae* Gyeltshen, Tobgyel and Dalström), and dragonfly (*Megalestes gyalsey* Gyeltshen, Kalkman and Orr) and naming them in honor of our royal family was a pure gesture of the love and respect we have for our leaders.

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[1] The Wangdue Dzong, seen from the author's home window.
[2] The forest across the river is lush and untouched.
[3] One of the first plants of *Chiloschista gelephuense* discovered in situ. This particular tree was cut for firewood sometime after the photo was taken.

After joining the staff at the Royal Botanical Garden and attending several national events such as the 5th Royal Bhutan Flower Exhibition and the 112th National Day for the venue beautification, I realized that I was not learning enough, but I was still happy that I was experiencing new things about ornamental plants and flowers and enjoyed exploring our native

flora, which has so much ornamental and medicinal value. A year later, I decided to challenge myself and become a woman who worked out in the field. In February of 2020, Stig Dalström, an American orchid taxonomist, happened to visit Bhutan as part of the ongoing Thunder Dragon Orchid Conservation Project, and was planning a field trip to the southeastern part of Bhutan together with some of my more experienced colleagues. I thought it was the perfect opportunity to get to do what I really wanted to do and asked if I could come along. At first, I was really skeptical as to how they would react to having a female joining their otherwise all-male team. But they welcomed me without hesitation and off we went in search of rare and endangered orchids in southeastern Bhutan. I have never been on a journey like that before, so I was excited to learn more about the orchids of my country. Perhaps the highlight was when we finally got to see the elusive and so far endemic *Chiloschista gelephuense* C.Gyeltshen and Dalström in its natural habitat.

I have seen many of our orchid species in the orchidarium at the RBG, but never actually studied them in their natural habitats. The main objective of the trip was to survey the health and distribution of the only known *Chiloschista gelephuense* population. We therefore began the search for this elusive orchid north of Gelephu Tshachu (hot springs) where it was first discovered. Sadly, the original collection site had been cleared for firewood, with many bushes and trees cut along the footpath leading to a household. We searched the area carefully but did not find any traces of the orchid for a long, disheartening time. Just as we were beginning to lose hope of finding any plants, I suddenly discovered the typical roots of a *Chiloschista* hugging a branch of a dense bush. The plant was leafless, as expected during the drier months of the year, but had two inflorescences carrying several seed capsules. It was an amazing feeling of both accomplishment and relief finding at least one plant in the type locality. We hoped that maybe the plants were still there and that we just did not see them. But we were also afraid that the population might have been reduced drastically or even eradicated almost completely because of the clearing in the area. After some more intense searching, however, we managed to discover a few more plants growing well hidden in another dense bush, which made us more optimistic about this rare species' future. We photographed the plant and the host bush, later identified as a *Celastrus* species by my senior Kezang Tobgay. We then unanimously decided to bring back one of the seed capsules to Dr. Sureeporn Nontachaiyapoom, a Thai volunteer temporarily associated with the RBG to teach artificial seed propagation. Amazingly, this has resulted in 32 *C. gelephuense* plantlets growing successfully in glass jars at NBC. Because of how vulnerable this rare species is to habitat destruction, the danger of losing the only known population was of huge concern.

On this trip I learned so much from the orchid expert Stig Dalström, my senior

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[4] The forest along the trail leading to the *Chiloschista gelephuense* site, however, has been cleared recently.

[5] Fortunately, a few additional plants of *Chiloschista gelephuense* were discovered inside a dense bush. From the left: Choki Gyeltshen, Dupchu Wangdi and the author Pem Zam.

[6] *Chiloschista* plants can be very difficult to see, particularly when they are leafless. Insert photograph by Stig Dalström: The flowers of *Chiloschista gelephuense*, flowered in cultivation at the Royal Botanic Garden in Serbithang, Thimphu, Bhutan.

[7] One of several flasks of artificially propagated seedlings of *Chiloschista gelephuense*.

[8] The author Pem Zam was the lucky rediscoverer of a healthy plant of *Chiloschista gelephuense*, carrying two inflorescences with several seed capsules.

colleague Choki Gyeltshen, our support staff and our main orchid grower Dupchu Wangdi. It is mind boggling how orchid seeds germinate and grow by tricking fungi into feeding them the necessary nutrients and sugar. Many orchids also trick their pollinators into pollinating them by mimicking the appearance of the pollinators' mates, or the flowers of their food plants, and they often grow in the most inhospitable of places. Though my main interest is studying flowering plants in general and orchids in particular, I never felt comfortable with how and where to start researching and learning about them until after this trip. It is also frightening and challenging to realize that many of our animal and plant species may become extinct even before they are discovered. This trip taught me how important it is to conserve our natural habitats to prevent biodiversity loss for real.

I have worked with Dr. Sureeporn and, together with my colleague Ms. Tshering Wangmo, I have learned how to micropropagate orchids in the laboratory. It has been a success so far and we have obtained many orchid plantlets. We are also in the process of constructing a better micropropagation laboratory at the Royal Botanical Garden. With the new laboratory completed we should be able to propagate and cultivate all the prioritized orchid species irrespective of their growing seasons and with special attention to the rare and endangered ones. Large-scale cultivation would be of enormous help in decreasing the collection of wild orchids and even potentially reintroducing endangered ones to their natural habitats. I want to continue on this journey of plant studies and habitat conservation, but realize that being a woman in this field can be challenging. Given the right motivation and support, however, I believe every person is capable of becoming a hero of nature regardless of gender.

Acknowledgments

I thank my parents Mr. Singye and Mrs. Tauchu Mo, who are hard-working farmers and made it possible for me to pursue this career choice. I also thank and acknowledge Dr. Tashi Y. Dorji, former Program Director of NBC, the current Program Director of NBC, Dr. Karma Dema Dorji and my senior colleagues at NBC for their support and guidance. My sincere appreciation goes to Stig Dalström for encouraging me to begin writing articles. I particularly thank Dr. Sureeporn Nontachaiyapoom for her expertise in propagating orchid species at NBC.

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— Pem Zam, Biodiversity Officer, National Biodiversity Centre, Ministry of Agriculture and Forests, Serbithang, Thimphu, Royal Government of Bhutan.

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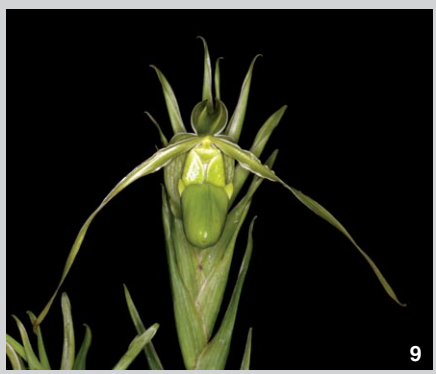
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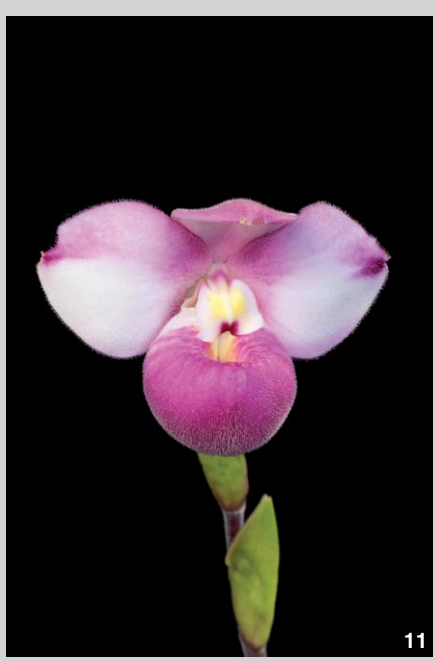
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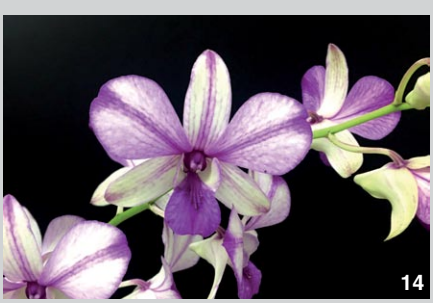
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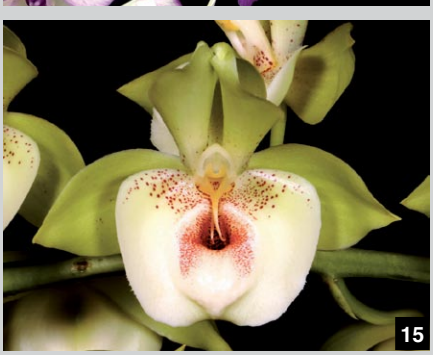
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[1] *Paphiopedilum villosum* f. *aureum* 'Piping Rock' AM/AOS 81 pts. Exhibitor: Leslie Ee, N.D.; Photographer: Ed Cott. Toronto Judging

[2] *Catamodes* Dragons Glade 'B-C' AM/AOS (Dragons Tail x *Catasetum* Orchidglade) 83 pts. Exhibitor: B. Butts- C. Lefaive; Photographer: Ed Cott. Toronto Judging

[3] *Clowesetum* Joy Prout 'Howard P. Martin' AM/AOS (*Clowesia* Rebecca Northen x *Catasetum semicirculatum*) 82 pts. Exhibitor: Howard Peter Martin; Photographer: Ed Cott. Toronto Judging

[4] *Cattleya* Irene Teo Lai Kheng 'Floral Hill Susan' HCC/AOS (Aloha Case x *coccinea*) 77 pts. Exhibitor: Sue and Jerry Finger; Photographer: Ed Cott. Toronto Judging

[5] *Paphiopedilum* Braeton 'Howard P Martin' HCC/AOS (*tonsum* x *braemii*) 79 pts. Exhibitor: Howard Peter Martin; Photographer: Ed Cott. Toronto Judging

[6] *Paphiopedilum charlesworthii* f. *sandowiae* (album) 'Coy' HCC/AOS 77 pts. Exhibitor: Tropical Gardens Orchids; Photographer: Judith Higham. Western Canada Judging

[7] *Paphiopedilum x vietenryanum* 'Lussier' CCM/AOS (*gratrixianum* x *henryanum*) 80 pts. Exhibitor: Raymond Lussier; Photographer: Thang Dam. Toronto Judging

[8] *Paphiopedilum* Doug Kennedy 'Chocolate 50' HCC/AOS (Enzan Win Fire x Yi-Ying Colorful Clouds) 79 pts. Exhibitor: Doug and Terry Kennedy; Photographer: Ed Cott. Toronto Judging

[9] *Phragmipedium longifolium* 'Zephyrus Mint' HCC/AOS 79 pts. Exhibitor: John Doherty; Photographer: Ed Cott. Toronto Judging

[10] *Oncostele* Memoria Flore Lussier 'Flore Lussier' AM/AOS (Moira Kavanaugh x *Oncidium maculatum*) 81 pts. Exhibitor: Raymond Lussier; Photographer: Thang Dam. Toronto Judging

[11] *Phragmipedium fischeri* 'Teggin' HCC/AOS 78 pts. Exhibitor: Sandy Larson; Photographer: Judith Higham. Western Canada Judging

[12] *Bulbophyllum sicyobulbon* 'Jardin botanique de Montréal' CCM-HCC/AOS 81-78 pts. Exhibitor: Jardin botanique de Montréal; Photographer: Thang Dam. Toronto Judging

[13] *Rhyncattleanthe* Velvet Fire 'Howard P. Martin' AM/AOS (Star Fire x *Rhyncholaeliocattleya* Velvet Rubies) 82 pts. Exhibitor: Howard P. Martin; Photographer: Charles Ufford. Toronto Judging

[14] *Dendrobium* Pop Eye 'Louisiana' AM/AOS (Nopporn White x Walter Oumae) 81 pts. Exhibitor: Al Taylor; Photographer: Wilton Guillory. Shreveport Judging

[15] *Catasetum* Richard Fulford 'Nicola Four' AM/AOS (Orchidglade x *lucis*) 84 pts. Exhibitor: Richard Fulford; Photographer: Tom Kuligowski. West Palm Beach Judging

[16] *Maxillaria magliana* 'Macarena' CHM/AOS 84 pts. Exhibitor: Carol Villenas; Photographer: Walter H. Wust. Puerto Rico Judging


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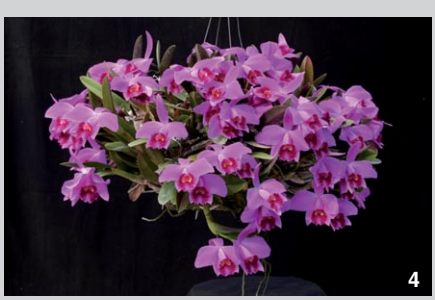
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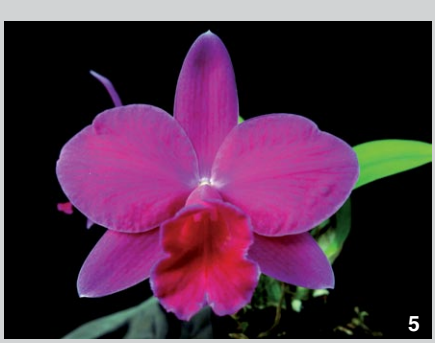
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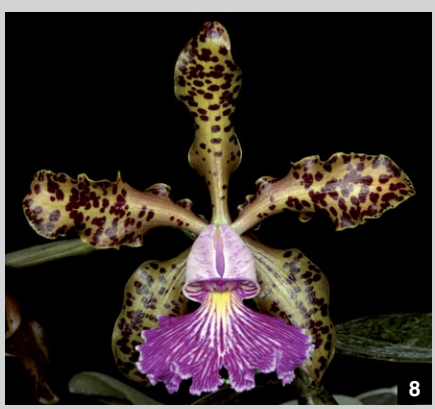
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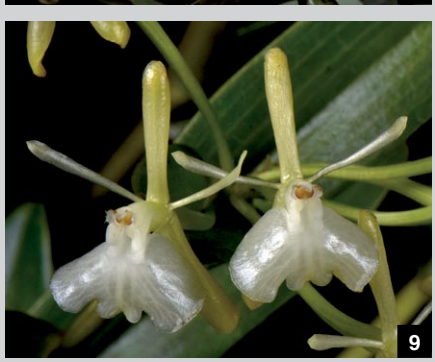
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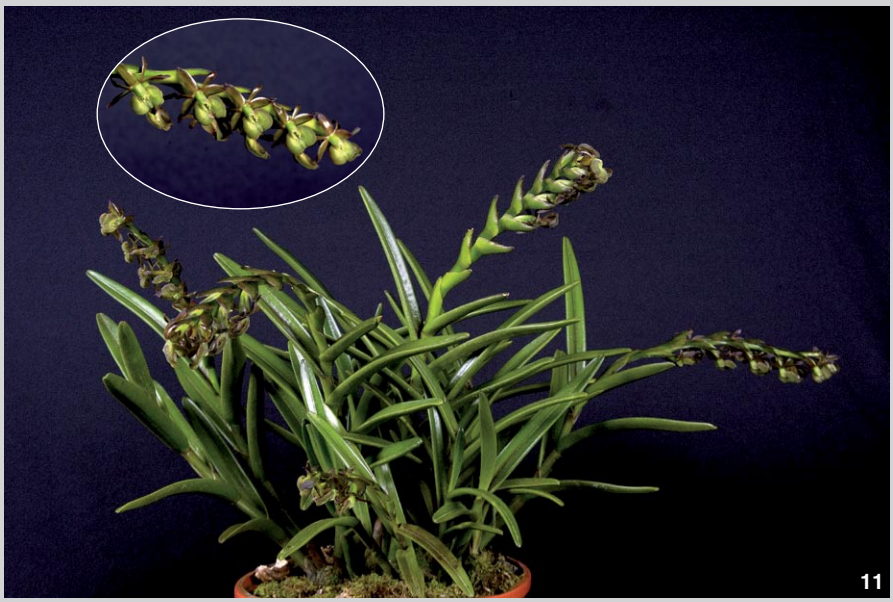
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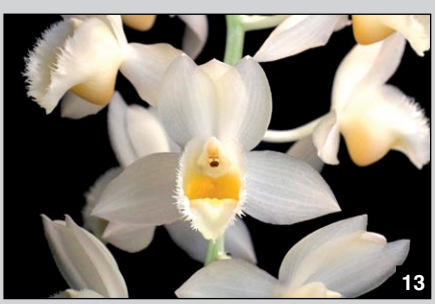
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[1] *Guarianthe skinneri* (Oculata) 'Old Times' CCM/AOS 81 pts. Exhibitor: Manuel Arias Sr.; Photographer: Walter H. Wust. Puerto Rico Judging

[2] *Oncidium gramineum* 'Nicolasa' CCM/AOS 81 pts. Exhibitor: Carol Villenas; Photographer: Walter H. Wust. Puerto Rico Judging

[3] *Catasetum arietinum* 'B-C' CHM/AOS 80 pts. Exhibitor: B. Butts- C. Lefaive; Photographer: Ed Cott. Toronto Judging

[4] *Cattleya pumila* 'Dark Star' CCE/AOS 90 pts. Exhibitor: Santa Barbara Orchid Estate; Photographer: Wayne Ferrell. Pacific South Judging

[5] *Cattleya* Seagulls Crawfish Pie 'Diamond Orchids' AM/AOS (*pumila* x *brevipedunculata*) 81 pts. Exhibitor: Peter T. Lin; Photographer: Peter T. Lin. Pacific South Judging

[6] *Rhyncholaeliocattleya* Ornamentales Ledezma 'Francisco' AM/AOS (Goldenzelle x *Cattleya* Hardyana (1899)) 80 pts. Exhibitor: Magdalena Ledezma; Photographer: Jorge Enrique Céspedes Trigueros. Puerto Rico Judging

[7] *Rhyncholaeliocattleya* Carlos Magdiel 'Arias Granados' AM/AOS (Oconee x Royal Reason) 82 pts. Exhibitor: Carlos Granados; Photographer: Jorge Enrique Céspedes Trigueros. Puerto Rico Judging

[8] *Cattleya schilleriana* (1857) 'Erick' AM/AOS 84 pts. Exhibitor: Erick Arce; Photographer: Jorge Enrique Céspedes Trigueros. Puerto Rico Judging

[9] *Epidendrum carnevalii* 'MAVA' AM/AOS 80 pts. Exhibitor: Manuel Hidalgo; Photographer: Jorge Enrique Céspedes Trigueros. Puerto Rico Judging

[10] *Rhyncholaeliocattleya* Memoria Hiroko Oshiro 'Alejandro' AM/AOS (*Cattleya* Horace x Goldenzelle) 83 pts. Exhibitor: Alejandro Rodríguez Cheung; Photographer: Jorge Enrique Céspedes Trigueros. Puerto Rico Judging

[11] *Epidendrum coriifolium* 'Marisol' CCM/AOS 83 pts. Exhibitor: Norman Steller; Photographer: Jorge Enrique Céspedes Trigueros. Puerto Rico Judging

[12] *Cattleya* Lulu Land 'Lousid8' HCC/AOS (Lulu x *aclandiae*) 77 pts. Exhibitor: Frank Zachariah; Photographer: Wilton Guillory. Shreveport Judging

[13] *Clowesetum* B-C Fernande 'Oscar' HCC/AOS (*Clowesia* Rebecca Northen x *Catasetum* Marsh Hollow) 76 pts. Exhibitor: Oscar Dalmao; Photographer: Ed Cott. Toronto Judging

[14] *Cattlianthe* Sandra Laura 'Sunset Valley Orchids' AM/AOS (Pink Treasure x Orchidglade) 82 pts. Exhibitor: Fred Clarke; Photographer: Peter T. Lin. Pacific South Judging

[15] *Cattleya maxima* (Coerulea) 'Anita' AM/AOS 81 pts. Exhibitor: Giancarlos Boricelli; Photographer: Walter H. Wust. Puerto Rico Judging

[16] *Epidendrum ciliare* 'Francisca Flores' CCM/AOS 84 pts. Exhibitor: Rebeca Zamora; Photographer: Jorge Enrique Céspedes Trigueros. Puerto Rico Judging


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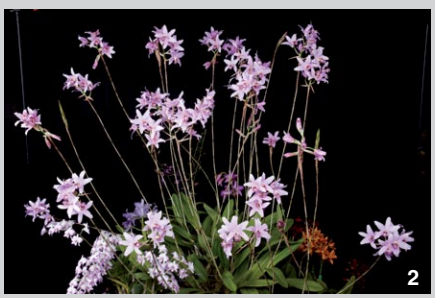
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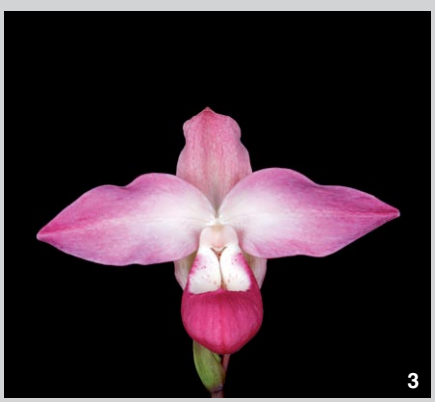
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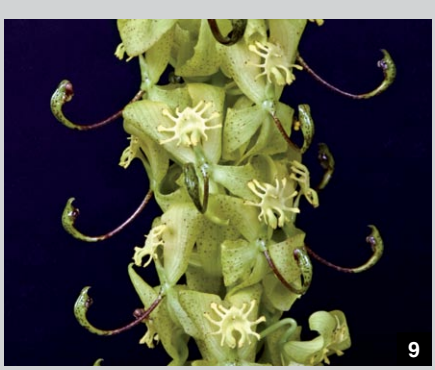
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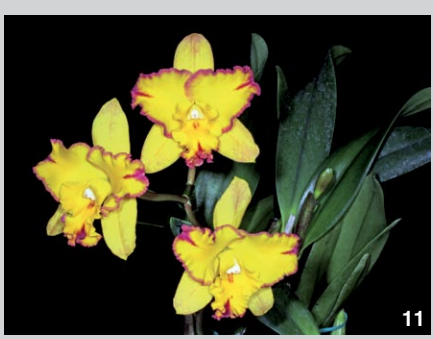
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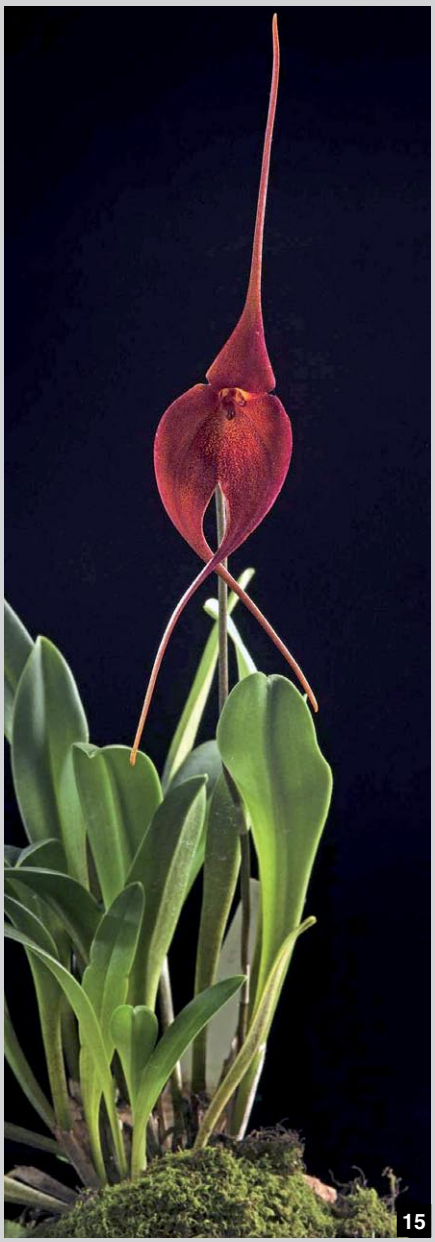
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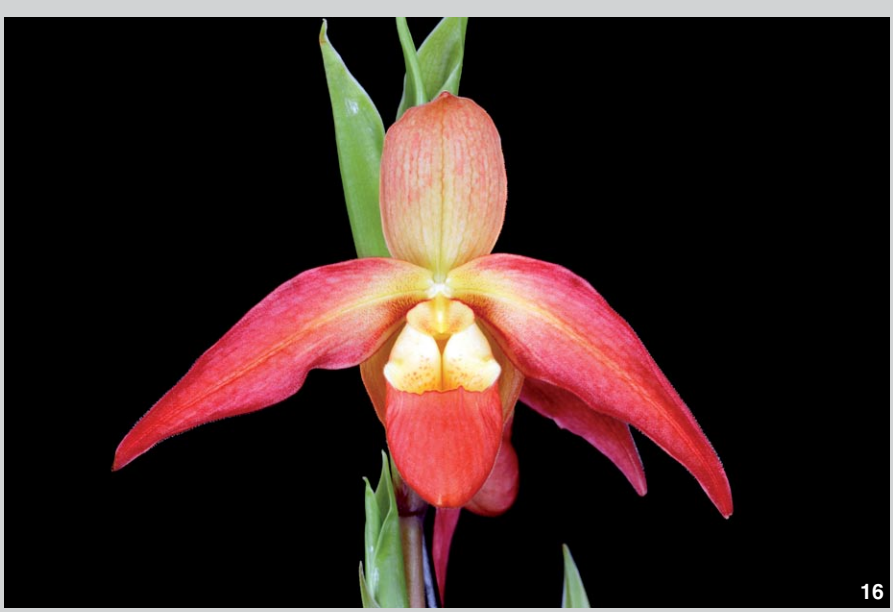
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[1] *Cattleya* Michelle's High Bid 'Fuschia Star' AM/AOS (Sierra Doll x Mini Purple) 81 pts. Exhibitor: Donna Ballard; Photographer: Arthur Pinkers. Pacific South Judging

[2] *Laelia* Summit 'Sunset Valley Orchids' CCE/AOS (*anceps* x *lyonsii*) 92 pts. Exhibitor: Ruben Colmenares; Photographer: Arthur Pinkers. Pacific South Judging

[3] *Phragmipedium* Peruflora's Spirit 'Arnie' AM/AOS (*kovachii* x Eric Young) 84 pts. Exhibitor: Arnold Gum; Photographer: Arthur Pinkers. Pacific South Judging

[4] *Phragmipedium* Incan Treasure 'Arnie II' HCC/AOS (*kovachii* x *longifolium*) 77 pts. Exhibitor: Arnold Gum; Photographer: Arthur Pinkers. Pacific South Judging

[5] *Prosthechea pulchra* 'Del Rosario' CHM/AOS 82 pts. Exhibitor: Manuel Arias Sr.; Photographer: Walter H. Wust. Puerto Rico Judging

[6] *Paphiopedilum* Luna Spots 'Hypnotic' AM/AOS (Luna Magic x Spots Galore) 87 pts. Exhibitor: Fred Capriccio; Photographer: Arthur Pinkers. Pacific South Judging

[7] *Cymbidium haematodes* 'Fang Hua' HCC/AOS 78 pts. Exhibitor: Jack Zhu; Photographer: Arthur Pinkers. Pacific South Judging

[8] *Rhynchobrassoleya* Remar's Adventure 'La Macha' HCC/AOS (*Rhyncholaeliocattleya* Toshie Aoki x *Brassavola nodosa*) 78 pts. Exhibitor: Vera Saenz; Photographer: Jorge Enrique Céspedes Trigueros. Puerto Rico Judging

[9] *Cycnoches aureum* 'Juana' AM/AOS 86 pts. Exhibitor: Jeremy Quesada; Photographer: Jorge Enrique Céspedes Trigueros. Puerto Rico Judging

[10] *Catamodes* Dragons Glade 'Dragon's Fire' AM/AOS (Dragons Tail x *Catasetum* Orchidglade) 82 pts. Exhibitor: Fred Clarke; Photographer: Peter T. Lin. Pacific South Judging

[11] *Cattlianthe* Straight Aussie 'Aurora Vision' AM/AOS (*Aussie Sunset x Straight Answer*) 81 pts. Exhibitor: New Vision Orchids; Photographer: Lynn O'Shaughnessey. Great Lakes Judging

[12] *Masdevallia* Carl Djerassi 'Doña Ligia' HCC/AOS (*coccinea* x *davisii*) 78 pts. Exhibitor: Manuel Arias Sr.; Exhibitor 2: Manuel Arias; Photographer: Walter H. Wust. Puerto Rico Judging

[13] *Oncidium* Tiger Brew 'Manuel Morán' AM/AOS (Memoria Rudolf Pabst x Tiger Hambühren) 81 pts. Exhibitor: Manuel Morán; Photographer: Walter H. Wust. Puerto Rico Judging

[14] *Bulbophyllum fascinator* (Aureum) 'Green Dragon' HCC/AOS 78 pts. Exhibitor: Peter T. Lin; Photographer: Peter T. Lin. Pacific South Judging

[15] *Masdevallia* Urubamba 'Gabriel Arias' AM/AOS (*ayabacana* x *veitchiana*) 84 pts. Exhibitor: Manuel Arias Sr.; Photographer: Walter H. Wust. Puerto Rico Judging

[16] *Phragmipedium* Rocquier 'Arnie' AM/AOS (Nicholle Tower x Eric Young) 82 pts. Exhibitor: Arnold Gum; Photographer: Arthur Pinkers. Pacific South Judging


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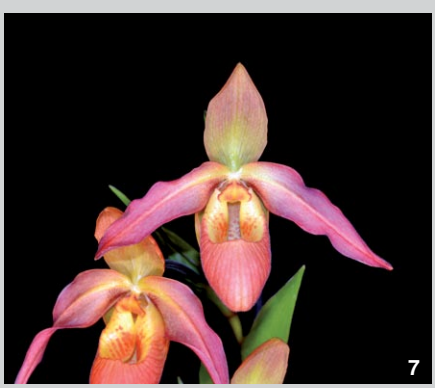
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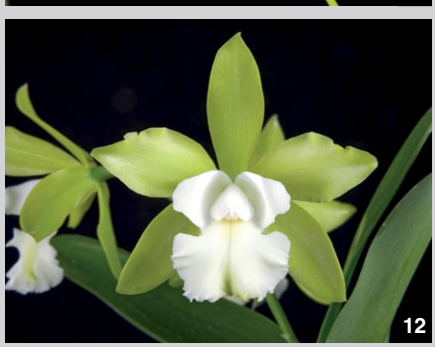
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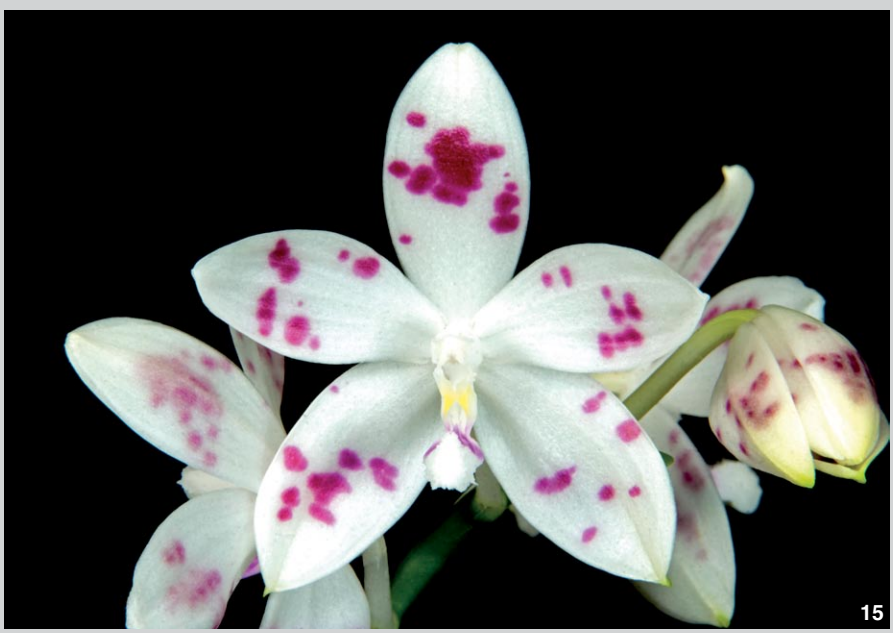
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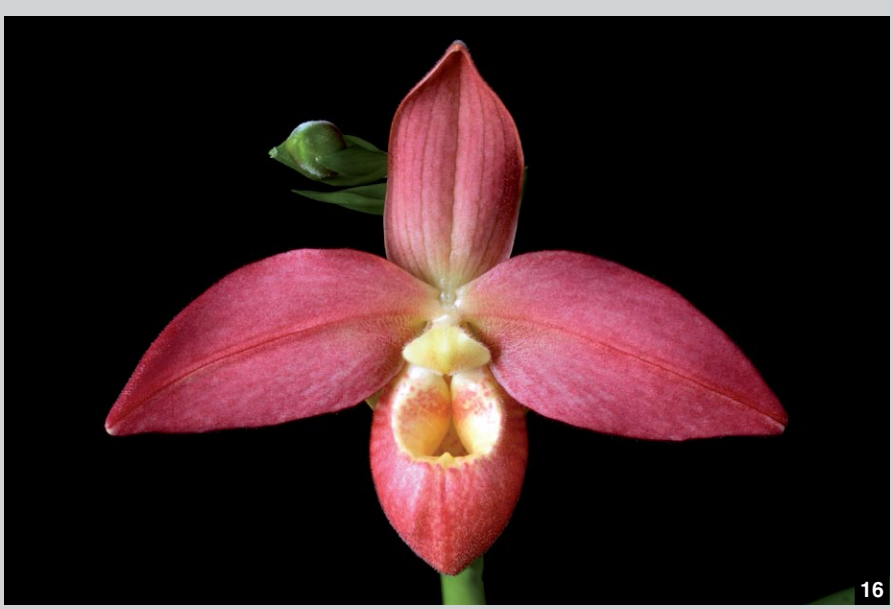
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[1] *Habenaria* Tanager 'Cheboygan' HCC/AOS (*xanthocheila* x *rhodocheila*) 77 pts. Exhibitor: Jim Heilig; Photographer: Ken Jacobsen. Pacific Central Judging

[2] *Habenaria* Tanager 'Charlevoix' AM/AOS (*xanthocheila* x *rhodocheila*) 82 pts. Exhibitor: Jim Heilig; Photographer: Ken Jacobsen. Pacific Central Judging

[3] *Habenaria rhodocheila* subsp. *rhodocheila* 'Ingham' AM/AOS 82 pts. Exhibitor: Jim Heilig; Photographer: Ken Jacobsen. Pacific Central Judging

[4] *Cymbidium ensifolium* 'Xiang He' HCC/AOS 79 pts. Exhibitor: Jack Zhu; Photographer: Arthur Pinkers. Pacific South Judging

[5] *Catasetum* Fong Cing 'Rory' HCC/AOS (José Abalo x Orchidglade) 79 pts. Exhibitor: Chaunie Langland; Photographer: Ken Jacobsen. Pacific Central Judging

[6] *Cattleya* Indigo Love 'Lavender Fantasy' HCC/AOS (Indigo Dawn x Love Knot) 77 pts. Exhibitor: Japheth Ko; Photographer: Ken Jacobsen. Pacific Central Judging

[7] *Phragmipedium* QF Aloha 'Hunter's Moon' HCC/AOS (QF Naukana Kealoha x *dalessandroi*) 77 pts. Exhibitor: John McCallen; Photographer: Ken Jacobsen. Pacific Central Judging

[8] *Fredclarkeara* Midnight Depth 'Sunset Valley Orchids' AM/AOS (Midnight Sky x *Catasetum* John C. Burchett) 87 pts. Exhibitor: Fred Clarke; Photographer: Arthur Pinkers. Pacific South Judging

[9] *Cattleya* Sierra Doll 'Portola' HCC/AOS (*walkeriana* x Pink Doll) 78 pts. Exhibitor: Japheth Ko; Photographer: Chaunie Langland. Pacific Central Judging

[10] *Cymbidium kanran* 'Red in Snow' JC/AOS. Exhibitor: Ken and Amy Jacobsen; Photographer: Chaunie Langland. Pacific Central Judging

[11] *Bulbophyllum septemtrionale* 'Chasus' HCC/AOS 77 pts. Exhibitor: Charles and Susan Wilson; Photographer: Ross Leach. Pacific Northwest Judging

[12] *Cattleychea* Siam Jade 'Roger Hayes' HCC/AOS (Penny Kuroda (Penny Kuroda Group) x *Cattleychea* Vienna Woods) 77 pts. Exhibitor: Sheryl Hayes; Photographer: Arthur Pinkers. Pacific South Judging

[13] *Phalaenopsis* Shan Feng Jing Red Peach 'Orchid Fest' AM/AOS (Chian Xen Roseherz x Ney Shan Gu Niang) 83 pts. Exhibitor: Gubler Orchids; Photographer: Arthur Pinkers. Pacific South Judging

[14] *Cattleya* Cypheri (1897) 'Jan' AM/AOS (*forbesii* x *purpurata*) 80 pts. Exhibitor: Betty Wise; Photographer: Mike Pearson. Pacific Northwest Judging

[15] *Phalaenopsis tetraspis* 'Arnie' HCC/AOS 78 pts. Exhibitor: Arnold Gum; Photographer: Arnold Gum. Pacific South Judging

[16] *Phragmipedium* Cahaba Glow 'KaraLynn's Hope' HCC/AOS (Sunset Glow x *besseae*) 78 pts. Exhibitor: Karen Barton; Photographer: Mike Pearson. Pacific Northwest Judging


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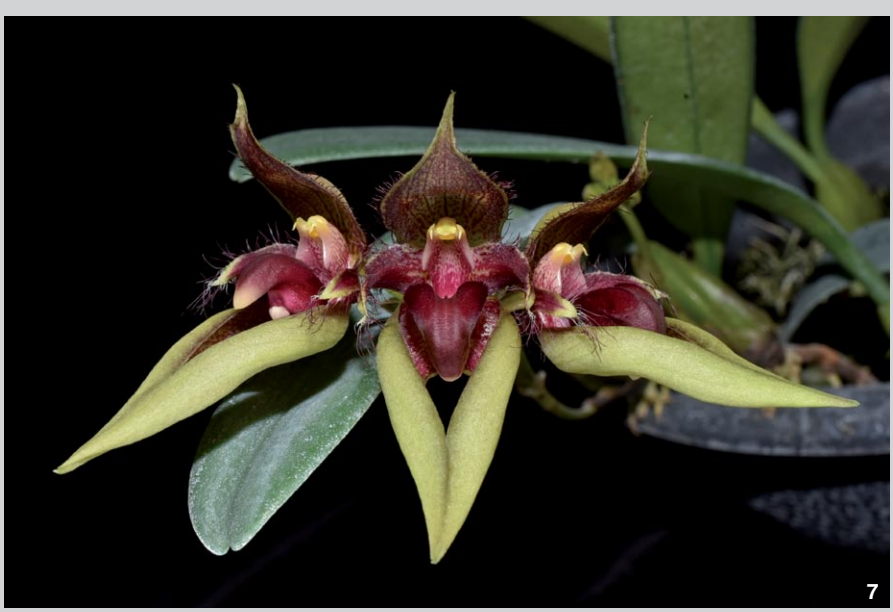
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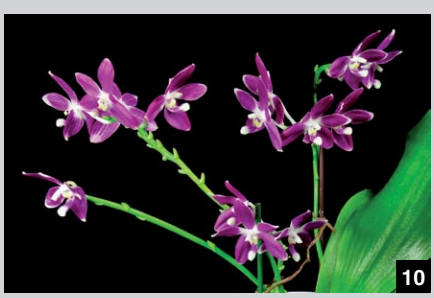

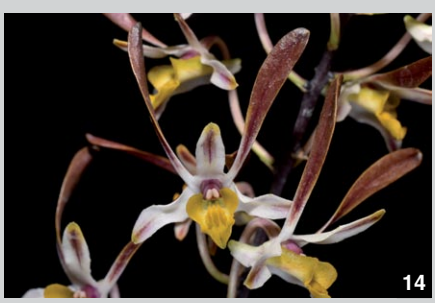

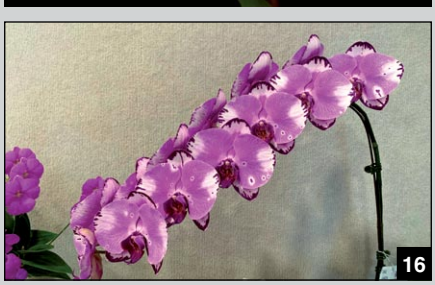

[1] *Phalaenopsis gigantea* (Alba) 'Queen' JC/AOS. Exhibitor: Prince Orchids; Photographer: Jen-Chieh Yeh. Pacific Central Judging

[2] *Phalaenopsis* Pale Face (1970) 'Orville's Peloric' JC/AOS (*lindenii* x *deliciosa*). Exhibitor: Orville Hu; Photographer: Jen-Chieh Yeh. Pacific Central Judging

[3] *Paphiopedilum* In-Charm Mirage 'Ruey Hua #3' AM/AOS (Lebeau x *godefroyae*) 82 pts. Exhibitor: Ruey Hua Orchids Huang Chin Yu; Photographer: Jen-Chieh Yeh. Pacific Central Judging

[4] *Rhyncholaelia digbyana* 'Yuan' AM/AOS 83 pts. Exhibitor: Cheng Yuan Cheng; Photographer: Jen-Chieh Yeh. Pacific Central Judging

[5] *Dendrobium formosum* 'Jiaho' JC/AOS. Exhibitor: Orville Hu; Photographer: Jen-Chieh Yeh. Pacific Central Judging

[6] *Phalaenopsis equestris* (Peloric) 'KBCC' AM/AOS 81 pts. Exhibitor: Dr. Cecilia Koo Botanic Conservation Center; Photographer: Chun-Ming Chen. Pacific Central Judging

[7] *Bulbophyllum pingtungense* 'KBCC' AM/AOS 83 pts. Exhibitor: Dr. Cecilia Koo Botanic Conservation Center; Photographer: Chun-Ming Chen. Pacific Central Judging

[8] *Dendrobium* Burana Pearl 'Hsian Yu' FCC/AOS (Hirota White x Burana Stripe) 91 pts. Exhibitor: Cheng Yuan Cheng; Photographer: Jen-Chieh Yeh. Pacific Central Judging

[9] *Dendrobium* Burana Pearl 'G.D.S.' CCM-AM/AOS (Hirota White x Burana Stripe) 85-84 pts. Exhibitor: Gold Orchid Garden; Photographer: Jen-Chieh Yeh. Pacific Central Judging

[10] *Phalaenopsis tetraspis* f. *speciosa* 'Prince' AM/AOS 83 pts. Exhibitor: Prince Orchids; Photographer: Jen-Chieh Yeh. Pacific Central Judging

[11] *Phalaenopsis* Lioulin Hot Lip 'Charming Butterfly' AM/AOS (Chian Xen Violin x Lioulin Lovely Lip) 85 pts. Exhibitor: Meidarland Orchids; Photographer: Jen-Chieh Yeh. Pacific Central Judging

[12] *Phalaenopsis* Yaphon Jade Green 'Green Pixie' AM/AOS (Yaphon Database x Princess Kaiulani) 83 pts. Exhibitor: Chun-Hung Chen; Photographer: Jen-Chieh Yeh. Pacific Central Judging

[13] *Vanda* John De Biase '4N Orchids' CCE/AOS (Kasem's Delight x Yip Sum Wah) 92 pts. Exhibitor: 4N Orchids; Photographer: Jen-Chieh Yeh. Pacific Central Judging

[14] *Dendrobium carronii* 'KBCC' AM/AOS 83 pts. Exhibitor: Dr. Cecilia Koo Botanic Conservation Center; Photographer: Chun-Ming Chen. Pacific Central Judging

[15] *Phragmipedium* Memoria Dick Clements 'Mont Milais' AM/AOS (*sargentianum* x *besseae*) 85 pts. Exhibitor: Woodstream Orchids; Photographer: Bryan Ramsay. National Capital Judging

[16] *Phalaenopsis* Fangmei Pink Pearl 'NCKU Beauty' FCC/AOS (Jiuhbao Diana x Chian Xen Piano) 90 pts. Exhibitor: Fangmei Orchids; Photographer: Michael Tibbs. Pacific Central Judging


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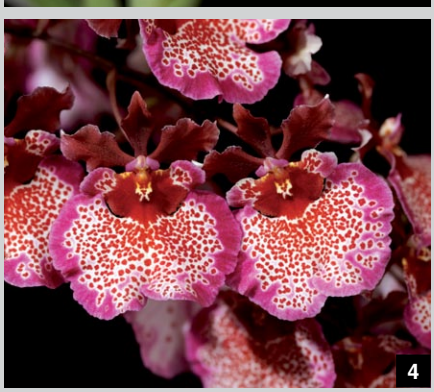
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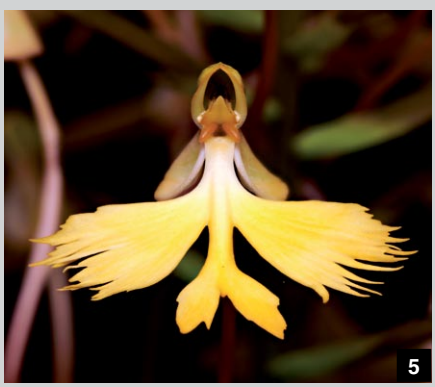
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[1] *Cattleya* Prism Palette 'Carnival' AM/AOS (Colorama x Horace) 80 pts. Exhibitor: Waldor Orchids, Inc.; Photographer: Bayard Saraduke. Mid-Atlantic Judging

[2] *Cattlianthe* Cherry Song 'Pink Panther' HCC/AOS (Candy Tuft x *Cattleya walkeriana*) 78 pts. Exhibitor: Sergey Skoropad; Photographer: Bayard Saraduke. Mid-Atlantic Judging

[3] *Pectabenaria* Perseus 'Fringe Benefits' AM/AOS (*Pecteilis hawkesiana* x *Habenaria medusa*) 83 pts. Exhibitor: Sarah Hurdel; Photographer: Bryan Ramsay. National Capital Judging

[4] *Tolumnia* Volcano Wave 'Martha Biondi' AM/AOS (Wave Dancer x Genting Volcano) 81 pts. Exhibitor: Shawn Wood; Photographer: Bryan Ramsay. National Capital Judging

[5] *Habenaria* Bird of Paradise 'Sarah Did It' AM/AOS (Conure x *medusa*) 83 pts. Exhibitor: Valerie C. Lowe; Photographer: Bryan Ramsay. National Capital Judging

[6] *Paphiopedilum* Memoria Renette L. Gatny 'Mary Ann's Jewel' HCC/AOS (Oriental Jewel x Oriental Spring) 78 pts. Exhibitor: Mary Ann Denver; Photographer: Maurice Garvey. Northeast Judging

[7] *Lepanthes helicocephala* 'Trudy' CBR/AOS. Exhibitor: Mary Ann Denver; Photographer: Maurice Garvey. Northeast Judging

[8] *Phragmipedium* China Dragon 'Black Canyon' AM/AOS (Grande x *besseae*) 86 pts. Exhibitor: Woodstream Orchids; Photographer: Bryan Ramsay. National Capital Judging

[9] *Masdevallia* Pangueña 'Jessica Lynn' AM/AOS (*peristeria* x *uniflora*) 80 pts. Exhibitor: Mary Ann Denver; Photographer: Maurice Garvey. Northeast Judging

[10] *Lepanthes tortilis* 'Darwin' CBR/AOS. Exhibitor: Mary Ann Denver; Photographer: Maurice Garvey. Northeast Judging

[11] *Cattlianthe* Mary Elizabeth Bohn 'Royal Flare' CCM/AOS (Blue Boy x *Guarianthe bowringiana*) 82 pts. Exhibitor: Alan Kenwood; Photographer: Maurice Garvey. Northeast Judging

[12] *Renanthera* Manila '4N Orchids #2' CCE/AOS (*philippinensis* x Brookie Chandler) 90 pts. Exhibitor: J&P Terrestrial Orchids; Photographer: Jen-Chieh Yeh. Pacific Central Judging

[13] *Dendrobium* Burana Pearl '4N Orchids' AM/AOS (Hirota White x Burana Stripe) 85 pts. Exhibitor: 4N Nursery; Photographer: Jen-Chieh Yeh. Pacific Central Judging

[14] *Polystachya malilaensis* 'Irene' CBR/AOS 0 pts. Exhibitor: Al and Irene Messina; Photographer: Maurice Garvey. Northeast Judging

[15] *Habenaria* Jiaho Yellow Bird 'Marc' AM/AOS (*rhodocheila* x *medusa*) 82 pts. Exhibitor: Marc Gray; Photographer: Teck Hia. Northeast Judging

[16] *Phalaenopsis* YangYang Blueberry 'Blue Velvet' AM/AOS (YangYang New Star x *violacea*) 82 pts. Exhibitor: Prince Orchids; Photographer: Yeh, Jen-Chieh. Pacific Central Judging


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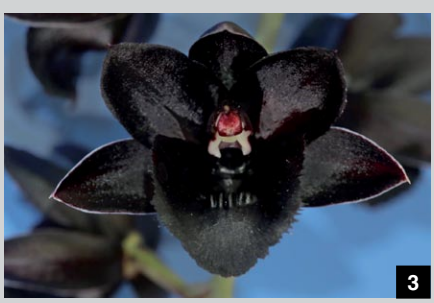
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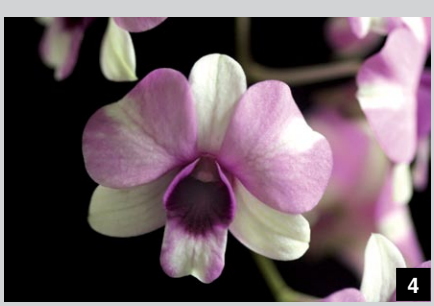
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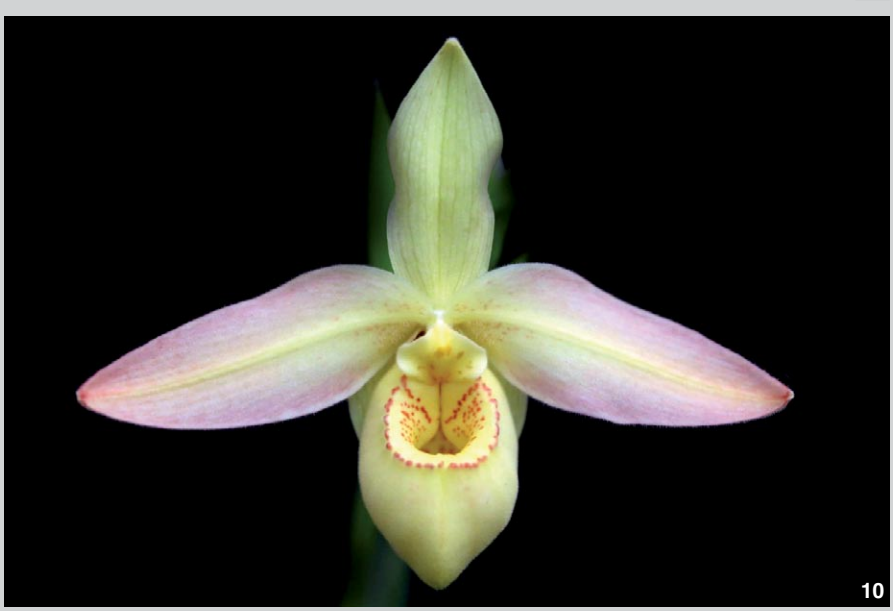
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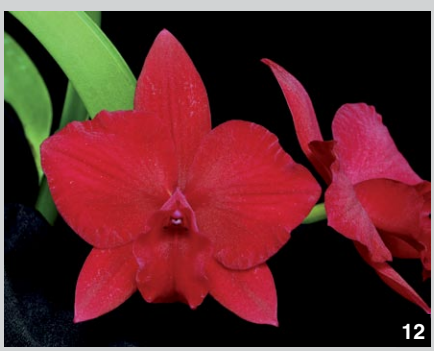

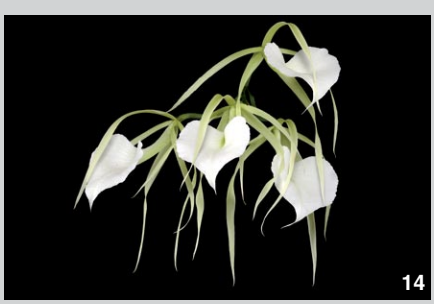

[1] *Habenaria* Jiaho Yellow Bird 'Hanayo' AM/AOS (*rhodocheila* x *medusa*) 83 pts. Exhibitor: Martha Suzuki; Photographer: Michael Blietz. Hawaii Judging

[2] *Bulbophyllum medusae* 'Pacific Heights' CCE/AOS 94 pts. Exhibitor: Katherine Leonard; Photographer: Alan Maii. Hawaii Judging

[3] *Fredclarkeara* Kelly Longley 'Omaha' AM/AOS (*Mormodia* Painted Desert x Catasetum José Abalo) 83 pts. Exhibitor: Joe and Karen Lankton; Photographer: Matthew Nutt. Mid-America Judging

[4] *Dendrobium* Maui Pixie 'Valley Isle' AM/AOS (Chao Praya Gem x Petticoat) 82 pts. Exhibitor: Aloha Aina Orchids; Photographer: Michael Blietz. Hawaii Judging

[5] *Paphiopedilum* Wössner Helene 'Windy Hill's Teacup Cutie' HCC/AOS (*charlesworthii* x *helenae*) 78 pts. Exhibitor: Marilyn LeDoux; Photographer: Melissa Garner. Mid-America Judging

[6] *Scaphosepalum digitale* 'Forest's Red Devil' CBR/AOS. Exhibitor: Randy Bayer; Photographer: Melissa Garner. Mid-America Judging

[7] *Cattlianthe* Karlo and Louis 'David's 100th' AM/AOS (Chicora x *Cattleya* Mini Purple) 80 pts. Exhibitor: Joan and David Rosenfeld; Photographer: Bayard Saraduke. Mid-Atlantic Judging

[8] *Paphiopedilum* Wonderful Lady 'Slipper Zone Leilani' AM/AOS (Mr Wonderful (2010) x Fred's Lady) 80 pts. Exhibitor: Lehua Orchids; Photographer: Bayard Saraduke. Mid-Atlantic Judging

[9] *Cattlianthe* Memoria Dina Izumi 'Brookside' CCM/AOS (Chocolate Drop x *Guarianthe* Barbara Kirch) 82 pts. Exhibitor: Waldor Orchids, Inc.; Photographer: Bayard Saraduke. Mid-Atlantic Judging

[10] *Phragmipedium* Cahaba Morning Mist 'Windy Hill's Sunglow' AM/AOS (Hanne Popow x Lutz Röllke) 81 pts. Exhibitor: Marilyn LeDoux; Photographer: Matthew Nutt. Mid-America Judging

[11] *Rhyncholaeliocattleya* Dendi's Gem 'Adam' HCC/AOS (SunCoast Sunspots x *Cattleya* Jungle Gem) 77 pts. Exhibitor: Michael Sivitz; Photographer: Bayard Saraduke. Mid-Atlantic Judging

[12] *Rhyncholaeliocattleya* Memoria Walter Off 'Carolina Orchids' AM/AOS (Higher Multiplier x *Cattleya* Seagulls Apricot) 82 pts. Exhibitor: Waldor Orchids, Inc.; Photographer: Bayard Saraduke. Mid-Atlantic Judging

[13] *Rhyncholaeliocattleya* Lebenkreis 'Shan Nasser' HCC/AOS (Rubescence x *Cattleya* Circle of Life) 77 pts. Exhibitor: Waldor Orchids, Inc.; Photographer: Bayard Saraduke. Mid-Atlantic Judging

[14] *Brassavola nodosa* 'O'Whimsy' HCC/AOS 77 pts. Exhibitor: Joseph Grezaffi, III; Photographer: Bayard Saraduke. Mid-Atlantic Judging

[15] *Rhyncholaeliocattleya* Chunyeah 'King Pai #19' AM/AOS (Tassie Barbero x Kuan-Miao Chen) 83 pts. Exhibitor: Waldor Orchids, Inc.; Photographer: Bayard Saraduke. Mid-Atlantic Judging

[16] *Cattleya labiata* var. *semi-alba* 'Waldor Super Select' HCC/AOS 79 pts. Exhibitor: Waldor Orchids, Inc.; Photographer: Bayard Saraduke. Mid-Atlantic Judging


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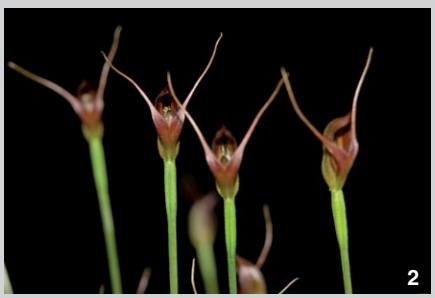
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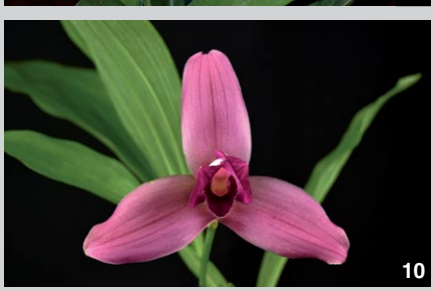
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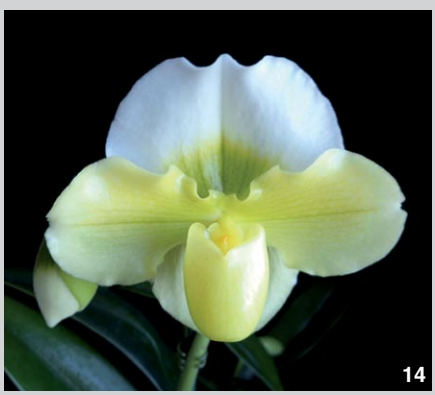
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[1] *Cattleya* Chyong Guu Swan 'White Jade' AM/AOS (Wayndora x Persepolis) 80 pts. Exhibitor: Atsushi Matsumoto; Photographer: Jason R. Mills. Atlanta Judging

[2] *Pterostylis erecta* 'Cherokee Spirit' CCM/AOS 83 pts. Exhibitor: David Mellard; Photographer: Jason R. Mills. Atlanta Judging

[3] *Dendrobium* Misty Magic 'Aurora Glow' HCC/AOS (*ceraula* x *cuthbertsonii*) 77 pts. Exhibitor: Sarah Patterson; Photographer: James Curtis. Carolinas Judging

[4] *Cattleya* Vicenta Lagmay Olivas 'Waldor' AM/AOS (Dinah x Elizabeth Off) 82 pts. Exhibitor: Chadwick and Son Orchids, Inc.; Photographer: James Curtis. Carolinas Judging

[5] *Cattleya* Petite Doll 'Grass Valley' HCC/AOS (Sierra Doll x *alaorii*) 76 pts. Exhibitor: Ted McClellan; Photographer: Ramon de los Santos. California Sierra Nevada Judging

[6] *Pterostylis obtusa* 'Tuscarora Spirit' CCM/AOS 86 pts. Exhibitor: David Mellard; Photographer: Jason R. Mills. Atlanta Judging

[7] *Cattleya maxima* 'Marie Graham' AM/AOS 85 pts. Exhibitor: Jeff Tyler; Photographer: Ramon de los Santos. California Sierra Nevada Judging

[8] *Calanthe rosea* 'Anacafe 2019' AM/AOS 80 pts. Exhibitor: Dr. Helmuth Ibanez; Photographer: Jorge Carlos. Carolinas Judging

[9] *Paphiopedilum* Hampshire Kin 'Shireland' AM/AOS (Hampshire Beau x Kinzua) 86 pts. Exhibitor: Arnold Klehm; Photographer: Nile Dusdieker. Chicago Judging

[10] *Lycaste* Reina Del Cisne 'Nikole' AM/AOS (*angelae* x Kiama) 80 pts. Exhibitor: Cesar Maaz Stwolinski; Photographer: Jorge Carlos. Carolinas Judging

[11] *Paphiopedilum* In-Charm Topaz 'Roselyn' CCM/AOS (*helenae* x Pacific Shamrock) 85 pts. Exhibitor: Robin and Josh Gurlitz; Photographer: James Curtis. Carolinas Judging

[12] *Bulbophyllum speciosum* 'Anacafe 2019' HCC/AOS 78 pts. Exhibitor: Dr. Helmuth Ibanez; Photographer: Jorge Carlos. Carolinas Judging

[13] *Stanhopea graveolens* 'Chatia de Teyul' AM/AOS 80 pts. Exhibitor: Carlos Herberto Teyul; Photographer: Jorge Carlos. Carolinas Judging

[14] *Paphiopedilum* Ouens Oak 'Brier Hill' AM/AOS (Hampshire Oak x Saint Ouens Bay) 81 pts. Exhibitor: Klehm Growers, Inc.; Photographer: Nile Dusdieker. Chicago Judging

[15] *Dendrobium* Valley Isle Pink 'Light Green' AM/AOS (Burana White x Odom's Goldmine) 86 pts. Exhibitor: Aloha Aina Orchids; Photographer: Michael Blietz. Hawaii Judging

[16] *Anguloa clowesii* 'Diego Jose' AM/AOS 80 pts. Exhibitor: Familia Ruiz Moino; Photographer: Jorge Carlos. Carolinas Judging

LISTED BELOW ARE THOSE CURRENTLY SCHEDULED SHOWS AND EVENTS. CANCELLATIONS CAN AND DO OCCUR WITH LITTLE OR NO WARNING. SEE THE AOS WEBSITE FOR CURRENT INFORMATION OR CHECK WITH THE PERSON LISTED AS EVENT CONTACT.

JULY

10—East Everglades Orchid Society Outreach Judging, R.F. Orchids (Banyon Pavillion), 28100 SW 182nd Ave, Homestead, FL; Contact: Tere Camacho, 305-401-8807; tere@bellsouth.net

24—Central Iowa Orchid Society Speaker's Day, Johnston Lions Club Community Center, 6401 Merle Hay Rd, Johnston, IA. Contact: Carson E. Whitlow; 515–993–4841, slipperguy@aol.com

AUGUST

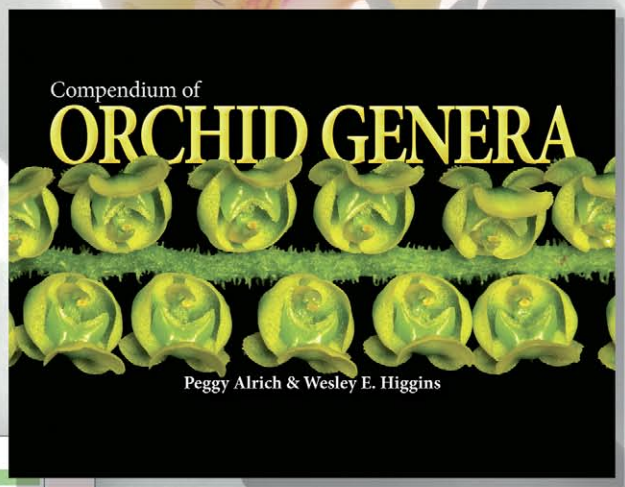
6–7—International Phalaenopsis Alliance Symposium, Highland Manor, 503 E. Main St., Apopka, FL; Contact: Eileen Hector; 813–368–7353, ipa.eileen@gmail.com

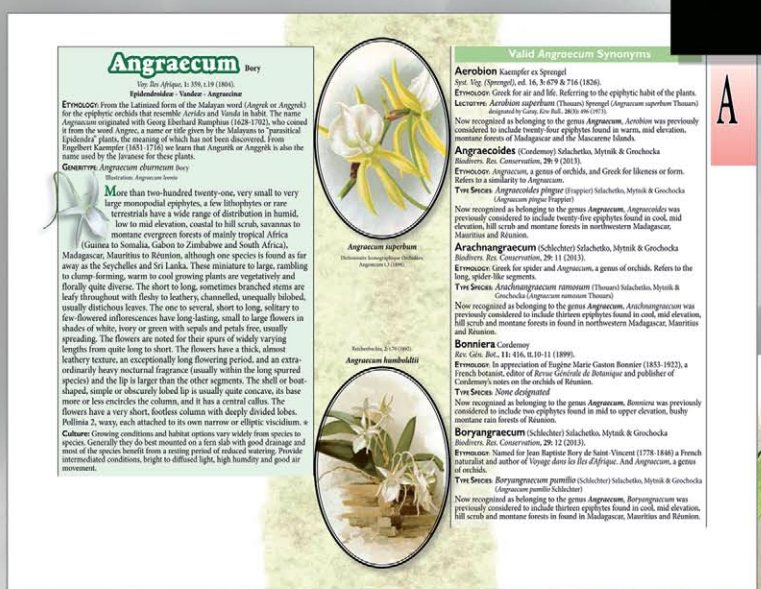
As of press time, all AOS judging centers with the exception of Toronto and Montreal are holding at least limited in-person judging. Please contact the appropriate judging center chair for location and time before taking plants (https://www.aos.org/orchid-awards-judging/aos-judging-centers.aspx).

ORCHID MARKETPLACE

Presenting

The Compendium of Orchid Genera by Peggy Alrich and Wesley Higgins





More than 200 orchid genera are presented with the original orchid discoverer and date as well as the etymology and an easy to read description of growth habit. The book is illustrated with antique color plates, many from an original publication, all compete with citations. This book will be a welcome and beautiful addition to any orchid grower's library, a stunning work and artistic treasure.

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ORCHIDS CLASSIFIEDS

SALES

NEW VISION ORCHIDS — Specializing in phalaenopsis: standards, novelties. Odontoglossums, intergenerics, lycastes and vandaceous. Russ Vernon — hybridizer. Divisions of select, awarded plants available. Flasks and plants. Tel.: 765-749-5809. E-mail: newvisionorchids@aol.com, www.newvisionorchids.com.

SELLING MY PRIVATE collection after 28 years; 2,500 sq ft of overgrown cattleyas and 500 sq ft of overgrown dendrobiums are available in Titusville, Fl. Contact: Kenny Yii @ 321-720-7337.

SALES

BROWARD ORCHID SUPPLY — we carry fertilizers, fungicides, pesticides, pots, baskets, growing media, tree fern, cork, wire goods, labels, pruners and more. For our complete product line, visit our website at www.browardorchidsupply.com. Call 954-925-2021 for our catalog or questions. AOS members receive a 10% discount. We cater to the hobbyist.

SALES

OLYMPIC ORCHIDS—Pacific Northwest grower specializing in species, miniatures, seedlings and hard-to-find orchids. Quality plants at reasonable prices. Please visit our Website at http://orchidfinders.com.

Classified ads are $55 for five lines (45 characters/spaces per line) and $15 for each additional line. $25 for first three words in red. $25 to include logo. The first three words can be in all caps, if requested.

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2021 Dillon/Peterson Essay Prize

THE AOS IS celebrating its Centennial Anniversary in 2021. To join in the fun, the Dillon-Peterson Essay Contest is asking for in-depth articles relating to significant people, events, programs or even plants or technology changes that have helped shape the direction of the AOS or are likely to in the future. Was there someone special in the AOS who mentored and inspired you and others? Did an AOS award you received plant the seed that resulted in you becoming involved in judging—could you tie that into how the judging program has helped shape the AOS and Affiliated Societies? Perhaps it is technological changes that the AOS has adopted that have changed and will change the AOS and your enjoyment of orchids? Share why the AOS has had and will have an enormous influence over lifetimes.

Membership in the American Orchid Society is not necessary to enter the contest. **The deadline is November 30, 2021**. The winning entry, if any, will be published in the June issue of the following year. For complete contest rules see http://www.aos.org/about-us/article-submissions/essay-contest-winners.aspx

Submit all entries to the Dillon/Peterson Memorial Essay Prize at AOS headquarters: Ron McHatton, American Orchid Society at Fairchild Tropical Botanic Garden, PO Box 565477, Miami, Florida 33256 (email rmchatton@aos.org).

Submission of articles for *ORCHIDS* magazine

The AOS welcomes the submission of manuscripts for publication in *Orchids* magazine from members and non-members alike. Articles should be about orchids or related topics and cultural articles are always especially welcome. These can run the gamut from major feature-length articles on such topics as growing under lights, windowsills and thorough discussions of a species, genus or habitat to shorter, focused articles on a single species or hybrid to run under the Collector's Item banner. The AOS follows the World Checklist of Selected Plant Families with respect to species nomenclature and the Royal Horticultural Society Orchid Hybrid Register for questions of hybrid nomenclature. The AOS style guide and usage guides can be downloaded from http://www.aos.org/about-us/article-submissions/style-guide-for-aos-publications.aspx

Articles as well as inquiries regarding suitability of proposed articles should be sent to jean.ikeson@gmail.com or the editor at rmchatton@aos.org.

The American Orchid Society, in congruence with its stated conservation aims and with the full approval of the AOS Trustees, prohibits advertisements for wild-collected orchids and orchid-collecting tours in the pages of *Orchids*. By submitting advertisements for orchid species, vendors are thereby asserting that plants advertised are either artificially propagated (from seed or meristem) or are nursery-grown divisions of legally acquired stock. While *Orchids* endeavors to assure the reliability of its advertising, neither *Orchids* nor the American Orchid Society, Inc., can assume responsibility for any transactions between our advertisers and our readers.

Orchids in a Virtual World

By Carol Klonowski/Photographs courtesy of the Taiwan Orchid Growers Association

STARTING IN EARLY 2020, everyone scrambled to find covid-compatible ways to hold events that would otherwise be canceled or postponed. The 23rd World Orchid Conference in Taiwan was no exception. Denied the ability to host an in-person event, conference organizers re-engineered it by not only creating two streaming platforms (one for the orchid exhibition and the other for conference lectures) but also a viewing platform for virtual judging. All three were available for remote access by conference registrants and judges around the world.

The World Orchid Conference (WOC) is a triennial, week-long event held in different destinations around the world. At each WOC, the next venue is confirmed and another, subsequent venue is awarded to follow three years afterwards. Thus, Taiwan was chosen as the site for the 23rd WOC in 2020 at the conference held in Johannesburg, South Africa in 2014.

However, just weeks before the show and conference were set to begin in Taichung, as exhibitors put final touches on their displays and attendees completed travel arrangements, Taiwan announced a shutdown of the event in particular, and the country as a whole.

Nearly six years of preparation were in limbo as the Taiwan hosts and World Orchid Conference Trustees tried to figure out whether to cancel this prestigious orchid event entirely or, like the 2020 Olympic Games, attempt to reschedule when public health concerns abated.

Meanwhile, months went by as the whole orchid world also shut down. Then local WOC officials saw their island nation emerging from lockdown and regrouped. They had an idea for proceeding with the show and conference, but in a virtual way. They postponed the official 23rd WOC, with permission from the WOC Trustees to a fully live, in-person event in 2024, COVID permitting, and named the new, streaming event the "2021 Virtual WOC 23rd."

The WOC 23rd website stated it this way: "The format of the resumed 23rd WOC in 2021 will combine in-person and virtual presentations for overseas invited speakers, presenters, and participants. A virtual platform will allow orchid hobbyists and professionals from around the world to participate remotely, despite the restrictions on travel and quarantine at the borders that may remain in place at the time."


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The 2021 Virtual WOC brought the Taichung Waipu Park exhibition areas to our computer screens and remote devices and, as the exhibition plans moved forward, so did the judging. Taiwan Orchid Growers Association (TOGA) staff reached out to judges who had registered for the original 23rd WOC in early March of this year: "Due to the continued threat of the pandemic and stringent travel restrictions, we have no choice but to transform this event to a completely virtual conference, judging, and orchid exhibition. We do realize the huge difference between the physical attendance and a virtual participation; but, given the current condition, this is all what we can possible [sic] do to continue this event.

Since the overseas judges cannot travel to Taiwan to conduct orchid judging, all judging will be conducted virtually and not be sanctioned by the WOC rules…The large orchid landscape displays and all individual exhibits, as well as the awarded orchids will be filmed in a 3-D format and be accessible online timely [sic]."

Judges who registered for this virtual experience were advised to have their browsers compatible with Google Drive, given links to a Judging Handbook, virtual judging demo and a show schedule with a list of plant classes. This last item was the only thing "normal," as it had plant entries organized into categories and classes just like ribbon judging in orchid shows around the world.

Virtual WOC judges received a follow-up email invitation to sign in with a password to customize for added security and a process to provide the Taiwan WOC with judges' credentials and preference of plant classes.

Virtual judging was then held April 16–21, 2021. Round 1 began with a 48-hour window for teams to evaluate plants in their assigned classes. This was followed by the selection of the Grand Champion and Medal Judging in Round 2 in another 48-hour time span. All the orchids submitted for judging were filmed in 3D to allow judges to cast their votes online. They could see each orchid in their assigned classes in 360-degree rotation and the background information (genus, species or registered name, and hybrid parentage). Orchid images were sharp and could be enlarged or minimized by on-screen controls or a touchpad.

As in most orchid shows, some teams


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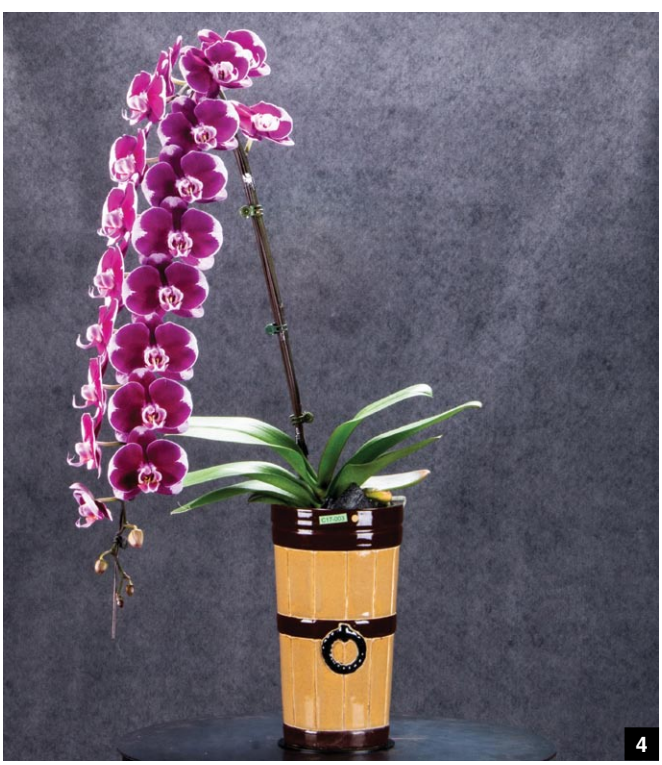
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had classes with only a few plants, and other teams had almost 100 plants to evaluate. Comparing plants within the class was relatively easy by checking your class ID and then viewing the thumbnail images of all entries. Compare that to walking around an exhibit hall to find the class entries in each display and show bench.

But missing was the team collaboration for voting on ribbons and medal winners, as well as the education of team members and student judges as part of the ribbon judging process. Viewing each plant individually for habit and conformation had to be done by loading one plant image at a time. This was a bit cumbersome, depending on internet speed, but forgivable given the short time available to develop this solution to remote orchid judging.

As of press time, the 2021 Virtual WOC 23rd is still available for viewing on the internet. Links for the exhibition halls and video conference (registration required) and general information on this Virtual WOC can be found at www.woc23.com and https://www.facebook.com/groups/278123240510934/. Once on the site, click to view the various exhibition halls, which allow one to rotate through the exhibits and select individual display plants for viewing.

[1] Grand Champion, *Volkertara* Jinn Feng Orange 'Golden Plum' (*Rhyncattleanthe* Young-Min Orange × *Guaritonia* Why Not).

[2] Cattleya Group Champion, *Rhyncattleanthe* Hsinying Catherine 'Dogashima' (*Cattleya* Fair Catherine × Love Sound).

[3] Slipper-Orchid Group Champion, *Paphiopedilum* (Shin-Yi Lance × Wössner Black Wings 'Chouyi #10084').

[4] Phalaenopsis Group Champion, *Phalaenopsis* Hwa Yuan Five Star 'Five Star General' (Leopard Prince × OX Spot Queen).

[5] Dendrobium Group Champion, *Dendrobium* Muyi Pearl 'Tung Sheng' (Pixie Princess × Tengkwei)

— *Carol Klonowski (email: cklonowski@aol.com).*

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