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THE BULLETIN OF THE AMERICAN ORCHID SOCIETY

VOL. 89 NO. 2 FEBRUARY 2020





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FRONT COVER

Cattleya labiata f. *coerulea* 'Natural Wonder' AM/AOS exhibited by the Tropical Orchid Farm, Maui, Hawaii in 2019. *Cattleya labiata*, a native of Brazil and the type species for the genus, comes in color forms ranging from dark lavender to pure white with a splash of yellow in the throat of the lip. This beautiful species is in the background of virtually all fall-blooming, large-flowered cattleya hybrids. Photograph by Jeffrey Parker.

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The mission of the American Orchid Society is to promote and support the passion for orchids through education, conservation and research

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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>.

acomodontum (ak-moh-DON-tum)
Aerangis (air-RANG-iss)
Afropectiniella (af-roh-pek-tin-ee-EL-la)
Ancistrochilus (an-sis-troh-KYE-luss)
Ancistrorhynchus (an-sis-troh-RINK-kus)
Angraecopsis (an-gray-KOP-sis)
Angraecum (an-GRAY-kum)
Arundina (air-un-DEE-na)
beccarii (bek-KAR-ee-eye)
bicolor (BYE-kull-ur)
Bolusiella (boh-loo-see-EL-la)
Bromheadia (brom-HEAD-ee-a)
Bulbophyllum (bulb-oh-FILL-lum)
candida (KAN-dee-dah)
Catamodes (kat-a-MOH-deez)
Catasetum (kat-a-SEE-tum)
Cattleya (KAT-lee-a)
Cattlianthe (kat-lee-AN-thee)
caudatus (kow-DAY-tus)
Coryanthes (kore-ee-AN-theez)
crumenatum (kru-men-AY-tum)
Cymbidium (sim-BID-ee-um)
dabaibaensis (da-bye-ba-EN-sis)
Dendrobium (den-DROH-bee-um)
denticulatum (den-tik-yew-LAY-tum)
distichum (DISS-tih-kum)
doratophyllum (dor-at-oh-FILL-lum)
Dracula (DRAK-yew-la)
echinolabium (eh-kine-oh-LAY-bee-um)
Encyclia (en-SIK-lee-a)
Epidendrum (eh-pih-DEN-drum)
Eulophia (yew-LOH-fee-a)
Eurychone (yoor-ee-KOH-nee)
falcata (fal-KAY-ta)
finlaysonianum (fin-lay-son-ee-AY-num)
gracillima (grass-ILL-ih-ma)
graminea (gram-IN-ee-ah)
graminifolia (gram-in-ee-FOL-lee-a)
Grammatophyllum (gram-mat-oh-FILL-lum)
Graphorkis (graf-ORE-kiss)
Guarianthe (gwar-ee-AN-thee)
Habenaria (hab-ih-NARE-ee-a)
hardyana (hard-ee-AY-na)
hennisiana (hen-nis-ee-AY-na)
kaiseriana (kye-ser-ee-AY-na)
labiata (lab-ee-AY-ta)
lawrenceana (law-rence-AY-na)
lejolyana (leh-jol-ee-AY-na)
lemoniana (lem-on-ee-AY-na)
Leptotes (lep-TOE-teez)
lilacina (lye-la-SEE-na)
lilifolia (lil-ee-ee-FOL-lee-a)
Liparis (lye-PAIR-iss)

Listrostachys (lis-troh-STAK-iss)
LisLycaste (lye-KASS-tee)
maculata (mak-yew-LAY-ta)
membranaceum (mem-bray-NAY-see-um)
Microcoelia (mye-kroh-SEE-lee-ah)
Mormodes (more-MOH-deez)
Odontoglossum (oh-don-toe-GLOS-sum)
Oncidium (on-SID-ee-um)
Orchidaceae (or-kid-AY-see-ee)
ortizii (ore-TEEZ-ee-eye)
pallida (PAL-ih-dah)
Paphiopedilum (paf-ee-oh-PED-ih-lum)
patinii (pa-TIN-ee-eye)
pertusa (per-TUSS-a)
Phalaenopsis (fail-en-OP-sis)
picturata (pik-tur-AY-ta)
Plectrelminthus (plek-trel-MIN-thuss)
Pleurothallid (plur-oh-THAL-lid)
plicata (ply-KAY-ta)
Polystachya (pol-ee-STAK-ee-a)
pubescens (pew-BES-senz)
pulchellum (pul-KEL-lum)
Robiquetia (roe-bih-KET-ee-a0)

Sarcochilus (sar-koh-KYE-lus)
sincorana (sin-kore-AY-na)
sinuata (syen-yew-AY-ta)
Spathoglottis (spath-oh-GLOT-tiss)
spathulata (spath-yew-LAY-ta)
speciosum (spee-see-OH-sum)
Stanhopeinae (stan-HOPE-ee-nee)
Stolzia (SHTOLST-ee-eye)
subclausum (sub-KLAW-sum)
Tridactyle (try-DAKT-ee-lee)
vaginatium (vag-in-AY-tum)
Vanda (VAN-da)
Vanilla (van-ILL-la)
waroqueana (vor-awk-AY-na)
warsecwiczii (var-shuh-VITZ-ee-eye)

CALL FOR GRANT APPLICATIONS

AOS Conservation Committee Accepting 2020 Grant Applications
By Thomas Miranda

IN ITS CONCERN for the protection of wild orchid species around the world, the AOS Conservation Committee announces that it is taking applications for conservation project grants for 2020. Please note that in recent years, the AOS has decided to separately fund conservation projects from research projects, allowing for some different types of projects to be considered. Although conservation research will still fall under the purview of the Research Committee, conservation grants are intended to encourage a more practical, hands-on grassroots approach. We are seeking applicants engaging in a wide range of projects that protect orchids and their natural habitats including, but not limited to:

- Studies that enhance our knowledge of crucial ecological information,
- Conservation assessments of specific orchids or regions,
- Seed propagation of rare or threatened species,
- Habitat restoration or reintroduction efforts,
- Raising public awareness regarding orchid conservation and encouraging public participation, and
- Providing education or outreach to present and future members of the conservation community.

All conservation-oriented projects, anywhere in the world, will be considered. Although an institutional affiliation is helpful, it is not required. An accurate, estimated budget is, however, required. Funds are limited; past grants have averaged about \$3,000.00. We REQUIRE projects be reported on annually, and that an article featuring your project be submitted for publication in *Orchids* magazine within six months of completion. Due to the nature of conservation projects, ongoing multiyear support is a possibility. The application period begins January 1, 2020. Applications must be received no later than March 15, 2020. Please see the AOS website for application and requirements or contact the AOS Conservation Committee directly at Conservation_committee@aos.org for an application. Good luck! — *Thomas Miranda, Chair AOS Conservation Committee (email: conservation_committee@aos.org).*

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The OCA conserves orchids by funding habitat purchases. Since our inception in 2005 we have helped with the purchase of over 3000 acres. Among our 2020 projects is expanding Fundación Ecominga's Dracula Reserve by over 1000 acres. These acres include...



Dracula syndactyla This very rare species is known in Ecuador only in one place, one of the proposed purchases. In the Andes, species distributions depend strongly on elevation. The properties to be purchased are at elevations not represented in other areas of the reserve; hence their importance.



Dracula trigonopetala is only recently described. The purchase will include the only protected population of this species. In addition to protecting rare orchids, the purchase will protect several newly identified frogs and a new forest mouse. There are probably many more species to be discovered in the expansion.



Trevoria sp. nov. is but one of the newly discovered orchids in the proposed purchase. Three *Platysteles*, four *Lepanthes*, one *Scaphosepalum*, five *Stelis*, and one *Pleurothallis* have been found in the area, and that's only so far!

We hope you will join us in promoting this work.

Become a member of the OCA and help us raise the funds for this project.

For more information: www.orchidconservationalliance.org

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 — **Edwin S. Wright**
 Robert Fuchs and Michael Coronado (Centennial Celebration)

Permanently restricted
 — **Conservation**
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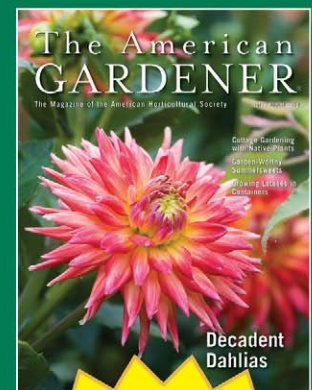


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PRESIDENT'S MESSAGE

IN MY MESSAGE last month, I mentioned that the US Postal Service is releasing 10 "wild orchid forever" stamps (nine orchid species) and wants to have their first day of issue ceremony with the American Orchid Society. The ceremony is scheduled for Friday, February 21, starting at 11:00 am EST in our library at the Fairchild Tropical Botanic Garden in Coral Gables, Florida. Although I would hope you would attend, if you cannot, you can watch the live stream from the US Postal Service's Facebook page or the American Orchid Society's Facebook page.

During my almost two years of writing these messages, I have introduced you to the various committees that are involved in keeping the American Orchid Society moving forward. Now, you will be introduced to several of our employees in the next few months. If you have talked to them over the phone, you can put a face to the voice! You have already met Jennifer Vina, our librarian, from a previous President's message. This month I'd like to introduce Laura Newton, our Awards Registrar.

Laura lives in Central Florida with her family on a 15-acre (6-ha) horse ranch. There she has two large greenhouses chock full of orchid species and hybrids, especially her favorite bulbophyllums. She is an accredited AOS judge in the Florida North-Central judging center, and a member of five local orchid societies.

She has been the AOS Awards Registrar for almost five years. Her favorite task is processing all of the fabulous AOS Awards to the most beautiful, exotic and sometimes unusual flowers and displays. She also oversees the selection of the 22 AOS Special Annual Awards; check out our upcoming April issue of *Orchids* magazine to see the winners selected by the Judging Committee this last October and approved by the Board of Trustees, or join us during the town hall meeting at the Members' Meeting in Sacramento, California on April 18 when the awards will be presented to the exhibitors and photographers. Laura also does the layout of the 16-page monthly spread of awards in *Orchids* Magazine.

Laura is a staff liaison to several AOS committees, most notably the Membership and Marketing Committee, helping to monitor and administrate the AOS Facebook Group; and the IT committee, mainly working on OrchidPro, but also overseeing the storage and collection of award photographs, monitoring the servers to be sure disks are operational, and checking that the backups are storing



properly. For the Species Identification Task Force (SITF) she participates in the researching of the species and keeping the lines of communication between the task force and the exhibitors and judging centers open. Check out the submissions and findings on the SITF public blog at <http://www.aos.org/sitf-blog.aspx>. If you have any questions about AOS awards, please do not hesitate to contact her at laura@aos.org.

As you can see, Laura wears lots of hats in her job for us. She also helps to proofread the magazine once a month.

The spring 2020 AOS Members' Meeting will be held in Sacramento, California, April 15–19, 2020 and will be hosted by the California Sierra-Nevada Judging Center. We have information on wineries and microbreweries and other fun activities in our gold country areas (foothills). Come out early or stay a few days after the meeting to relax and see what this area has to offer you. Old Town Sacramento has the best railroad museum and restaurants and it is just a simple walk from the hotel! The event will be held at the Embassy Suites on the Capitol Mall in Sacramento. They have a free shuttle to and from the airport seven days a week, so car rental will not be necessary.



- [1] Ten stamps featuring the nine orchid species in the upcoming new stamp release. Top row (left to right): *Triphora trianthophoros*, *Cypripedium californicum*, *Hexalectris spicata*, *Cypripedium reginae*, *Spiranthes odorata*. Bottom row (left to right): *Platanthera leucophaea*, *Triphora trianthophoros*, *Platanthera grandiflora*, *Cyrtopodium polyphyllum*, *Calopogon tuberosus*.
- [2] Laura Newton, AOS Awards Registrar. Photograph by Wes Newton.

Until next time, happy growing!
— Susan Wedegaertner, AOS President
(email: susan@aos.org).

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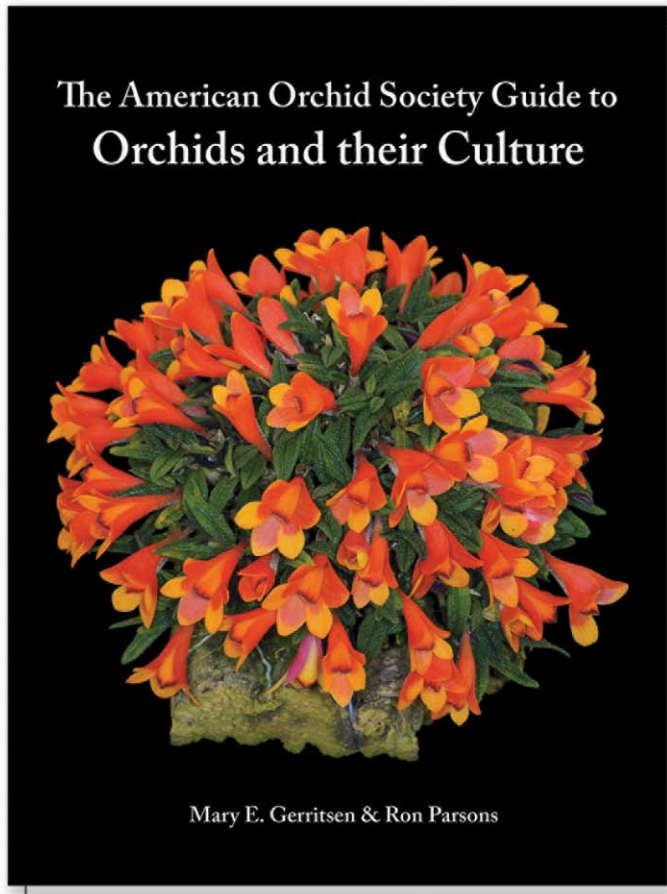
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February: The Month of Inflation

By Thomas Miranda

ECONOMISTS TELL US not to worry about inflation; they say “time” is actually more important. For those of us in the work force, this may be true as your wages, I hope, tend to increase with the cost of living. For those of us that have saved all our lives, seeing our nest egg shrink in value can cause some consternation. You may think I am joking when I say we should all invest in orchids. After all, there is the old joke about how you become a millionaire in the orchid business — start as a *billionaire*.



Thomas Miranda

But hear me out. Investments come and go, and the stock market has its ups and downs. Even if you are successful at investing, money itself cannot buy your happiness. Instead,

you should invest in the things that bring you joy. Whether it is your artwork; your music; your garden; your dwelling, however humble; your children and grandchildren or of course, your orchid collection, surrounding yourself with things you are passionate about is the road to fulfillment and true wealth.

Believe me, I know how naive that sounds. But the truth is, without my daily dose of orchids, I would not have the happiness I currently possess. Yes, orchids can be expensive and you need funds to grow and nurture them. But these are small investments that add so much to our quality of life. As the buds on so many of my orchids inflate this month, I am reminded of how rich my life truly is. Not because of the amount of dollars in my investment account, but because of the personal investment I have made in the most wonderful world of orchids.

BLEAK FORECASTS Even if your portfolio is dormant, the earliest initial signs of growth are starting to appear in your collection. The weather in the Northern Hemisphere is still cold and often gloomy or overcast. But now that we have passed the winter solstice and day lengths are starting to increase again, many orchids, such as cattleyas, dendrobiums and oncidiums, are showing new root tips and eyes on their rhizomes that will soon elongate into this year's new growths and flowers in season. It is still a month or two early to be repotting these, so wait until your plants have roots



BUDDY MARK

Laelia Lookalike 'Mary Frances' CCM/AOS (*anceps* × *gouldiana*) carried 167 flowers and buds when exhibited by Bill Weaver in February of 2017.

about 1–2 inches (2.5–5 cm) long before trying to reestablish them. Cooler-growing cloud forest plants such as masdevallias, draculas and other pleurothallids, as well as odontoglossum-type oncidiums are loving life this month, and if in active growth, February is a fine time to work with these plants. Fully dormant deciduous plants such as catasetums, habenarias and soft-cane dendrobiums appreciate a rest from water and fertilizer this time of year or you will risk drowning and rotting them while dormant.

BLOOMING FOOLS So many of our most spectacular orchids start to bloom this month including phalaenopsis, cymbidiums, certain cattleyas and lycastes. These form the basis of the many exhibitions that happen this time of year. Watering for these semidormant plants can be tricky. They are generally not producing foliage while they are producing flowers, so watering should be reduced. Fertilizing is best suspended this time of year for such plants. While some claim that a blossom-booster fertilizer formulation should be applied while plants are spiking, I have found that it is just a waste of time and money to feed plants this time of year. Unless they are currently in active growth, feed them later on when they are producing new roots to take up all those nutrients.

ADJUSTMENT FOR INFLATION If you are going to exhibit your prized orchids, make sure heavy inflorescences are supported with a stake. Unless they

are mounted plants with spikes that arch downward, any plants with large, showy or heavy blossoms benefit in their presentation and floral longevity with some subtle and judicious staking and grooming. Place stakes where they are hidden by leaves or pseudobulbs and tie with wire or clips in neutral green, brown or black colors so they do not distract from the flowers. Remove brown-tipped or disfigured foliage and who knows, you might get a ribbon or an AOS award! This time of year, it is always best to prewarm the car and wrap and protect your precious plants from the bitter cold on the way to the exhibit or show table.

THE MARKET Temptation is all around you at these orchid shows. Not only can you often see the spectacle of well-bloomed mature plants, you usually have vendors that are depending on you falling in love with a few new species and hybrids that they have propagated. It is great if you can support your local orchid entrepreneurs as they are often the backbone and pillars of the local orchid scene. They have the experience and wisdom to answer your questions, and supply you with quality plants to invest in. They are a precious resource for the hobbyist, the scientist and even the conservationist. — *Thomas Miranda has been working professionally with orchids for over three decades. He is an AOS accredited judge and is the chairman of the American Orchid Society's Conservation Committee (email: biophilialak@gmail.com).*

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GREATIdeas Text and drawings by Jean Allen-Ikeson

Greenhouse Foundations — Prior Planning Pays Off

IF YOU HAVE ever been involved in the military, you have probably had that phrase drilled into your psyche. My father drilled it into mine. It is an idea that simply means look and think before you leap. Building a greenhouse requires you do to more than look at a catalogue and order the structure!

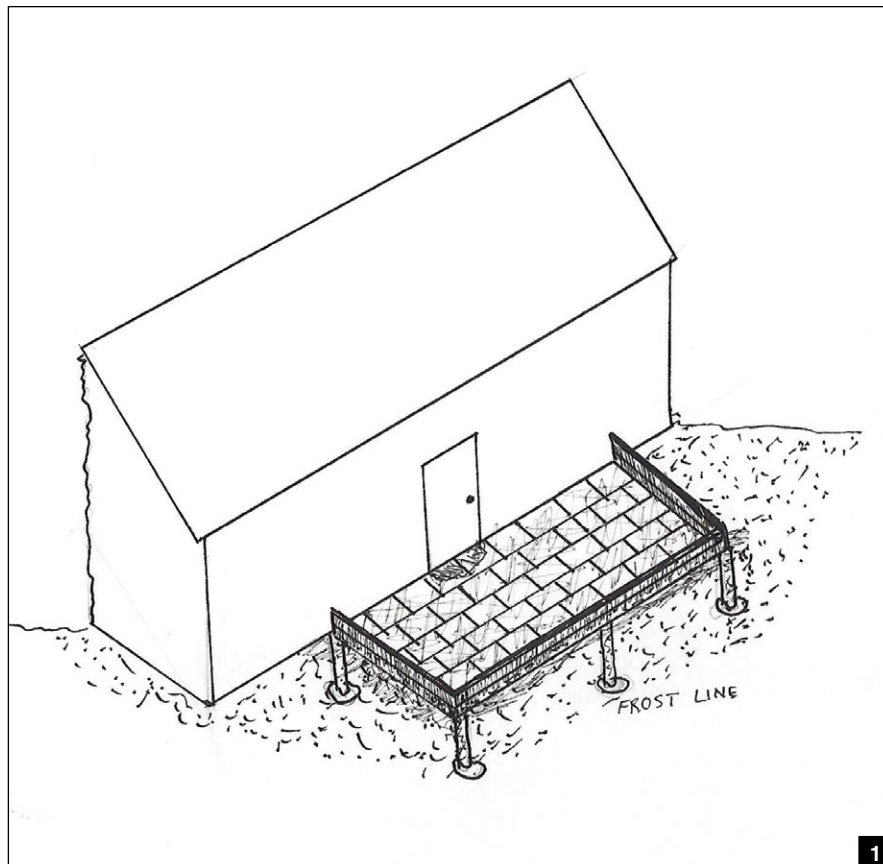
The foundation and any services such as water, electricity or gas are the second thing you should do after consulting your local municipal planning department for regulations or permits. A small, freestanding greenhouse is usually relatively regulation-free so long as it is not too close to a fence line. You will need some space between a fence and the structure to construct it and put in the glazing anyway.

A larger greenhouse and especially one attached to a house, garage or barn will likely require a more complicated foundation and a building permit. Most good greenhouse companies will provide you with a shop drawing or a blueprint with an engineer's stamp — the latter can be a significant cost — to present to the municipality.

They will also want a site drawing with the grade, any drainage, the foundation, distance from fences or other structures, and how any services will be installed. You can do this with graph paper, a ruler and a pencil at your kitchen table.

Smaller freestanding greenhouses are the easiest and something that homeowners can often do with a bit of sweat equity. You need the exact size of the greenhouse outer dimension and add 0.5 inch (1.25 cm) extra on each side to allow for irregularities in the foundation materials. Dig a shallow trench of about 6 inches (15.2 cm) deep that is level. It could be 4 inches (10.2 cm) on one end and 7 (17.8 cm) on the other in relation to the outside grade if it slopes. If the grade is steeper than that, you may need to increase the height of the overall foundation so that it well above grade in some areas and well below grade in others. The bottom line is that it should be at least 4–6 inches (10.2–15.24 cm) in the ground to steady the greenhouse in the wind, prevent wind from getting under the walls and as a deterrent to rodents and rabbits.

If you raise the greenhouse on the



foundation well above ground (which can give you more height inside), you do not want to have to climb into it through the door or have steps (not a great idea for carrying trays of plants in and out!). Many greenhouse manufacturers will allow you to “drop” the door into the foundation so that the sill is embedded into the foundation so that it is lower than the base of the greenhouse frame. For some companies, this custom option is free (bcgreenhouse.com for example). This allows you to make the sidewall and hence, the peak, higher by increasing the height of the foundation up to the point of a knee wall. You do not generally need glazing down to the floor, as your plants will be on a bench or in deep pots.

If your greenhouse site is open to the wind and you live in area that can have high winds, think about rotating a freestanding greenhouse a bit so that a corner cuts into the prevailing wind rather than the long side being blasted like a sail. My ideal placement is to have the long wall facing slightly south-southeast. The

long wall picks up the sun and warmth earlier in the day, which gives your orchids a head start on light in the shorter winter months. Warmth and light are important in northern climates in the winter, and you can shade the west end in hot climates.

The simplest DIY foundation consists of a trench, a small patio stone set in each corner and perhaps one or two more under the long walls if it is a larger greenhouse. Make sure all are level with each other. Then fill the trench up to the level of the stones or pavers with gravel. Lay layers of 4 × 4 inch (10.2 × 10.2 cm) or 6 × 6 inch (15.2 × 15.2 cm) cedar or pressure-treated lumber from corner to corner. If you run the first layer to the end of the longest side and butt the end wall first layer against it, then do the opposite on the next layer. Run end wall lumber of the second layer to the outer edge of the first layer and butt the long wall piece against it so that they interlock at each corner to give the foundation greater stability.

You will want to use long spike nails to

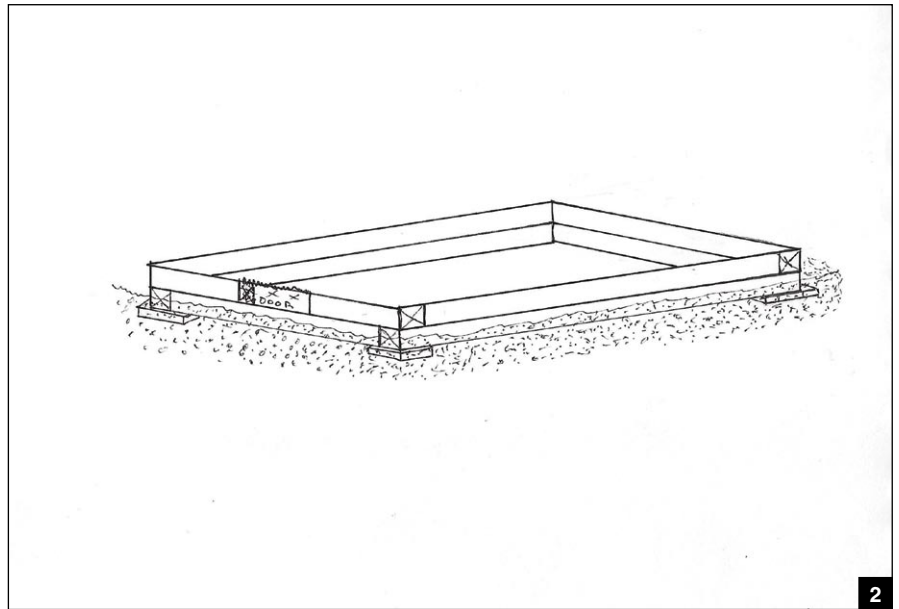
hold the layers together and you may also want to drill holes vertically and pound rebar steel through the layers and well into the ground to keep the foundation from shifting. Just check that your rebar and nails in the top layer are not in the way of the holes in your greenhouse frame that are used to attach the greenhouse to the foundation!

A more complicated foundation would involve digging a bit deeper trench, pouring a footing with concrete into it and then pouring a short wall or laying a block wall on top of the footings. Be sure to plan for frost, sand or any other soil that might subside. Whatever foundation you use, you will need to check with the greenhouse company when you order it so that they send the appropriate fasteners for wood vs. concrete. Either type of foundation can be covered with stone veneer or metal flashing with dense Styrofoam-type insulation under it to insulate and protect from the wind. The downside to wood foundations is that there may be small cracks the wind can get through. At the minimum, caulk the joins. Wood is less expensive than concrete, however.

An attached greenhouse is a horse of a different color. You will need a foundation that goes below the frost line if you are in a cold climate. In a warmer climate, it will need the depth or support that is similar to the house or other structure so that the house and greenhouse stay level with each other in all seasons. You do not want frost or shifting subsoil to pull the greenhouse away from the house!

The most expensive foundation consists of a deep foundation and footings of poured concrete and then backfilled with gravel. Be sure to pack the gravel before laying a patio stone floor. Concrete floors do not drain as well. Yes, you can put drains in the floor but beware of potting materials blocking them. Styrofoam beads and peanuts float and do not always drain away easily and can lead to a blockage with other materials.

Alternatively, a deep foundation can be prepared by digging holes to below frost level, pouring a few inches of a concrete footing and then placing thick cardboard tubes (available at building centers) that are 6 or 8 inches (15.2 or 20.3 cm) in diameter and then filling them to a set level with concrete. These need to be placed in the corners and at intervals on the walls if the tubes are longer than 6 feet (1.8 m) or whatever your municipality suggests depending on the size and weight of your greenhouse. Then proceed



with cedar or pressure-treated lumber on top of the concrete tubes as you would on a free-standing greenhouse. This method is far less expensive the farther north and deeper the foundation needs to be than a solid concrete or block wall; nor does it create the mess that a full concrete foundation would make with a backhoe needed to dig the trenches or floor out.

If you live in a cool or cold climate, place 2 inches (5.1 cm) of special below-grade, Styrofoam-type insulation under the floor to keep the frost and cold in the ground from creeping into the greenhouse. It keeps a greenhouse with a sunny exposure about 10 F (about 5 C) warmer in the winter than a floor without such insulation.

A final suggestion: I have always put a cistern under my greenhouses (four over the years) to collect rainwater. I use a plastic septic tank (they are usually rated for potable water) under the greenhouse and run a drain from the eavestrough on the house or the barn into it. Be sure to put in an overflow! These tanks withstand

- [1] Foundation for an attached greenhouse. Attached greenhouses must have foundations that reach below the frost-line to avoid heaving during the winter.
- [2] Foundation appropriate for a freestanding greenhouse.

pressure, last longer than the greenhouse will and hold 600 to 1,500 gallons (2,271–5,678 L). In southwest Texas, people also commonly use larger above-ground water storage tanks outside the greenhouse because the municipal water has such a high mineral content.

— Jean Allen-Ikeson is an AOS judge, Chair of the Editorial Board and National Judging Education Coordinator. She is the author of the *Sarcocochilus Supplement to Orchids* and numerous other articles on hybridizing, judging and culture. Previously she worked as a technical publisher and editor, and wrote over 140 articles for a high circulation computer magazine (email: jean.ikeson@gmail.com).

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CONSERVATION UPDATE

Conservation and Reintroduction of Singapore's Native Orchids

Text and photographs by Tim Wing Yam



ORCHIDACEAE CONSISTS OF around 25,000 to 30,000 species worldwide and is one of the largest vascular plant families in the World and in Southeast Asia. More than 800 orchid species in 120 genera have been recorded in peninsular Malaysia (Seidenfaden and Wood 1992).

Singapore is located in a center of floral diversity with thousands of orchid species. It is situated just the north of the equator, off the southern tip of the Malay Peninsula. Consisting of the main island of Singapore and many smaller islands, the total land area is about 278 square miles (720 sq km). The whole island consists of lowland with the highest point at Bukit Timah, only reaching an elevation of 535 (163 m). With a typical equatorial climate, it experiences uniform temperature and high humidity throughout the year. Average daily temperature fluctuates between 77 and 91 F (25–33 C). Its annual rainfall is about 91 inches (230 cm), and the wettest months are from November to January.

Although the country is an urban city, many interesting natural habitats can be found. In the heart of the main island is a primary rainforest and freshwater swamp forest. In addition, some mangroves also remain. The other habitats consist of secondary forests, shrub, grasslands, urban parks and fields.

The biological and physical factors within each habitat have created numerous ecological niches for many orchids to thrive. After being released from a mature seed capsule, the airborne orchid seeds eventually settle down in a niche, such as on a tree trunk, on rock or on the ground. Provided with the right physical (e.g. moisture and light) and biological (e.g. the right fungus to infect the seed) conditions, the seed will germinate and grow (Arditti 1992). Numerous ecological niches combined with the right climate account for the large number of orchid species found on the Island of Singapore. Unfortunately, many of the natural habitats and the native orchids that thrive there have disappeared due to habitat destruction. A comparison of the habitats on the island 150 years ago with today showed that most of the mangrove and marshy areas have been replaced by industrial estates or residential areas. Forest and mangrove areas such as those at Choa Chu Kang, Jurong, Ang Mo Kio and Serangoon, where native orchids used to thrive, no longer exist. As a result, the native orchids are seriously endangered. Out of the 224 species recorded in Singapore, 154 are considered to be nationally extinct, 62 are



critically endangered, three are vulnerable, only five are considered to be common (Tan et al. 2008; Lim et al. 2019). Four of them are terrestrial (*Arundina graminifolia*, *Bromheadia finlaysonianum*, *Eulophia graminea*, *Spathoglottis plicata*), while the most common of all is the epiphyte *Dendrobium crumenatum*, also known as the pigeon orchid.

THE PROGRAM The orchid conservation and reintroduction program, which started in 1995, aims to monitor existing species, explore ways to conserve their germplasm, and increase their number through subsequent reintroduction into appropriate habitats, including roadside trees, parks and nature areas (Yam 2013). As a valuable part of our natural heritage, these orchids beautify our parks and streetscape and contribute towards Singapore's vision of being a "City

- [1] *Bulbophyllum pulchellum* in flower.
- [2] Reintroduced *Bulbophyllum pulchellum* bearing several inflorescences.
- [3] *Bulbophyllum pulchellum* in its native habitat in the Nee Soon Swamp forest.

in a Garden."

The goals of our conservation program are:

- To conserve the species by raising seedlings from seeds and vegetative propagation. For species that are nationally extinct, plants are reintroduced from our neighboring countries such as Peninsula Malaysia for planting.
- To reintroduce the plants to their natural habitats, parks and roadside trees.
- To monitor the growth of reintroduced plants.

- To investigate the best conditions for reintroduction.

Propagation of native species started in the mid-1990s and seedlings were introduced in 1999. By 2009, we succeeded in propagating and introducing five species of native orchids; namely, *Grammatophyllum speciosum*, *Bulbophyllum vaginatum*, *Bulbophyllum membranaceum*, *Cymbidium finlaysonianum* and *Cymbidium bicolor* subsp. *pubescens* (Yam 2008). From 2009 to 2019, we expanded our reintroduction effort, and, to date, 40 native orchid species have been reintroduced across Singapore, comprising over 40,000 plants at more than 40 different locations.

Success stories illustrate how propagation and reintroduction are done:

Bulbophyllum pulchellum

A critically endangered species, *Bulbophyllum pulchellum* appeared to be quite widespread in swampy areas of Singapore as an epiphyte on trees, although it is not common. Herbarium records show that it has been collected in Chan Chu Kang, Kranji, Seletar, swamp forest at Jurong Road, and the Mandai Forest. In 1955, the species was collected by J. Sinclair on a "road leading to Number 1 Rifle Range, in Nee Soon," "as an epiphyte on *Knema malayana*." During a tree flora survey in 2010 at Nee Soon Freshwater Swamp, the presumed extinct species was rediscovered.

A few plants were collected from the Nee Soon Swamp Forest where the species was rediscovered. The plants were divided and grown in the nursery of the National Orchid Garden. Each cutting consists of two old stems and a new shoot. The cuttings were mounted on fern bark which is covered by a layer of sphagnum moss. They were placed under semishade (i.e., 50 percent shade) and watered twice a day. After growing in the nursery for two years, the plant had about 10 shoots and a good root system. It is important to reintroduce strong and vigorous plants because these established plants have higher rate of survival. Reintroduced orchids must be planted under the right environmental conditions. Sibling crosses were also made between the different wild-collected plants. Seeds were sown and seedlings have been growing in the nursery. The species has been successfully reintroduced at Upper Peirce Reservoir, Bukit Timah Nature Reserve, PasirRis Park and Dairy Farm Nature Park. Some plants have flowered.

Cymbidium bicolor* subsp. *pubescens

Thought to be extinct, *Cym. bicolor*



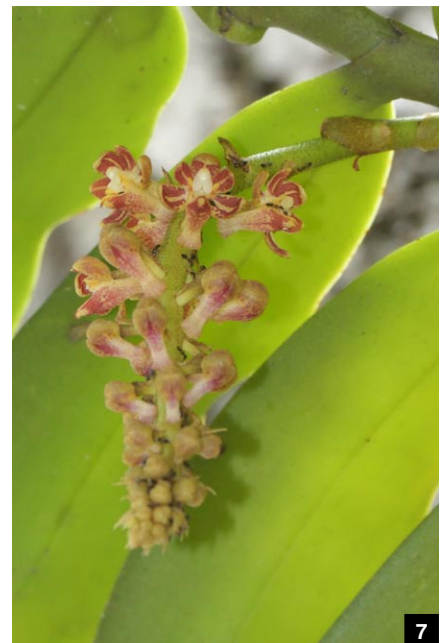
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subsp. *pubescens* was rediscovered at the Sungei Buloh Wetland Reserve in 1999. Seeds were collected from this plant several years ago. The seeds were sown on Knudson C medium. Seedlings were grown on the medium to 1.6 inches (4 cm) tall before being transferred to the nursery. Two seedlings were planted per fern bark measuring 2.8 inches long × 2 inches wide (7 cm × 5 cm). They were grown at the nursery for about one year when new shoots began to develop and was ready for reintroduction. Seedlings raised from seeds from this single plant have been reintroduced successfully to parks and nature areas throughout the island. Seedlings grow well at sheltered areas where the plants are not exposed to direct sunlight and strong wind. However, those planted near the exposed mangrove area, only 10 percent survived. Orchids planted in forested area such as MacRitchie Reservoir grow well without any watering even during drought periods. Some of these plants have flowered and produced seed capsules.

Robiquetia spathulata

Thought to be extinct, *Rbq. spathulata* was rediscovered in 2006. Before that, the species was recorded only once in Singapore by Henry Ridley. After unsuccessful attempts to propagate the plants from seeds, the plant was cloned and eventually reintroduced into many areas all over the island. From 2012 to 2015, more than 900 plants have been planted. More than 90 percent of the reintroduced plants survived, with strong root systems and healthy leaves. Some of these plants have flowered.

MAINTENANCE Our aim is to have as little maintenance as possible. Orchids planted under the right microclimate should be able to thrive by themselves like other epiphytes. Therefore little maintenance is needed. In case of severe drought, plants can be drenched twice a week. If plants are reintroduced during the dry season or planted at more exposed locations, it is necessary to water them at least three times a week. Once the roots of the newly planted orchids attach themselves to the tree trunk, watering can be reduced.

When dead leaves from trees fall within the cracks and crevices of the old tree trunk, they decay and the resulting humus not only holds water but also provide nutrients for the epiphytes. The reintroduced orchids should be able to thrive like other epiphytes without the application of fertilizers. To help the seedlings to establish faster, a light,



balanced foliar fertilizer can be applied one month after planting and for a period of six months after that.

Our hope is that the reintroduced species will act as catalysts in the restoration of at least part of the original ecosystem. For example, pollinators may be attracted to come back to pollinate the flowers. Orchid seeds that are formed naturally after flowers are pollinated may be blown to the proper environment where appropriate mycorrhizal fungi are present. And we hope that one day we will be able to see natural populations of native species sprouting up all over the island!

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- [4] Native orchid seedlings growing in the nursery.
- [5] Reintroduced *Cymbidium bicolor* subsp. *pubescens* growing vigorously on a tree in the Dairy Farm Nature Park. Leftmost inset: reintroduced *Cymbidium bicolor* subsp. *pubescens* flowered at the Sungei Buloh Wetland Reserve; rightmost inset: naturally produced seed capsules on reintroduced plants.
- [6] *Robiquetia spathulata* plantlets being grown in the laboratory.
- [7] Reintroduced *Robiquetia spathulata* in flower.
- [8] National Orchid Garden at the Singapore Botanic Gardens.

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Into Africa, Part 2

by Thomas Mirenda

The Central African Shade-House Network

THE PAST YEAR has been one of liberation, exploration and revelation. The circumstances were ripe for me to travel. I had an extraordinary and generous offer by the Kenya Orchid Society to come to Africa, and I had an idea about a strategy for orchid conservation that made sense to me. It seemed that events had conspired to facilitate one of the most unforgettable, life-changing experiences of my existence. I have many stories to tell about my six weeks on the continent that will make for compelling future articles and talks. There I found fantastic new friends, cities, landscapes and, of course, orchids.



Thomas Mirenda

I definitely wanted to meet up with Tariq Stevart, PhD, and his team in Gabon, to see and learn about his program for central African orchids. I had seen the website for the

Central African Orchid Database created by Vincent Droissart from the French National Research Institute for Development in collaboration with the Missouri Botanical Garden (MOBOT) — (<http://www.orchid-africa.net/>), and I was thrilled to learn of his network of shade houses and gardens where collections of species virtually unknown to the rest of the world are being carefully catalogued, cultivated, bloomed, photographed and propagated as a means of understanding, documenting and conserving them for the future. Desperate to see these species for myself, I found my way to Gabon to meet him and his amazing team.

As tourism is not a big industry in Gabon, you may not be aware of its splendors. With vast tropical forests stretching to the wide sandy beaches of the western coasts on the Atlantic Ocean, Gabon is both beautiful and biodiverse, with many areas not sufficiently botanized. It is an area with myriad unfamiliar and even unknown species, certainly regarding their orchids, but also every other type of organism.

Orchids in the wild are often difficult to see; they are either high in the trees or very rarely actually bearing flowers, making accurate identification a challenge and the description of new species fraught with difficulty. Tariq and his team of local



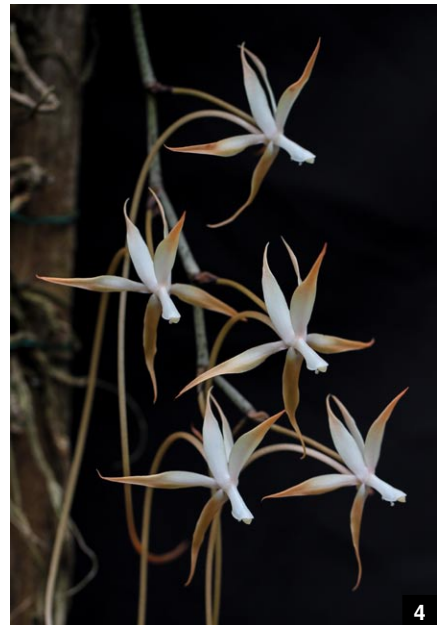
THOMAS MIRENDA



THOMAS MIRENDA



VINCENT DROISSART



VINCENT DROISSART

botanists have assembled astounding collections that are being conserved and cultivated within their native ranges. This conservation strategy, neither exactly in situ nor ex situ but rather a combination of the two, is referred to as the “circa situm” strategy — growing plants in gardens or reserves within or adjacent to their natural areas. This strategy gives the plants perfect natural conditions but is enhanced with a little horticulture and protection from other threats such as poaching, logging or severe weather. Often the results are spectacular specimen

- [1] The main collection of the shade-house network housed in Libreville, the capital and largest city in Gabon.
- [2] *Angraecum distichum* growing in full-sun.
- [3] This spectacular West African species, *Aerangis gracillima*, is found from Cameroon to Gabon.
- [4] Another spectacular species, *Aerangis bouaensis* is found from Gabon to the Central African Republic.



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plants. Growing them in gardens and shade houses allows for easy access and documentation. By doing things this way, over 40 new species have been identified and described in recent years by the MOBOT team.

I had the honor of visiting two collections in Libreville, as well as two local wild-orchid hotspots with Tariq and some of his botanists, Dr. Archange Boupaya (now the head of the National Herbarium) and John Kaparidi a well-versed botanist who also served as our driver on the challenging drives to our study sites. In my short time there, I was thrilled to see thousands of wild and cultivated orchids including *Aerangis*, *Ancistrochilus*, *Ancistrohynchus*, *Angraecopsis*, *Angraecum*, *Bolusiella*, *Bulbophyllum*, *Eulophia*, *Eurychone*, *Graphorchis*, *Listrostachys*, *Microcoelia*, *Plectrelminthus*, *Polystachya*, *Stolzia*, *Tridactyle*, *Vanilla* and many others. One area, literally on the beach, had multiple orchids on every tree as well as other fantastic nonorchidaceous genera such as *Aristolochia* (Dutchman's pipes), *Gloriosa* (climbing flame lily) and *Siphonochilus* (African orchid ginger), making it a virtual treasure trove of exotic botanicals.

Dr. Stevart and his team have similar efforts going on in several other Central African countries (São Tomé, Cameroon, Equatorial Guinea and Madagascar), where they are developing infrastructure and training local personnel in orchid ecology, cultivation and micropropagation quite successfully. I look forward to future discoveries and visits with my newfound friends in Central Africa.

— Thomas Mirenda has been working professionally with orchids for over three decades. He is an AOS accredited judge and is the chairman of the American Orchid Society's Conservation Committee (email: biophiliak@gmail.com).

VINCENT DROISSART



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- [5] The panglobal genus *Polystachya* has representatives found throughout the tropical and subtropical regions of the world. Described in 2004, *Polystachya lejolyana*, is found from Cameroon to Gabon.
- [6] Described by Summerhayse in 1937 as *Angraecum doratophyllum*, this delicate species is now classified as *Afropectinariella doratophylla*. The genus of four species is found in West and West Central Africa.
- [7] *Listrostachys pertusa* is widespread in West and West Central Africa.
- [8] *Plectrelminthus caudatus* is the only species in this genus. The striking nonresupinate green-and-white flowers are produced on long, pendent inflorescences.



Sylvia Strigari

Coryanthes kaiseriana

Text by Lizbeth Oses-Salas and Franco Pupulin/Watercolor by Sylvia Strigari

Tribe CYMBIDIEAE
Subtribe STANHOPEINAE
Genus CORYANTHES Hook.

Coryanthes kaiseriana G. Gerlach, Lankesteriana 8:23–27, f. 1A–D, t. 1–3. 2003. Type: Costa Rica. San José: San Isidro de Pérez Zeledón, cult. Danilo Quesada Rivera, 27 March 1976, leg. R. Lucas Rodríguez C. 1457 [1497] (Holotype: USJ-14560).

Epiphytic, large *herbs* up to 50 cm tall, forming massive mats, mostly associated with ant nests. Roots slender, ca. 1 mm in diameter, produced from the rhizome at the base of the new shoots. *Pseudobulbs* aggregated, narrow oblong-ovoid to oblong-conical, up to 7.2 × 1.9 cm, with a brown ring at the apex, covered when young by triangular, membranous leaf sheaths, becoming dry-papyraceous with age and eventually dissolving. *Leaves*; two at the apex of the pseudobulb, narrowly elliptical to linear-lanceolate, acute, up to 41 × 3.9 cm. *Inflorescence* pendent, up to 37 cm long, the peduncle terete, stout, with several ovate, tightly clasping bracts. *Flowers* brightly colored and morphologically complex, intensely scented, the sepals and petals ephemeral. *Dorsal sepal* yellow with reddish dots more concentrated at the base, ovate, obtuse, subapiculate, the lateral margins inrolled, 2.8 × 2.5 cm, folded back at the middle along a curved line. *Lateral sepals* yellow with reddish dots along the ribs, falcate, acute, 9.8–10.7 × 2.6–3.1 cm, strongly reflexed at the base, folded from side to side along the sinus, the margins inrolled. *Petals* dull greenish yellow, with reddish brown spots, linear-sigmoid, subacute, apically twisted-incurved, 4.1 × 0.8 cm. *Lip* divided into a hypochile, mesochile and epichile, 3.9 × 3.2 × 2.5 cm; hypochile semicircular-cucullate, orange-yellowish, with a touch of reddish brown at the base, covered dorsally with osmophores, 3.3 × 1.7 × 2.7 cm; mesochile semitubular, obtuse, the lateral margins inrolled to form a conical cuniculus, abaxially yellow with reddish brown sides, adaxially pale yellow with reddish brown spots; epichile cup-shaped, deeply excise frontally, with an apical, ligulate, thick ligule, abaxially yellowish red, adaxially yellow, with reddish brown spots more concentrated

toward the apex. *Column* semiterete, 3.7 × 0.6 cm, abruptly bent forward in the apical portion, provided with two small, triangular, parastigmatic wings and two large pleuridia on each side of the base, whitish green, marked with purple elongated spots and two projections near the apex. *Pollinia* two, oblong-ovoid, slightly flattened; stipe ligulate and curved; viscidium bidentate. *Fragrance* strong and pleasant. *Fruit* an elliptical capsule, ca. 6 × 4 cm.

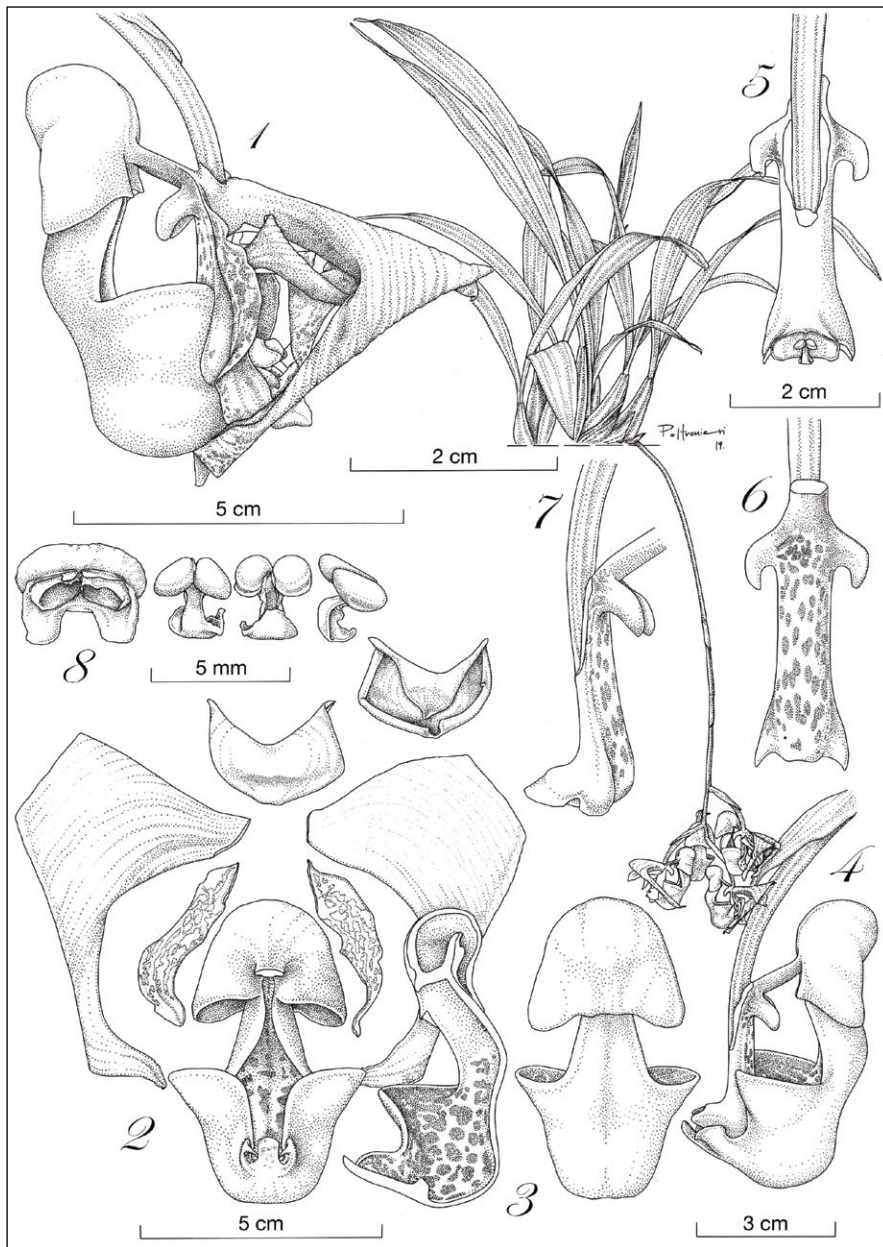
Stanhopeinae, the subtribe to which the genus *Coryanthes* belongs, is characterized by a great variety and plasticity in flower morphology. One of the floral parts in which these variations are more remarkable is the lip, to a point that sometimes it is almost impossible to produce a faithful description of it (Gerlach and Dressler 2003). In order to botanically describe its structure it is best subdivided into three parts: the hypochile that is the basal part, the mesochile (the middle), and the epichile, corresponding to the apical portion (Gerlach and Schill 1993, Dodson 1965). The flowers of *Coryanthes* also hold the record of being the heaviest in the family, as they can reach a weight of more than 100 grams (approaching a quarter pound).

In 1831 the genus *Coryanthes* (from the Greek *korys* = helmet, and *anthos* = flower), commonly known as bucket flowers, was established by Hooker and published in *Curtis's Botanical Magazine*, inspired by the helmet-shaped epichile (Gerlach and Schill 1989, Gerlach and Romero 2008, Gerlach 2011). The species of this genus are distributed from Mexico to Bolivia and Brazil, from sea level to around 1,500 m, where they are more commonly found in humid lowland forests. Nevertheless, plants are quite difficult to find in the field as their populations are mostly composed of a few scattered individuals, with a very low density compared to other epiphytic orchids. This fact, as well as the short duration of the flower and the mutualistic relationship that the plants have with ants (making them painfully difficult to collect), have been raised as an explanation for the rarity of *Coryanthes* species in orchid collections, even though they are very desirable among horticulturists (Gerlach

2011).

As previously mentioned, *Coryanthes* have a strong relationship with ants, growing epiphytically in so-called ant-gardens. Here, with their root system, the plants provide a base for the construction of the nest, and also offer nectar in extrafloral nectaries. In return, the ants defend the plant against herbivores and fertilize them with the excrement of vertebrates collected from the soil. Another special relationship of *Coryanthes* with insects is with the males of euglossine bees (Dodson 1965). In the pollination process, these bees are attracted to the flower thanks to the fragrance produced through the osmophores located on the lip (Gerlach and Schill 1993). While the fragrance works as a reward for the bee, the morphology of the lip also works as a trap. When the bees fall into the cavity of the epichile, they contact the liquid secreted by the glands located at the base of the column, which fills the cup. With their wings moistened, and due to the slippery surface of the inner cup, the bees can only escape by grasping a callus located at the level of the liquid, which leads them directly to a cavity formed by the tip of the lip and the apex of the column. In that way the bee first contacts the stigma, pollinating the flower if carrying a pollinarium from a previous visit; as the bee struggles to exit the channel, the pollinarium is glued to the rear of his thorax. Self-pollination is avoided due to a spatial separation of anther and stigma (Gerlach 2011).

Coryanthes kaiseriana has been known since 1976 when Rafael Lucas Rodríguez used a specimen of this species as a model for his drawing number 928 (where he even noticed the very wide hypochile — a diagnostic characteristic of the species) which he identified as *Coryanthes speciosa* Hook. *Coryanthes kaiseriana* was also confused with *Coryanthes picturata* Rchb.f. in 1991 and 1993 by Gerlach and Schill. Dressler, in 1993, confused it with *Coryanthes maculata* Hook, and Kaiser. It was not until 2003 when Gerlach eventually identified it as a still undescribed taxon and dedicated the new species to Dr. Roman Kaiser, a Swiss fragrance chemist, in recognition of his scientific contributions



Coryanthes kaiseriana. The plant.

1. Flower.
2. Dissected perianth; the dorsal sepal, in natural position, shown in adaxial and abaxial views.
3. Lip, longitudinal section and dorsal view.
4. Column and lip, lateral view.
5. Column, dorsal view (the anther cap removed).
6. Column, ventral view.
7. Column, lateral view.
8. Anther cap and pollinarium in dorsal, ventral, and lateral views.

All drawn from *Pupulin 8834* by Sara Díaz Poltronieri.

that helped to better understand the floral syndrome of orchids with perfumes. Curiously, his surname translated from German means emperor, and it can surely be said that Kaiser is the emperor of aromas for his unmatched ability to detect their composition. In several cases, he was the first to find aromatic substances previously unknown to science, thanks to decades of study the fragrances produced by rare plants studied in situ in rainforest canopies (Gerlach & Dressler 2003, Kaiser 2016). Roman Kaiser studied chemistry at Winterthur Technical College, Switzerland, and since 1968 has worked as a fragrance and flavor chemist at Givaudan Research Center in Dubendorf, near Zurich (Kaiser 2016), a company that for several years has stood out for being the best in the flavor and fragrance industry (Givaudan, 2019).

Dr. Kaiser led the development of the technique known as headspace analysis (Kaiser 2016), to elucidate the compounds present in the air surrounding odoriferous objects such as plants and flowers, a technique that has since been used extensively to sample in vivo the aromatic compounds of a large variety of taxa.

Coryanthes kaiseriana is distributed in the Central American isthmus, along the Pacific slope of the continental divide from the province of Puntarenas, Costa Rica, to the province of Chiriquí in Panama, in humid tropical areas. Although it is a challenge to cultivate, this species as well as the other species of *Coryanthes* can be satisfactorily grown at a temperature between 20 C and 35 C (77–95 F), with an ambient humidity around 50 percent, a quite strong light intensity (50–70 percent shade or approximately 3,000–5,000 footcandles), with a smooth and continuous air circulation. Watering frequency, like that for *Catasetinae*, depends on the time elapsed since the plant was mounted or potted, and the quantity of water must be increased as the roots penetrate the substrate. A good culture medium is represented by thick pieces of cork bark, taking care to put a thin layer of coconut fiber between the bark and the plant, which must be changed at least every two years because the plants are very sensitive to substrate decomposition. Plants of *Coryanthes* can also be grown in a basket with perfectly drained wood substrate particles between 10 and 20 mm (0.4–0.8 in) and coconut fiber. According to Villegas (2017), sphagnum moss should be avoided.

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Selected Botanical Terms

abaxial - lower surface of a leaf
 acuminate - tapered to a point
 acute - pointed
 adaxial - upper surface of a leaf
 apiculate - ending abruptly in a small, distinct point
 bidentate - having two teeth or projections
 bifoliate - having two leaves
 canescent - having fine grayish white pubescence
 concave - bowl-shaped
 convex - curved outward like the surface of a sphere
 coriaceous - leathery
 cucullate - hooded
 cuniculus - burrow or low passage
 ephemeral - short-lived
 epichile - distal portion of the lip
 epiphyte - growing on another plant for support and not as a parasite
 erose - irregularly notched
 falcate - sickle-shaped
 glabrous - smooth
 hypochile - basal portion of the lip
 imbricate - overlapping
 internode - space between joints or successive leaves
 infrageneric - within a genus; subclassification of a genus

involute - curled
 lanceolate - narrow oval tapering to a point at each end
 ligulate - strap-shaped
 ligule - strap
 membranous - thin, like a membrane
 mesochile - middle portion of the lip
 obcuneate - wedge-shaped with wide end at the base
 oblanceolate - narrow at attachment, rounded apically
 obovate - egg-shaped with the wide end up
 obtuse - blunt or rounded
 osmophore - scent producing structure
 ovate - egg-shaped with the narrow end up
 papyraceous - papery
 parastigmatic - areas situated beside the stigma
 pedicel - a stem carrying a single flower
 peduncle - the lower part of the inflorescence below the first bud
 phytochemical - any biochemically active compound found in plants
 pleuridia - multibranching structures
 plicate - pleated
 pollinarium - structure that is attached to the insect during pollination

recurved - bent or curled backward
 reflexed - bent backward
 revolute - rolled backward or inward
 rhizome - horizontal stem
 scarious - dry and membranous
 sigmoid - S-shaped
 sinus - space or indentation between two lobes of a leaf
 staminode - sterile or abortive stamen; in Cyripedioidea, the flat structure that covers the two fertile anthers
 stipe - a small stalk
 sub - prefix meaning nearly or almost as in subpyriform - almost pear-shaped
 sympatric - found growing together; habitats that overlap
 terete - cylindrical or pencil-shaped
 trilobed - having three parts
 truncate - abruptly terminated as if cut off
 type - specimens on which a description is based
 viscidium - the sticky pad on the caudicle or stipe of the pollinarium that attaches the pollinarium to a pollinator

Artificial Light Intensity and

By Ray Barkalow

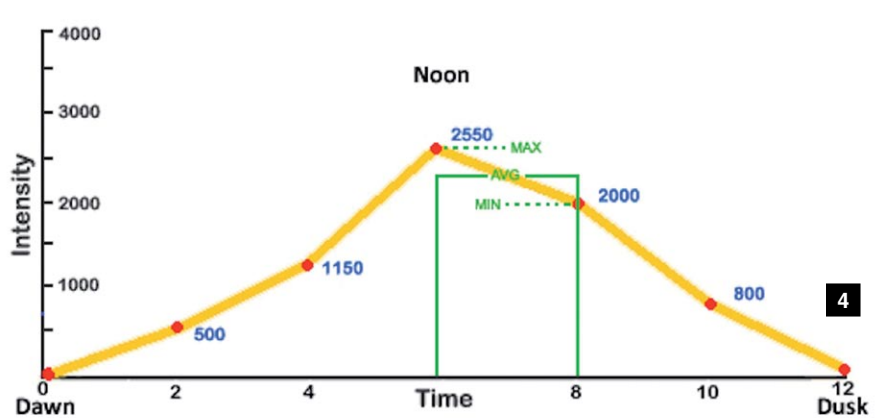
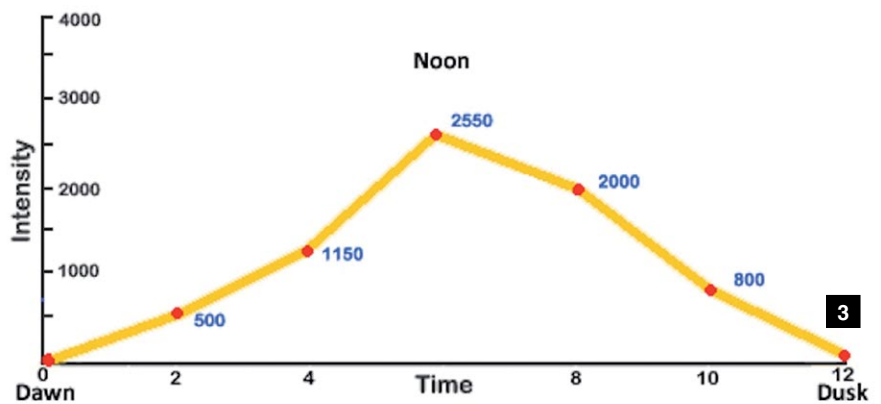
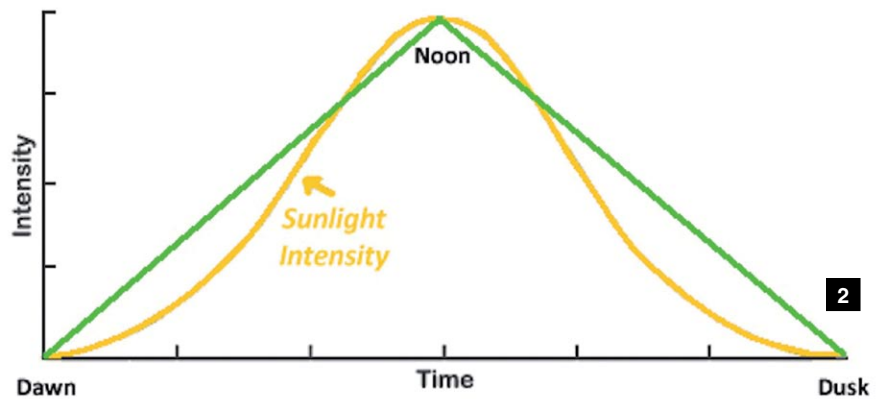
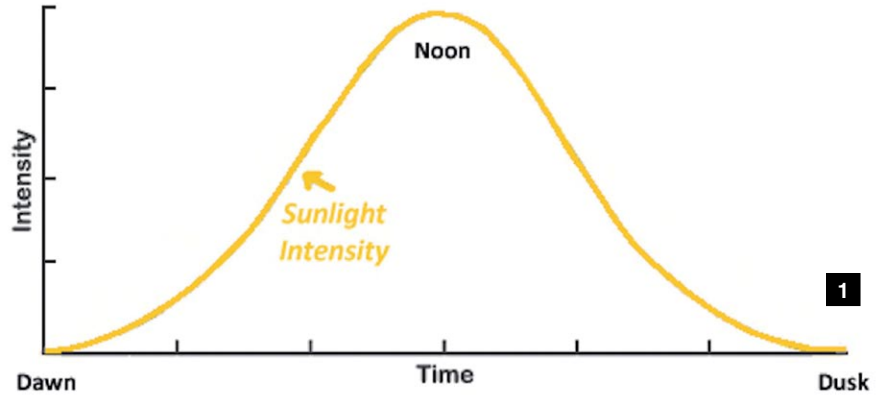
COURTESY OF THE many culture guides available on the Internet, such as those issued by the American Orchid Society, Charles O. and Baker L. Baker or individual growers, we can often find out reasonable target light levels for our plants. What many do not realize is that those recommendations are typically the peak light levels the plants can tolerate in the middle of the day, and not the levels the plants should see continuously when using artificial lighting. Furthermore, there is very limited information available about determining the amount of *supplemental* light that might be needed to compensate for winter's reduced sunlight, that high-rise next door or the leafing-out of that big tree by your window. Fortunately, there are two simple mathematical tricks that allow us to make some reasonable estimations of both. First, let us consider how the sun's rising and setting works in relation to our plants' needs.

Natural sunlight intensity starts at zero just before dawn, reaches a peak at noon and then fades back to zero at dusk.

The amount of light energy that a plant receives is the area under the curve, known as the "daily light integral" (DLI), which is the product of *intensity* × *time*. We can easily estimate that by superimposing a triangle over the curve of the sun's intensity.

The area of a triangle in the second figure is calculated as $(1/2 \times \text{base}) \times \text{height}$, or in this case, $(1/2 \times \text{hours}) \times \text{maximum intensity}$. As culture guides typically provide the maximum recommended light level for a plant, if we use 100 percent artificial lighting at constant intensity, we need only provide one-half that intensity for the same time period. As an example, if we consider a cattleya's upper limit as 3,000–5,000 footcandles, then under artificial light with similar day lengths, our lamps should provide between 1,500 and 2,500 footcandles. So, how can we use that to find out how much supplemental light we will need? With the help of a light meter and periodic readings, it is really quite simple!

Start by taking light-level readings at fixed intervals throughout a day. The more frequent the better, but we will use two hours over a 12-hour day in this example. Starting with zero at dawn, we can plot the light intensity every two hours until it



Supplemental Light

reaches zero at dusk again.

The area under this irregular curve can be estimated by superimposing rectangles over each 2-hour interval, each having a height that is the average of the two associated readings then summing their areas. However, rather than drawing the chart and the boxes, we can create a table of the light intensity measurements we have taken. Averaging them for each 2-hour period, we can apply similar logic and simply calculate the average light intensity. We have used footcandles in this example, as many folks have meters using those units, but this applies with any light intensity units.

Using our cattleya example again, for which the peak recommended light intensity is 3,000–5,000 footcandles — the equivalent of 1,500–2,500 footcandles applied continuously — our natural lighting average is apparently some 333–1,333 footcandles shy of the preferred range. Be sure not to add so much that your natural-plus-supplemented light intensity exceeds the highest recommendation, so you will not burn your plants. In this case, we can safely add about 1,000 footcandles, turned on at dawn and off at dusk, increasing the average light intensity to 2,167 footcandles, while reaching 3,550 at noon, perfect for happy cattleya plants!

— *Ray Barkalow has been growing orchids for over 45 years and operates First Rays LLC horticultural chemicals. He can be reached at email: info@firstrays.com*

- [1] Plot of natural sunlight as a function of time from dawn to dusk.
- [2] The daily light integral is easily estimated from the green triangle superimposed on the natural light intensity curve.
- [3] Irregular curve resulting from plotting actual light intensity measured at 2-hour intervals from dawn to dusk.
- [4] The area under the irregular curve in figure 3 can be estimated by superimposing rectangles over each 2-hour interval, each having a height that is the average of the two associated readings; then summing their areas.
- [5] Calculation of average light intensity derived from the measurements in figure 4.

AVERAGE LIGHT INTENSITY CALCULATION

HOURS	START	END	AVG	X 2HR
0-2	0	500	250	500
2-4	500	1150	825	1650
4-6	1150	2550	1850	3700
6-8	2550	2000	2275	4550
8-10	2000	800	1400	2800
10-12	800	0	400	800
			Sum	14000
			Sum/12	1167

COLLECTOR'S ITEM

How I Grow *Bulbophyllum beccarii*

Text and photographs by Jerry Lee Fischer, Orchids Limited



I HAVE BEEN growing *Bulbophyllum beccarii* since the 1990s and have had some of the same plants for all these years. This magnificent species from Borneo is most interesting for its gigantic wide leaves and the hundreds of small red-mahogany, yellow and white flowers that last just a couple of weeks at best but have an incredibly horrid scent of rotting flesh. The flowers simulate carrion, and flies are attracted to them and end up pollinating them in their search for fresh or not-so-fresh meat.

In nature, this plant climbs the trunks of trees and can be 40 feet (12.2 m) long! The leaves can be as wide as 18–20 inches (45.7–50.8 cm) and can be up to 2 feet (61 cm) in length. The leaves are somewhat funnel-shaped and collect leaf litter and other debris, which falls down and decomposes providing a constant source of moisture and nutrients to the roots.

When I first started growing these, I tried pots but they really did not like pots that well so I purchased some tubular cork and mounted them on that with wire. Watering every one-to-three days and foliar feeding with fertilizer that is six times stronger than recommended for root feeding seems to work best when done in the morning just once per week. It is important to use rain, distilled or reverse osmosis, as water with minerals in it will not be tolerated for long.

I have also put sphagnum moss around the tubular cork and covered that with long coconut fiber tying it all down with fishing line. The roots seem to stay fairly short being from 3–6 inches (7.6–15.2 cm) long so frequent watering and good nutrition are important.

This species starts developing buds in June through July so it is important to be attentive to watering and feeding at this time. The flowers are truly magnificent! I remember reading about the first plant to flower in England in the 19th century in a conservatory. The story goes that a woman came in to draw illustrations of the plant but found the stench so powerful that she fainted. I have not experienced that but then again, in the summer in Minnesota, it is quite warm and the giant exhaust fans we have turn over the air every minute so most likely the smell gets sucked out of the greenhouse before it gets too overpowering.

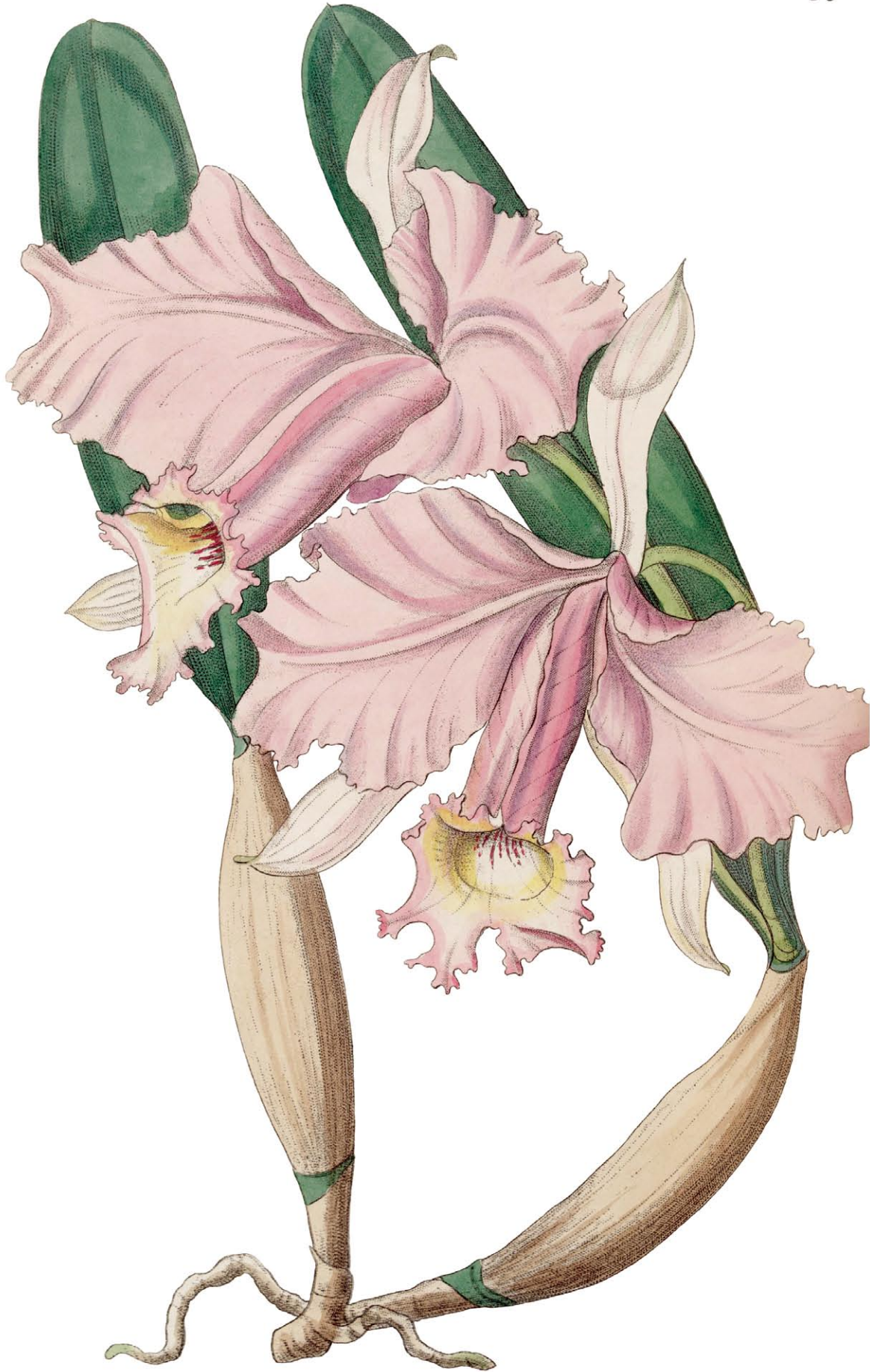
This species is difficult to come by and I have tried for years to pollinate the ones I have with no success. I have made a hybrid called *Bulbophyllum* Bechinolina which is (*beccarii* × *echinolabium*) that has the same growth habit with pretty large



leaves, wonderful flowers with great color and a larger size than the *Bulb. beccarii* parent. The hybrid is easy to grow and we grow them in pots. They could also be tied on trees and I think the hybrid would do well in south Florida, whereas *Bulb. beccarii* probably would not. There is also a smaller form of the species with more petite leaves. I prefer the big one!

— Jerry Fischer, *Orchids Limited*, 4630 Fernbrook Lane N, Plymouth, MN 55446 (email: orchids@orchidweb.com).

- [1] *Bulbophyllum beccarii*
- [2] Mature *Bulbophyllum* Bechinolina (*beccarii* × *echinolabium*) happily growing in a pot.
- [3] Flowering habit of *Bulbophyllum* Bechinolina. The upright inflorescence of the *Bulb. echinolabium* parent and simultaneous-flowering of the *Bulb. beccarii* parent are dominant in the cross.
- [4] Close-up of a flower of *Bulbophyllum* Bechinolina.



W.B. Booth del.

Pub. by J. Ridgway 169 Piccadilly July 1 1846

J. Barclay sc.

1

The Victorian Search for *Cattleya labiata*

by Peggy Alrich and Wesley Higgins



WILLIAM JOHN SWAINSON (1789–1855) was a British naturalist and an artist who is most known for his beautiful colorful drawings of nature. His father, John Timothy Swainson (1756–1824), was a founding member of the Linnean Society. William is credited with starting the Victorian fascination with orchids when the specimens he sent back from Brazil sparked much interest.

William Swainson moved in high society and collected specimens for Sir William Hooker at Kew Gardens and Sir Joseph Banks at the British Museum. He had many academic and renowned friends. Swainson was a member of many learned societies; he became a fellow of the Linnean Society in 1815 and he was elected a fellow of the Royal Society in 1820.

Swainson solicited financial backing from Sir Joseph Banks and the British government for exploration in Brazil but patronage was declined. Using his own resources he traveled to Brazil in 1817 accompanied by Henry Koster, a British explorer known for his book *Travels in Brazil* (1816). Swainson only stayed

for a year because of a political revolt; however, during that time he gathered an impressive collection of insects, plants of many species, and bird skins. In August 1818, Swainson returned to Liverpool, England, via Rio de Janeiro.

In a letter to Professor Jameson, which was published in the *Edinburgh Philosophical Journal* (1819), Swainson detailed his journey through Brazil. The precise provenance of Swainson's orchid collections was not known. Different horticulturists gave conflicting information. Swainson wrote, "I presented to my friend W. J. Hooker, Esq. an interesting collection of parasitic plants." Hooker was the Regius Professor of Botany at Glasgow, but Swainson failed to tell Hooker where the plants had been collected.

John Lindley described the new species as *Cattleya labiata* based on material from Hooker and a drawing made by a Mr. Curtis from a specimen that had flowered in William Cattley's stove the previous November. Lindley's description in *Collectanea Botanica* (1824) naming the orchid, immortalized Cattley. Lindley said, "Without exception, it is the handsomest

species of the order we have ever seen alive."

Hooker (1827) wrote this: "The most splendid, perhaps, of all orchideous plants, which blossomed for the first time in Britain in the stove of my garden in Suffolk, during 1818, the plant having been sent to me by Mr. Swainson during his visit to Brazil. The individual here delineated [in *Exotic Flora*] is an offset from the parent plant just mentioned, and it flowered at the Glasgow Botanic Garden in November 1824...although Mr. Cattley's plant was derived from the same source."

With Lindley's publication, major orchid nurseries across Europe sent their most experienced collectors to Rio de Janeiro (where Swainson had departed Brazil) in search of *Cattleya labiata*. The collectors (1830–1880) scoured the surrounding hillsides and mountains without success. Mr. Swainson was not available because he had gone to the wilds of New Zealand (1841–1855). Thus the handsomest known orchid species became "lost."

Naturalist Dr. George Gardner traveled



CATTLEYA WARCOQUEANA var. AMETHYSTINA L. LIND.

2



CATTLEYA LABIATA LINDL. var. LILACINA L. LIND.

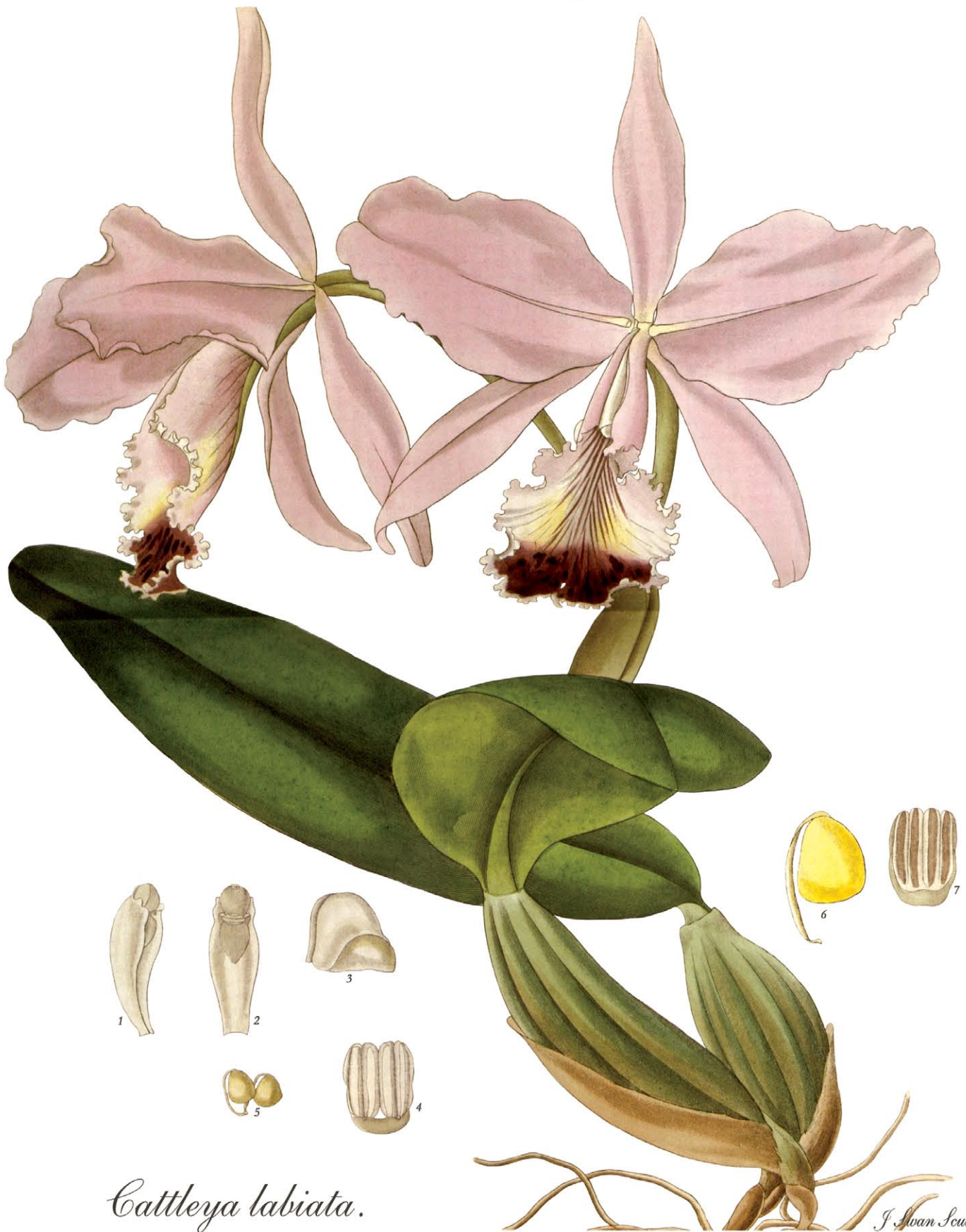
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Antique Plates — *Cattleya labiata*

- [1] *Cattleya labiata* as *Cattleya lemoniana*. *Edwards's Botanical Register*, 32:t.35 (1846).
- [2] *Cattleya labiata* as *Cattleya warocqueana*. *Lindenia*, 6:t.268 (1890).
- [3] *Cattleya labiata* var. *lilacina*. *Lindenia*, 14:t.646 (1898).
- [4] *Cattleya labiata* var. *candida*. *Flore Serres et des Jardins de L'Europe*, 7: t.661 (1851).
- [5] *Cattleya labiata*. *Fortsetzung Allgemeinen Deutschen Garten Magazine*, 8(6):t.20 (1824).
- [6] *Cattleya labiata*. *Orchid Album*, 2:t.88 (1883).
- [7] *Cattleya labiata* as *Cattleya pallida*. *Paxton's Flower Garden*, revised, 2: t.59 (1883).
- [8] *Cattleya labiata*. *Gardener's Assistant*, 1:8 (1900).





Cattleya labiata.

J. Swan Sculp. Glas

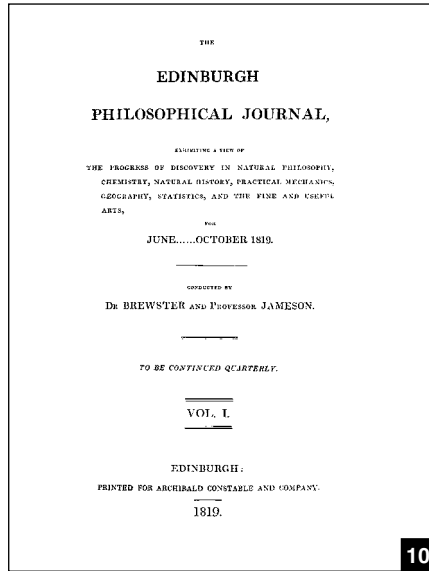
to Brazil in 1836. He found a lavender orchid in the Organ Mountains that he thought was *Cattleya labiata*. Gardner sent specimens to R.A. Rolfe, editor of the *Orchid Review*, who determined that the plants Gardner had found were *Laelia lobata*.

Rolfe (1893) wrote the following: "This magnificent Orchid was originally introduced from the immediate neighbourhood of Rio de Janeiro by Mr. William Swainson, and flowered for the first time in Europe in the stove of William Cattley, Esq., of Barnet, during November 1818. In 1819, it flowered at the Glasgow Botanic Garden, and then again in November 1824, when a coloured plate was prepared for the *Exotic Flora*, from which work we learn that this very plant was an offset from Mr. Cattley's parent plant." The precise locality where it was collected was not stated.

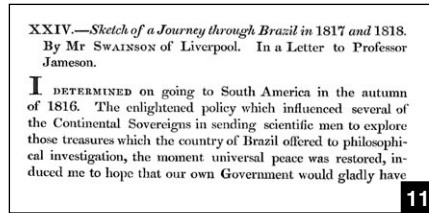
Frederick Boyle (1892) reports the rediscovery of *Cattleya labiata*: "In 1889, a collector employed by M. Moreau, of Paris, went to explore central and northern Brazil in search of insects, and sent home fifty plants — for M. Moreau was an enthusiast in orchidology also. He had no objection in keeping the secret of its habitat, and when Mr. Sander, of St. Albans, chanced to call, recognized the treasure so long lost he gave every assistance.

Thus the "lost orchid" had become found. *Cattleya labiata* was not lost in Brazil but lost in literature. William Swainson had clearly stated in his "Sketch of a Journey through Brazil" (1819): "Instead of following the example of all my fellow labourers, by going in the first instance to Rio de Janeiro, I landed, about the end of December 1816, at Recife, in the province of Pernambuco, 8 degrees south of the line [equator].... I quitted Pernambuco in June 1817, and, with a small train, directed my course (by a circuitous route towards the interior) for along the great river St. Francisco.... At length we reached the village of Penedu, in the beginning of August.

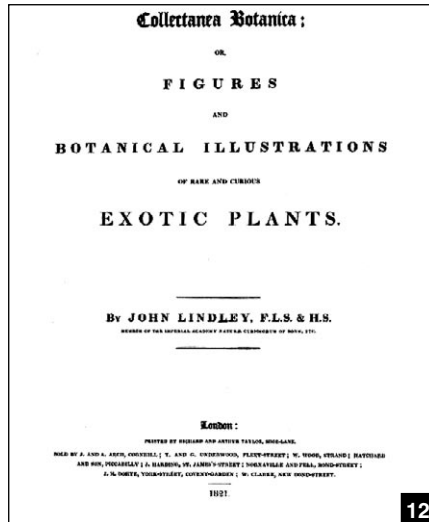
- [9] *Cattleya labiata*. *Flora Exotica*, 3:t.157 (1827).
- [10] *Edinburgh Philosophical Journal* (1819).
- [11] *Edinburgh Philosophical Journal*, 1:369 (1819).
- [12] *Collectanea Botanica* (1821).
- [13–14] *Cattleya labiata*. *Collectanea Botanica*, t.33 (1821).



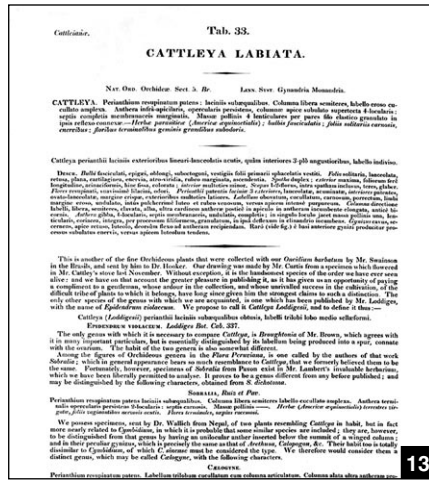
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The botanical subjects collected on this journey were numerous and interesting, particularly among the parasitic plants and cryptogamia."

The specific plant came from northeastern Brazil, far from the coast and at 1,640 to 2,380 feet (500–1,000 m) above sea level where the temperature oscillates between 64 and 72 F (18–22 C). Robert Rolfe (1900) finally put the story together in "*Cattleya labiata* and Its Habitat," published in the *Orchid Review*. One can only speculate how Swainson's "Sketch of a Journey through Brazil" in a Scottish journal was overlooked for so many years.

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- Peggy Alrich is a freelance graphic designer (sunflowerltd@earthlink.net).
- Wesley Higgins is an AOS accredited judge (wesley.higgins@comcast.net).



14

Here Be Dragons

Fantastic New *Catamodes* Hybrids

BY FRED CLARKE



I ALWAYS LOVE to see a new grex flower for the first time. It is remarkable to be the first person ever to see a plant bloom!

The hybrid genus (nothogenus) *Catamodes* (*Ctmds.*) is made by combining two genera: *Catasetum* and *Mormodes*. The first few *Catamodes* hybrids were registered in the 1980s and produced limited results, with flower quality being heavily influenced by the asymmetric flower from the *Mormodes* parent. One valuable quality contributed by *Mormodes* is flower color, which often can be intense. Crossing *Mormodes* with highly colored *Catasetum* species or hybrids can lead to especially vivid flowers in the resulting offspring. The addition of *Catasetum* genes leads to a significant improvement in plant vigor, and *catamodes* generally grow very well.

Catamodes Black Magic (*Mormodes sinuata* × *Catasetum* Orchidglade), registered in 1987, produced few plants of good quality. However, one had an exceptionally deep burgundy flower color, approaching black, and this cultivar ‘Nosferatu’ received a First Class Certificate (FCC) from the American Orchid Society. Unfortunately, the flower shape was somewhat closed, with narrow segments, and this cultivar is not fertile.

A more recent hybrid, *Catamodes* Dragons Tail (*Mormodes lawrenceana* × *Catasetum denticulatum*), produced flowers with very different colors and unexpectedly good shape. The flowers almost look like scales on a mythical dragon’s tail and the flowers have hard substance and are long-lived. It was theorized that these exceptional qualities could be further improved by breeding back to *catasetums*, producing the first second-generation *Catamodes*. This led to significant improvements: greater flower size, symmetrical flower shape, large flat lips, intensified color and long-lived blooms. Two initial crosses were made: *Catamodes* Dragons Glade and *Catamodes* Darkonium

The first to flower was *Ctmds.* Dragons Glade (Dragons Tail ‘Dark Tale’ × *Ctmds.* Orchidglade ‘Davie Ranches’ AM/AOS). *Catasetum* Orchidglade is a well-known hybrid and has demonstrated its value as a breeder, making it a logical choice to breed back to *Ctmds.* Dragons Tail. The offspring of this pairing grew vigorously, and the first plants flowered just two years from flask, with the majority blooming the following year. In the Sunset Valley Orchids 2017 seedling list, I wrote: “Flowers will have a yellow base color overlaid with dense coalescing dark burgundy-brown



FRED CLARKE

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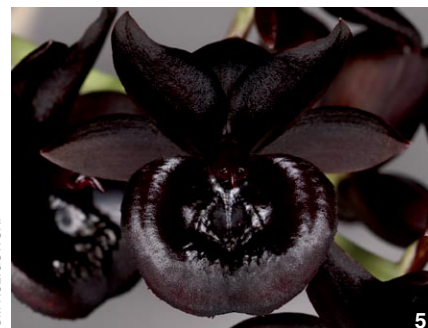
FRED CLARKE

KATIE PAYEUR

TOM KULIGOWSKI



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spots, and the lips will be flat and similar in coloration.” The first plants to bloom validated this prediction. Flowers have excellent form and hard flat lips in yellow, with varying types of burgundy spotting — very beautiful! Each new plant that bloomed seemed better than the last. One even had a solid yellow lip. Then, the unexpected happened: plants began to bloom with flowers in black and shades

- [1] *Catamodes* Dragons Glade ‘Sunset Valley Orchids’ AM/AOS. Photograph by Arthur Pinkers.
- [2] *Catamodes* Dragons Tail ‘Dark Tale’
- [3] *Catasetum* Orchidglade ‘Davie Ranches’ AM/AOS
- [4] *Catamodes* Dragons Glade ‘Robin’s Sunspot’ AM/AOS grown by Sandra Dixon in Michigan.
- [5] *Catamodes* Dragons Glade ‘Black Singularity’ AM/AOS grown by Luiz Hamilton Lima in Florida.



6

CHARLOTTE RANDOLPH



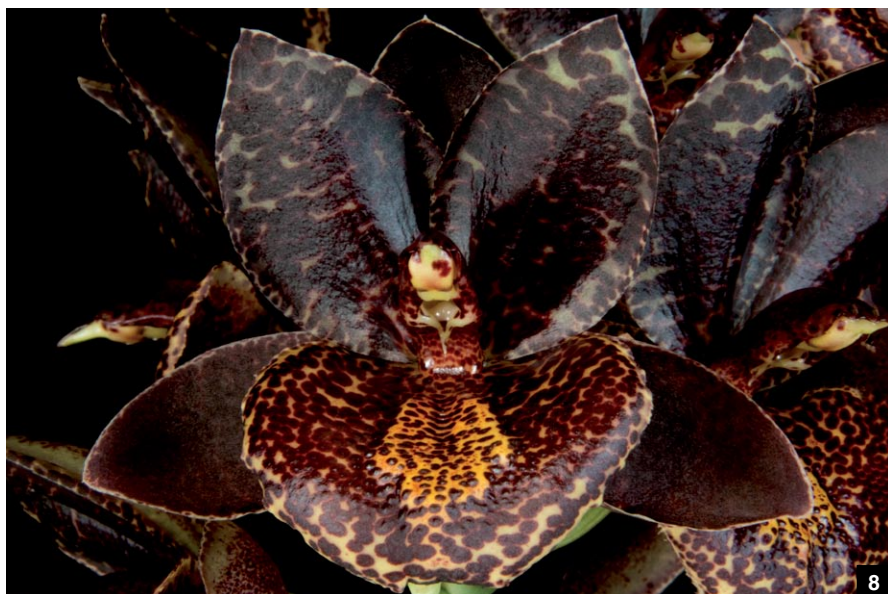
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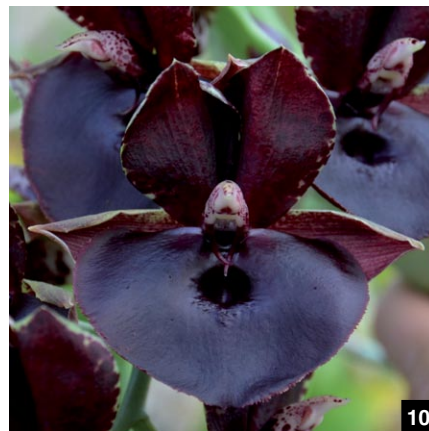
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- [6] *Catamodes* Dragons Glade 'Westway Farms' AM/AOS grown by Don Ghiz in Texas.
- [7] *Catamodes* Dragons Glade 'Black Dragon'
- [8] *Catamodes* Dragons Glade 'Zeus' AM/AOS
- [9] *Catamodes* Dragon Glade 'Pure Gold'
- [10] *Catasetum* John C. Burchett 'Ursa Major' FCC/AOS
- [11] *Catamodes* Dragons Glade 'Black Lava'
- [12] *Catamodes* Dragons Glade 'Summer Dragon'. Photograph by Fred Clarke





13

FRED CLARKE



14

FRED CLARKE

of black. That was a shocker, but you can imagine my delight!

Five plants of *Ctmds.* Dragons Glade have been awarded: the first to Sandra Dixon in Michigan for *Ctmds.* Dragons Glade ‘Robin’s Sunspot’ AM/AOS, then to Luiz Hamilton Lima in Florida for *Ctmds.* Dragons Glade ‘Black Singularity’ AM/AOS, and shortly thereafter to Don Ghiz in Texas for *Ctmds.* Dragons Glade ‘Westway Farms’ AM/AOS. Two more plants have since earned AOS awards: *Ctmds.* Dragons Glade ‘Zeus’ AM/AOS and most recently *Ctmds.* Dragons Glade ‘Sunset Valley Orchids’ AM/AOS.

A year later the second cross, *Ctmds.* Darkonium (Dragon Tail ‘Dark Tail’ × *Catasetum* John C. Burchett ‘Ursa Major’ FCC/AOS), began to bloom. *Catasetum* John C. Burchett is remarkable in many ways, most notably for its huge flat lip that can be described as “black burgundy.” It is also a reliable bloomer, producing stems of flowers three times a year. An excerpt from the 2018 catalog reads, “If any cross in this listing will break new ground, this is the one! I anticipate that this grex will produce even more spectacular offspring than Dragons Glade. The flowers will be large with flat lips, some will bloom spotted while others will be solid black. Do not miss out on these!” With such a strong sales pitch, they sold out quickly, and we were left with just eight plants to flower here in the nursery. Of those few, the first three have been keepers, all with superb shape, color, flower count and flower longevity, given the cultivar names ‘Black Tale’, ‘Base Element’ and ‘New Element’.

While putting the finishing touches on this article, a long-time friend and customer, Rick Wells of California, called to tell me that he received a First Class Certificate on *Ctmds.* Darkonium ‘Ebony Beauty’! This was his first FCC/AOS after 55 years of growing orchids — congratulations, Rick!

Here at Sunset Valley Orchids we are constantly reminded of how amazing *Catasetinae* plants and flowers can be. There is such a large diversity of flower forms, colors, and bloom periods across this group, allowing for a near-infinite number of varieties and opportunities to be developed. Seeing the first plants to bloom from a cross is amazing. Getting them awarded is icing on the cake — just ask Rick Wells.

Acknowledgement

I am greatly honored and indebted to have Ron Kaufmann and Sue Bottom as my editors, their combined insights and



FRED CLARKE



ARNOLD GUM

wisdom are truly beneficial.

— Fred Clarke owns and operates *Sunset Valley Orchids*, located near San Diego, California, USA. His interest in *Catasetinae* spans over 30 years, and he is recognized as the foremost breeder of plants in this group. His hybridization efforts and commitment to the worldwide education of hobbyists in the culture of *Catasetinae* has created renewed interest in this amazing group and helped to establish *Catasetinae* as rewarding plants for growers of all types (website: www.sunsetvalleyorchids.com; email: fred.clarke@att.net).

[13] *Catamodes* Darkonium ‘Black Tale’.

Photographed under natural sunlight, the color saturation is so uniform and heavy that the flowers appear to be black (inset) however a photograph taken with a bright flash and reveals the actual pigment to be an intense dark port wine color.

[14] *Catamodes* Darkonium ‘Base Element’

[15] *Catamodes* Darkonium ‘New Element’

[16] *Catamodes* Darkonium ‘Ebony Beauty’ FCC/AOS

Orchids in Watercolor

Cattleya Mini-Kitty

Marcia Whitmore

CATTLEYA MINI-KITTY (Minipet × *sincorana*) is a cute plant with a large flower. The plant is usually no taller than 6 inches (15 cm) and sends out new growth on a regular basis. My plant grows in plenty of light and dries slightly between waterings. It is fertilized year around with rainwater-formulated MSG fertilizer. I also add Epsom salts (magnesium sulfate) at a tablespoon per 5 gallons (11.7 ml/L) of water. Many hybridizers are making these minicattleyas, which allows the hobbyist to grow more plants in a smaller space. These small plants are ideal for the hobbyists who grow under lights and for windowsill growers, provided they can provide enough light. I purchased this plant from Diamond Orchids in Diamond Bar, California, when Peter Lin spoke at the Central Iowa Speakers Day a few years ago. This painting was completed on Arches 300 lb. cold pressed paper. — *Marcia Whitmore (email: whitbrits@gmail.com)*.

Marcia Whitmore began growing orchids in a basement room under fluorescent lights in 1972 and moved into a 14-ft × 18-ft (4.3 m × 5.5 m) greenhouse in 1984. Marcia is a retired teacher and fine arts coordinator and taught in public schools for 35 years. She has earned many AOS awards and is a member of the Illowa Orchid Society, Eastern Iowa Orchid Society, American Society of Botanical Artists and the Great River Chapter of Botanical Artists (whitbrits@gmail.com, <https://asba-art.org/member-gallery/marcia-whitmore>, www.marciawhitmore.com).



Sl Minipet
x
L. Sincorana

M. Whitmore '19

Growing With LED Lights

T5 HO LED Replacements for Fluorescent Grow Lights

BY A'NA SA'TARA



agrobrite

1

LIGHTING OPTIONS FOR indoor orchid growing, both for supplemental seasonal light sources and for year-round growing areas, have evolved in leaps and bounds over the past few years. Indoor horticulture and agriculture are being radically transformed by the availability of high-quality light from energy- and heat-efficient light-emitting diode (LED) grow lights. These LED grow lights have evolved beyond simple bulbs into panels and fixtures with a variety of sizes and light intensities.

Although indoor grow lights were once ideal primarily for lower-light orchid genera, such as *Phalaenopsis* and *Paphiopedilum*, higher-intensity LED grow lights are now widely produced, thanks to the high-light demands of commercial cannabis production. We have used high-intensity LED grow light fixtures successfully for indoor wintering of high-light-loving cymbidiums and Australian dendrobiums.

We also have used another high-intensity LED fixture to provide year-round lighting for a 4- × 4-foot (1.2- × 1.2-m) humid, cool-growing area. An unforeseen problem? The canes on our *Dendrobium subclausum* grew so large, it expanded horizontally and vertically out of the space. The outside of the plastic basket is being obscured by root growth. Yes, LED grow lights work for orchids!

"HITTING THE HEAT WALL" WITH T5 HO FLUORESCENT GROW LIGHTS One of our recent ventures in orchid culture was to create a dedicated warm room for seedlings to maintain higher humidity and 62 F (17 C) night temperatures for recently deflasked orchids. The growing area worked so well that we moved another shelving unit with blooming-size and near-blooming-size paphiopedilums, and a few phalaenopsis and warmer-growing dendrobium species into the nursery room.

All these shelves were originally illuminated with T5 HO fluorescent grow lights. Full-spectrum T5 HO lighting worked well with good root growth and consistent flowering (9–10 hours/day of light). However, we began to encounter something common in many vertical growing setups: too much heat building up in the room.

Even in relatively cool central California, the heat output from the fluorescent lights began raising the orchid room temperature into the upper 80s F (30 C) in early autumn. Earlier in the summer, it was not so much of a problem: when the rest of our house reached



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[1] Comparison of light quality and differing visible-light spectrum from LED and fluorescent fixtures. Top shelf is illuminated by Active Grow Sun White T5 HO LED grow lights. Lower shelf illuminated by Hydrofarm T5 HO Agrobrite fluorescent bulbs.

[2] *Dendrobium subclausum* is a moderate-to-high-light orchid species from New Guinea. Although this orchid grew vigorously with light levels of 4,000–6,000 fc for 6 hours/day, it grew and bloomed even better under much-less-intense LED lights for 8 hours/day.

[3] *Paphiopedilum acmodontum*. We grow paphiopedilum from deflasking to blooming size under LED grow lights. Mottled-leaf and small to midsize multifloral seedlings are grown under the same lights. Near blooming size, multifloral species are grown under higher LED light intensity or in a southeastern window with afternoon supplemental light from T5 HO LED grow lights.

80 F (27 C), the air conditioning would automatically turn on, effectively capping the heat buildup in the growing room. But as the rest of the house stayed cooler due to lower daytime outdoor temperatures, the air conditioning did not run, and heat continued to build in the warm-growing room.

THE NEW OPTION: T5 HO LED REPLACEMENT “BULBS” What to do? I wanted to bring the heat output (and electricity usage) down to the level prior to adding the additional shelves. However, we had perfectly good T5 HO fixtures. What did I discover? A few companies have identified this market for all of us (not just orchid growers) who have invested in extensive T5 fluorescent lighting over the years. There are LED horticultural “bulbs” designed to fit into T5 HO lighting fixtures! Some of these T5 HO LED replacement bulbs use nearly half of the electricity as the fluorescent lights with a comparable reduction in heat output.

The T5 HO LED replacement “bulbs” are actually an LED strip inside of a polycarbonate or glass tube with the appropriate electrical connection at the end to fit into a T5 fluorescent fixture. These are designed to last 30,000–50,000 hours, depending upon the manufacturer. That translates into about 8–10 years of daily usage.

While evaluating the longevity of T5 LED replacement bulbs, I noted in one brand's technical specifications that they are not expected to simply “burn out” at the end of 30,000 hours, but might decrease to less than 90 percent light output after that time. No one has had that length of experience with new LED horticultural-lighting technology, so we will see how long LED strips actually remain useful. I expect in coming years that lighting technology will have advanced so much that maximum longevity will be irrelevant. There will be better, cheaper, and hopefully even more energy-efficient options available for replacement.

IT JUST SMELLED AWFUL AND NO FIRE OCCURRED At the time of beginning my research (September 2018), there were six companies to consider for T5 HO LED grow light replacements. Now, over a year later, there are even more options.

Before you excitedly purchase the least expensive T5 HO LED replacement bulb and pop it into your existing fixture, I would like to explain some significant details that generally do not show up in bold print on a product page. Based upon our experience with our first set of T5 LED replacement bulbs, one company's



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product was removed from sale for a while.

Oh yes, I never realized that buying orchid grow lights could get this exciting. In summary: it just smelled awful on a Sunday morning and no fire or harm to the orchids occurred.

Here is the situation. Not all ballasts in T5 lighting fixtures will work with all T5 HO LED replacement bulbs. (The ballast is behind the fixture reflector and responsible for regulating the current and providing sufficient start-up voltage to the bulbs.)

Manufacturers do not comprehensively test all ballasts. In our case, I figured that we were okay since we had Hydrofarm Agrobrite and Sun Blaster fixtures — widely used manufacturers for T5 HO fluorescent horticultural lighting. I assumed that, if the T5 HO LED replacement bulbs did not work in those fixtures, the manufacturer would not have much of a market.

Well, I was wrong. The first local manufacturer that we selected for trial, Waveform Lighting (www.waveformlighting.com), had apparently remarketed their residential/commercial T5 full-spectrum LED lights for horticultural applications. After describing my experience with their smoldering PhotonTube T5 LED bulb, it was determined that there was likely a problem with using the product in a T5 HO (54-W) ballast. They only tested regular T5 (28-W) fixtures. Waveform promptly refunded all of our money, sent a return shipping label, and immediately removed these T5 LED replacement tubes from their website pending further testing.

As of late 2019, the PhotonTube



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[4] An example of a T5 HO LED replacement for a fluorescent grow light. These are essentially an LED light strip in a polycarbonate or glass tube with the appropriate T5 electrical connection at each end. Image provided with permission by Active Grow Sustainable Horticultural Lighting.

[5] Three shelves of orchid seedlings, predominantly paphiopedilums and Brazilian cattleyas, growing under 40-W LED Propagation Luminaire from Active Grow. These 40-W fixtures replaced 108-W T5 HO fluorescent fixtures for a total energy savings of 204 W for the shelf unit — with higher quality light and less heat.

is back on the market, with a listing of compatible ballasts in a pdf downloadable from the product page. However, the main product description still exhorts “plug and play” into your existing T5 ballast. As we demonstrated, buyer beware with any T5 HO LED replacement bulb making such claims.

(Note: we do not receive compensation from any manufacturer or any free products. We have trialed many horticultural lights and would like to help other orchid growers with our experience.)

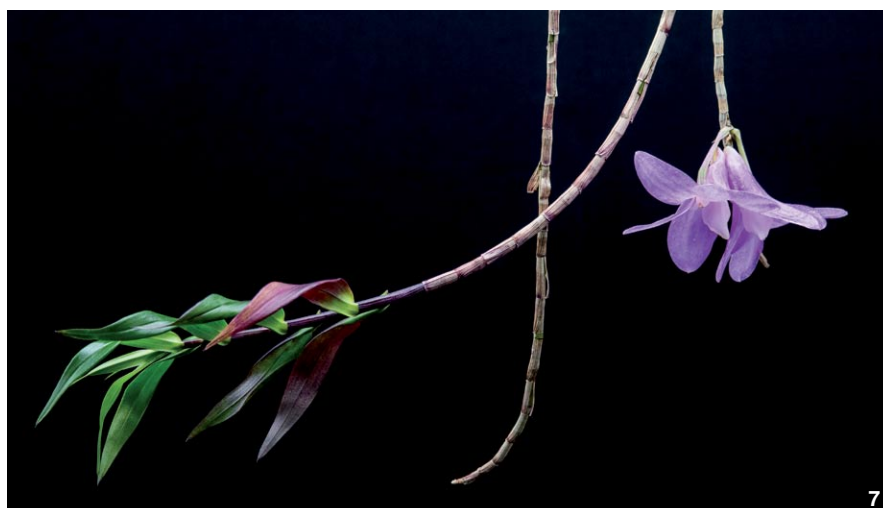
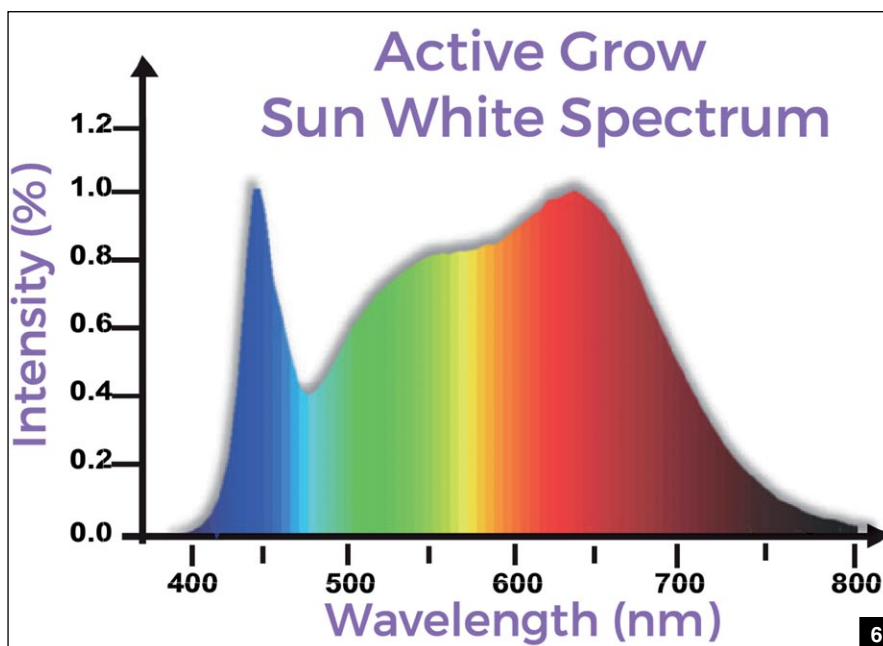
T5 HO LED GROW LIGHTS: BALLAST COMPATIBILITY After the failure of the Waveform Lighting product, and considering several other manufacturers (e.g., Gardener's Supply Company, Thrive AgriTech, AgroLED), I selected Active Grow Sustainable Horticultural Lighting (www.activegrowled.com) for our next set of T5 HO LED replacement bulbs. When I first purchased these T5 HO LED grow lights, they were anticipated to work with both Hydrofarm Agrobrite and Sun Blaster ballasts. They performed beautifully in our Agrobrite fixtures so I ordered a second set to replace the fluorescent tubes in one of our Sun Blaster fixtures.

Alas, it turns out that the Active Grow T5 HO LED lights were compatible with Sun Blaze light fixtures, not Sun Blaster. The replacement LED grow lights seemed fine at first, but began to flicker after 20 minutes. While manufacturers list the ballasts that they have tested, there were no obvious labels on our original T5 HO fixtures from Gardener's Supply Company — just a sticker with “Sun Blaster” on it.

It is possible to unscrew the metal reflector on some T5 HO fixtures to look at the interior electrical components. You should be able to see the ballast and read the fine print of the specific ballast manufacturer and model. This is important fine print if you wish to be sure of a compatible bulb purchase! And, avoid the meltdown that we experienced in our unaware initial trial.

ENERGY USAGE: BALLASTS AND WATTAGE With this information, I realized that we were at a crossroads: continue using our existing T5 HO fixtures or convert the lighting to an entirely new LED grow-light fixture. Again, the LED light learning curve stepped up a notch to understand product options — and energy usage — more thoroughly.

When you buy a replacement 4-foot (1.2-m) T5 HO bulb at a given wattage, say 24 W, and plug it into a T5 ballast, you likely add 4–6 W per bulb of operating



electricity usage. In other words, each 4-foot (1.2-m) bulb now actually uses 28–30 W of electricity. You can expect a T5 HO LED fixture with two 4-foot (1.2-m) 24-W bulbs to operate at 60 W. That can be significant with many bulbs in use: about 25 percent more electricity usage than you might initially anticipate from your LED conversion.

Grow light manufacturers tend not to prominently point this out for replacement bulbs. But the full electricity consumption, including the ballast, should be included when there is a specification for an entire light fixture (LED or fluorescent).

MORE OPTIONS: EVOLVING BEYOND THE BALLAST T5 HO light fixtures with ballasts are a technological carryover from fluorescent lighting. Although LED light-fixture design is advancing toward nonballasted fixtures, these are not yet developed for T5 HO LED bulbs. However, Active Grow has developed

[6] A spectrograph from a full-spectrum, horticultural LED light with high color-rendering index. Unlike fluorescent bulbs with isolated wavelengths, full-spectrum LED lights provide a continuous light spectrum more similar to natural sunlight. Different products offer different wavelength emphasis. Image provided with permission of Active Grow Sustainable Horticultural Lighting.

[7] *Dendrobium Pfeiff's Kaleidoscope* (*Dendrobium lawesii* × *Dendrobium papilio*). This orchid was sensitive to the light intensity from our original high-intensity 400-W LED light fixture, even when placed 3 feet (0.9 m) below it. Note the oldest, reddened leaves. New leaf growth resumed normal green (same location) when the light fixture was replaced with a 240-W fixture with T5 HO LED grow lights.



two ballast-free LED light fixtures: one with replaceable T8 bulbs and another with nonreplaceable LED “bulbs” (strips) integrated into the fixture. The light intensity (photon output) of these is less than a T5 HO LED fixture ... but so is the electricity usage because there is no power consumption by a ballast.

Yes, it gets a bit complicated when you delve into the details.

For comparison, a 4-foot (1.2-m), ballasted fixture with two T5 HO LED bulbs will use 60 W of electricity (with 24-W bulbs). The 4-foot (1.2-m), nonballasted, two-bulb fixture from Active Grow, called the Propagation Luminaire, consumes 40 W. The nonballasted 4-foot (1.2-m), four-bulb T8 fixture from Active Grow uses 88 W of electricity.

Additionally, there are LED strip lights manufactured by Sun Blaster (www.sunblasterlighting.com) in a variety of lengths. A Sun Blaster LED strip delivers 25 percent more lumens for the same wattage compared to a Hydrofarm Agrobrite T5 HO fluorescent bulb. These LED strips are thin and lightweight compared to heavy metal T5 fixtures. However, the energy savings relative to a fluorescent bulb is minimal: a 4-foot (1.2-m), Sun Blaster LED strip is 48 W, only 6 W less than a standard 4-foot (1.2-m) T5 HO fluorescent bulb.

What did we do with all of these choices?

Ultimately, we decided to convert our three-tier seedling shelves to the Active Grow 40-W unballasted LED light fixtures. The seedlings would not benefit from the higher light intensity of the T5 HO LED

bulbs, and 33 percent energy/heat savings (40 W vs. 60 W) is considerable.

For our other LED grow lights, we opted to use T5 HO LED replacement bulbs. I had existing compatible fixtures for some and purchased new fixtures for two other shelves. After a year of trial, I also decided to swap out our 400-W Amare Technology high-intensity LED fixtures for 240-W fixtures with eight T5 HO LED (replaceable) bulbs from Active Grow.

Finally, we use a few Sun Blaster LED strips for supplemental afternoon lighting in our eastern windows. I am satisfied with these unobtrusive lights overall, but the spectrum is distinctly more “blue” than the Active Grow LED light spectrum. It is not noticeable with ambient natural light, but less visually pleasing as a sole light source. This observation brings us to our next important topic: the light spectrum of LED grow lights compared to fluorescent bulbs.

LIGHT SPECTRUM: LED VS. FLUORESCENT GROW LIGHTS When switching from fluorescent lights to LED grow lights, you will likely experience a notable difference in the color of the LED light — and, hence, your orchids.

For example, the visual light quality for the Active Grow LED lights appears more yellow compared to the Agrobrite and Sun Blaster T5 HO fluorescent bulbs that I have used. This is due to the greater emphasis on the red end of the visible light spectrum compared to the blue wavelengths. It is an easily overlooked point, but you might want to choose

[8] We consistently flower mottled-leaf and sequentially blooming paphiopedilum species under T5 HO LED grow lights with the Active Grow Sun White spectrum operating at 7.5–9 hours/day. Two 4-foot (1.2-m) 24-W LED bulbs are used to illuminate a 4- × 2-foot (1.2- × 0.6-m) shelf (60 W total for fixture).

one LED manufacturer (and hence light spectrum) for your fixtures if you wish to have color uniformity in your growing area.

I would say that the Active Grow LED lights appear more “natural” and visually pleasing compared to any of our T5 HO fluorescent bulbs. This is what you would expect: this manufacturer’s Sun White LED spectrum has a much higher color-rendering index than fluorescent lights.

Ultimately, it is not what I see that matters, but how the plants respond to available photosynthetic wavelengths. Based upon the quality of light spectrum (photosynthetically active radiation) and efficient production of photosynthetically valuable wavelengths (photosynthetic photon flux density), LED grow lights are a resounding upgrade from our T5 HO fluorescent lights.

The light spectrum is at the heart of any grow light’s value, and LED technology brings the potential for an “indoor sun” like never before. However, a second “buyer beware” caution is in order. It is easier to copy spectrographs and product information than it is to actually build a high-quality LED grow

light that genuinely performs according to its marketing material. While there are many bona fide quality manufacturers, there are also cheaper LED grow lights of questionable spectral output, technology and longevity.

A detailed discussion of how LED grow light spectra compare to fluorescent grow lights and important technical specifications to consider, are addressed in my article "More than footcandles and lux: new ways to think about indoor orchid lighting with LED lights" (*Orchids* 88(11):830–835).

ORCHID GROWING WITH LED LIGHTS: RESULTS After a growing season using our new LED fixtures, I am pleased. In addition to less electricity usage and heat emission, I am observing equal-to-better growth and flowering. Most of the species that we grow — even higher-light dendrobiums — did not need the greater intensity light provided by the 400-W LED fixtures that we initially purchased. Remember the *Dendrobium subclausum* that I mentioned in the introduction? This vigorous, high-light orchid is growing better and has bloomed more profusely in a new growing area with 120-W LED strip lighting than when residing under the 400-W LED fixture.

Thus, more light is not always better — or needed. This is an important aspect of selecting the right LED fixture for the orchids that you are growing. Additionally, orchid placement (distance from the lights) is a critical and often an ongoing adjustment until you get it right for a particular orchid.

Currently, we are flowering most of our indoor orchids (paphiopedilums, dendrobiums, leptotes, epidendrums, sarcochilus, and *Vanda falcata*) at 7.5–9 hours/day of light. It might seem surprising that such a diversity of genera receive the same hours of LED light per day. Rather than changing the number of hours of light, I modulate light intensity needs by the number of bulbs and plant distance from the light fixture. For example, small mottled-leaf paphiopedilums grow about 13 inches (33 cm) below two 4-foot (1.2-m) T5 HO LED bulbs (4- × 2-ft [1.2- × 0.6-m] shelf) while the same-size shelf with moderate-light dendrobiums uses four bulbs. Our cool-growing area (4 × 4 ft [1.2.m × 1.2 m]) has eight 4-foot (1.2-m) T5 HO LED bulbs, and orchids placed from 10 inches (25 cm; Mexican *Laelia*) to 40 inches (1 m; sarcochilus, *Vanda falcata*) below the fixture.

While I do not have personal experience growing blooming-size cattleyas



under lights, one reviewer of the Active Grow T5 HO LED grow lights indicated excellent flowering with 16 hours/day of lighting.

I observed two immediate differences in the warm-growing room with the conversion of the T5 HO fluorescent bulbs to LED light fixtures: lower room temperature and less rapid drying of the small (2-in [5-cm]) seedling pots. With a year of growth now complete, I can report that both seedlings and blooming-size plants have thrived. Observing a lightly "bleached" appearance to a few species' leaves, I decided to move some lower-light paphiopedilum seedlings to a new shelf with another 40-W Active Grow LED fixture hanging higher (18 in [46 cm]) above the plants than the other shelves (13 in [33 cm]).

FINAL REFLECTIONS ON LED GROW LIGHTS FOR ORCHIDS I hope that our journey into the world of T5 HO LED replacement bulbs for orchid growing provides a good starting point to consider your options. First key lesson learned: do not assume that your existing T5 HO fixture will work with **any** T5 LED replacement bulb. Second, when comparing manufacturers, light quality (spectrum) is as important as quantity (output). Third, investigate both ballasted and nonballasted lighting options for electricity usage; it might be worthwhile to replace your T5 HO fixtures with newer technology in some situations. Lastly, consider that a cheaper product will not always actually produce better long-term energy consumption or growing results.

As a final reflection, I certainly would not purchase another T5 HO fluorescent fixture, though I am pleased to have T5

[9] *Dendrobium* Avril's Gold 'Dark & Spotty' AM/AOS. A few dozen of our Australian dendrobiums winter (Nov-Mar) under T5 HO LED lights. Many, like this one, initiate spikes and flower midwinter indoors. Previously, I thought that cold nights produced the most red pigmentation in this grex; however, these well-spotted flowers developed entirely under lights this year, with 50F (10C) minimum nights.

HO LED replacement bulbs as an option to extend the life of our existing fixtures. Instead, for my new growing-area innovations, I would select a nonballasted LED grow light or T5/T8 HO LED fixture with replaceable bulbs. The decision would depend upon the 1) light intensity desired, 2) whether it was a supplemental or primary light source and 3) size of space to illuminate.

Happy orchid growing with bright and beautiful LED lighting!

— A'na Sa'tara, DPhil, grows 700 orchids with her husband Paul in the San Francisco Bay area of California, both outdoors and in three indoor growing areas with LED lights. She brings her love of wild nature, worldwide travels and decades of photography, combined with her earlier scientific research as a geographer at Oxford and Stanford universities, to orchid growing with heart, purpose and a passion for the deep essence of orchids (website: aeorchids.com, email: aeorchids1@gmail.com).

Liparis liliifolia

A “Lily” of an Orchid

TEXT AND PHOTOGRAPHS BY SORAYA CATES PARR

LIPARIS LILIIFOLIA IS a unique native terrestrial orchid; ranging from its mysterious, spidery appearance to the controversial debate on the spelling of its name. It is distinctive in that it is self-incompatible; unlike most terrestrial natives.

Liparis liliifolia is also commonly called the lily-leaved twayblade. It looks like a lily when the leaves are emerging in the immature stages of growth. As a perennial member of the Orchidaceae, it is endemic to the deciduous forests of North America. It grows from a corm, near the surface of loose and decomposing leaf litter. Its habitats, observed here in Middle Tennessee, are moist forest slopes, dense with *Quercus* species (Oak), *Liquidambar styraciflua* (Sweetgum), *Liriodendron tulipifera* (Tulip Poplar), *Asimina triloba* (Paw-Paw) and *Juniperus virginiana* (Eastern Red Cedar). Two basal, succulent-looking leaves are produced from the corm that has overwintered, and flowering occurs in late spring.

There has been controversy as to the correct spelling of the species with a double *ii* or a single *i* in the word *liliifolia*. Linnaeus in 1753 first described this flower as *Ophrys lilifolia* (note the single *i*). In 1800, Swartz transferred *Ophrys lilifolia* to the genus *Malaxis*, renaming the species *Malaxis liliifolia*. Lindley placed the species in the genus *Liparis*, naming it *Liparis liliifolia*, and cited all the synonyms as containing the double *ii*. The debate continued until Bernard Boivin wrote an article in *Rhodora* in 1967, correcting the spelling of several species based on Article 73, note 2 of the International Code of Botanical Nomenclature. The article communicates uniformity in the formation of scientific botanical names. He acknowledged the name *Liparis lilifolia*, to be corrected as *Liparis liliifolia* (double *ii*).

DESCRIPTION Two succulent, shiny leaves emerge and overlap at the stem's base. The Greek *liparos* means fat or greasy describing the way the leaves look on the forest floor. Leaves are oval with an acute to the obtuse apex, and with a bright spring-green coloration. The leaves



- [1] Close-up of *Liparis liliifolia*.
- [2] Ants are observed foraging on the flowers.
- [3] April 18, 2019 the lilylike plants are starting to emerge.
- [4] April 21, 2019 the plants still resemble lily-of-the-valley.
- [5] Plants beginning to flower on April 26, 2019.
- [6] By May 16, 2019 mature plants are in full flower.
- [7] Mature corm and this year's daughter corm emerging.

are 4–18 cm long and 2–5.5 cm wide. The leaf bases usually persist over the winter on a parent corm. The parent corm gives rise to a daughter corm attached by a very short rhizome. These corms are encased in dry sheathing scales that are very shallow and easily uprooted by white-tailed deer. The daughter corm will become the current year's growth.

The raceme observed in Middle Tennessee is 4–13 cm long and bears 5–22 resupinate flowers. The pedicels are purple. The sepals are a light green.

The petals are long, extremely narrow and pendent. They are purple and shaded at the tips to a light green. The obovate lip of each flower is remarkable as it is large compared to the rest of the flower; 1–1.1 cm long and 0.8–1 cm wide. Upon microscopic inspection, the margins of the lip are minutely erose. The color of the lip is purple with a fine network of reddish veins. The two lateral sepals (green) are held forward (porrect) under the lip, and can be seen through the lip, as it is translucent. A single shiny vein in the

center of the lip may attract the pollinator as it runs straight into the interior of the column. The column is light green to cream-color and resembles a tiny insect's head. It bears two string-like transparent tubercles on the inner surface near the base of the lip. The column arches above the lip. The anthers and the two pairs of waxy pollinia are yellow.

As stated above, *Lip. liliifolia* plants do not appear to be self-compatible, unlike many terrestrial orchids. The success of the cross-pollination depends on the closeness or proximity of the pollen recipient, which is considered the distance between parent plants (Catling 1983, Gregg 1989). The offsets of the corms make asexual reproduction possible. *Liparis liliifolia* lacks a nectar spur but ants were noticed on several plants, suggesting the presence of floral rewards. The author encountered only four fruit-sets out of the 97 plants in a half-mile (0.8-km) radius.

POLLINATION Most orchid flowers have specific coloration, nectar and special odors to attract insects. Many times the flower's appearance can mimic or trick the insect into pollination for fruit set. Species of bees, wasps and moths are considered common pollinators for terrestrial orchids. Flies (Dipterans), have been known to frequent *Lip. liliifolia* but it is not known specifically that they act as pollinators. Small flies and mosquitoes were frequent visitors to the plants observed here in Middle Tennessee. Some of the flies were identified as *Drosophila*; a genus of flies whose members include fruit flies. However, distinct pollinators for these particular plants were not observed by the author. Odor was not perceptible, but in many cases, odors may only be perceptible to a specific pollinator. The large lip with its translucent coloration and strong red venation may be mimicry designed to attract a pollinator. Purple and brownish flowers attract insects interested in carrion. Little has been observed in seed dispersal in *Lip. liliifolia*, but it can be hypothesized that it is likely water or air may be a primary means of dispersing the seed to other locations.

FOLKLORE Composers of classical music in the 19th century often chose the subject of witches, ghosts and the macabre in expressing their new-found freedom of the music genre of the times. One such composition was linked to a poison orchid mixed with opium. The orchid was described as a spidery plant that looked much like a lily. One can imagine *Lip. liliifolia* in this musical "March



to the Scaffold," from Berlioz' "Symphonie Fantastique." In this composition, an artist poisons himself with the mixture of the poison orchid and opium then drops off into a deep sleep. He has a vivid dream of killing a woman he loved and is condemned to death by being brought to the scaffold and beheaded. In the orchestra version, you can actually hear the slice of the guillotine.

CURRENT CONSERVATION STATUS Although growing urban populations, pesticide and fungicide usage and illegal collecting are happening at a fast rate here in Middle Tennessee, there seems to be an abundance of many terrestrials including *Lip. liliifolia*. However, in several other states, this orchid is threatened or endangered. Its range has diminished in the Northeast. The species is considered threatened in Massachusetts and Vermont; it is considered endangered in Connecticut, New York and Rhode Island. State endangered species laws vary protections from state to state. Some offer a degree of protection but not all.

What can one person do to help conservation of any native orchid, you might ask? There are many options. Join conservation organizations, help to educate gardeners' programs and garden clubs, join your local American Orchid Society's affiliated society and the AOS, and educate yourself on what native species may be in your area. Support environmental practices at your home and workplace, and volunteer with reliable groups that help preserve the lands where the native orchids are located.

We should realize that our Earth is not a storehouse of resources for mankind's needs. All plant and animal life are links in

a complicated and important chain. Once a link is removed, the other links within this chain of life are affected, sometimes with very sad consequences.

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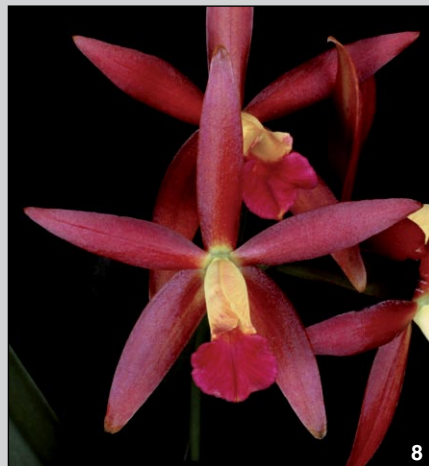
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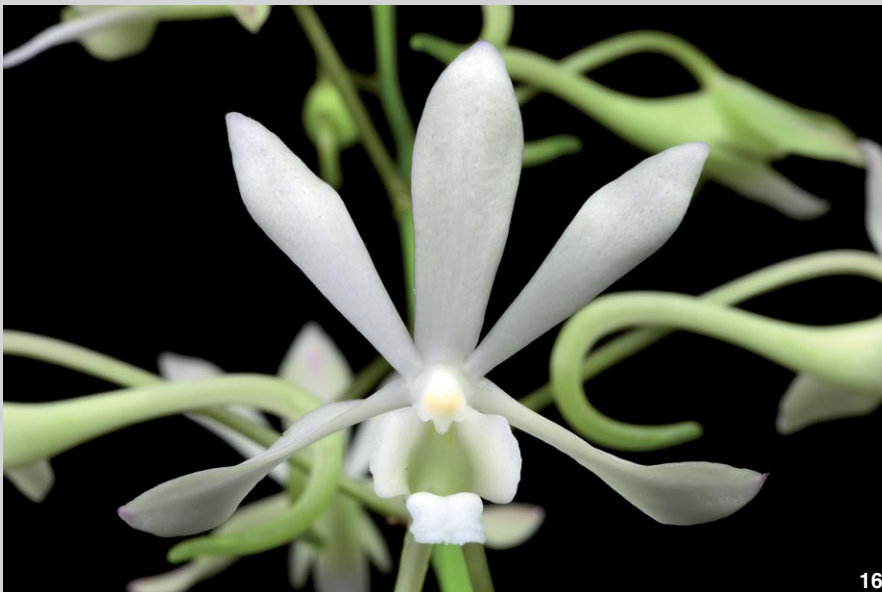
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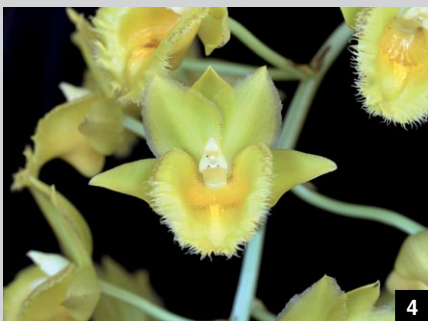
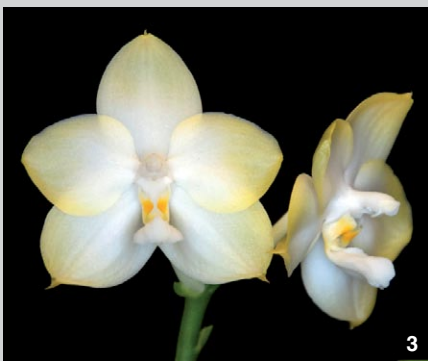


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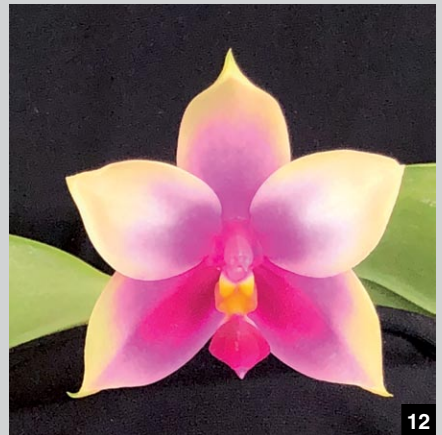
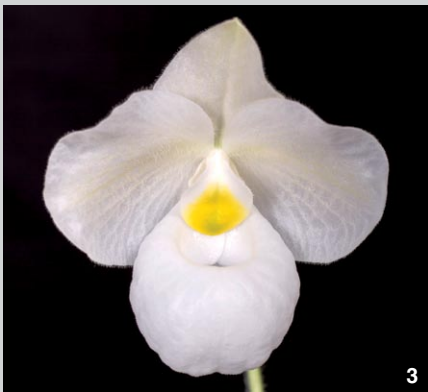
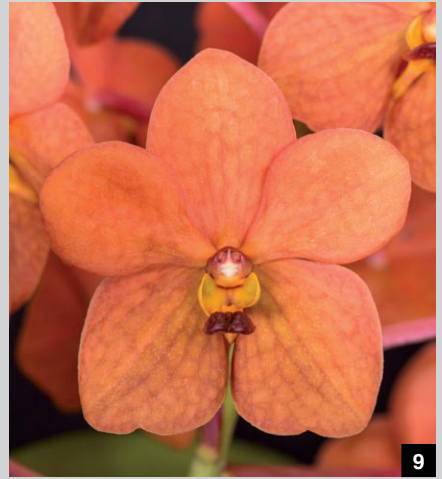
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- [1] *Rhyncholaeliocattleya* Laura Schneider 'Odom's Orchids' AM/AOS (Glenn Maidment x Bingham Vick) 80 pts. Exhibitor: Odom's Orchids; photographer: Tom Kuligowski. West Palm Beach Judging Center
- [2] *Paphiopedilum* Wössner China Moon 'Mainshow' AM/AOS (*armeniacum* x *hangianum*) 86 pts. Exhibitor: Long Trieu; photographer: Tom Kuligowski. West Palm Beach Judging Center
- [3] *Vanda* William Bachschmidt 'Crownfox Gold' AM/AOS (Crownfox Keylime x *tesellata*) 84 pts. Exhibitor: R.F. Orchids, Inc.; photographer: Tom Kuligowski. West Palm Beach Judging Center
- [4] *Cymbidium* Sinseiden 'Sebastian' HCC/AOS (*sinense* x *seidenfadenii*) 76 pts. Exhibitor: Kevin Hill; photographer: Ramon de los Santos. California Sierra Nevada Judging Center
- [5] *Cattlianthe* Okinawan Rock 'Do-Over' AM/AOS (Chloe x Chocolate Drop) 81 pts. Exhibitor: Jim Roberts Florida SunCoast Orchids; photographer: Tom Kuligowski. West Palm Beach Judging Center
- [6] *Rhyncattleanthe* ChocoBerry Fondue 'Krull's Rubies' AM/AOS (*Cattlianthe* Chocolate Drop x *Rhyncholaeliocattleya* Ryo Iwata) 88 pts. Exhibitor: Krull-Smith; photographer: Tom Kuligowski. West Palm Beach Judging Center
- [7] *Vanda* Brighton's Two Tone 'Joden's Delight' AM/AOS (*sanderiana* x *Taveesuksa*) 80 pts. Exhibitor: Joe Ortlieb; photographer: Tom Kuligowski. West Palm Beach Judging Center
- [8] *Brassocattleya* Ancle Gloudon 'Odom's Orchids' HCC/AOS (*Cattleya* Jalapa x *Brassavola subulifolia*) 77 pts. Exhibitor: Odom's Orchids; photographer: Tom Kuligowski. West Palm Beach Judging Center
- [9] *Brassocattleya* Florida Stars 'Elise' AM/AOS (*Brassavola* Little Stars x *Cattleya* Mark Jones) 82 pts. Exhibitor: Jim Roberts Florida SunCoast Orchids; photographer: Tom Kuligowski. West Palm Beach Judging Center
- [10] *Laelia* Finckeniana 'William' CCM/AOS (*Laelia albida* x *Laelia anceps*) 84 pts. Exhibitor: Mac's Orchids; photographer: Tom Kuligowski. West Palm Beach Judging Center
- [11] *Encyvola* Phoenix 'Kona' CCM/AOS (*Brassavola nodosa* x *Encyclia phoenicea*) 84 pts. Exhibitor: Judy Mezey; photographer: Tom Kuligowski. West Palm Beach Judging Center
- [12] *Rhyncholaeliocattleya* Triumphal Coronation 'Seto' HCC/AOS (*Cattleya* Drumbeat x Pamela Hetherington) 78 pts. Exhibitor: Atsushi Matsumoto; photographer: Jason R. Mills. Atlanta Judging Center
- [13] *Catamodes* Dragons Glade 'Westway Farms' AM/AOS (Dragons Tail x *Catasetum* Orchidglade) 85 pts. Exhibitor: Don Ghiz; photographer: Charlotte Randolph. Alamo Judging Center
- [14] *Holcoglossum* *wangii* 'Rachel's Ice' CCM-AM/AOS 88-80 pts. Exhibitor: Lynne Madonia; photographer: Jason R. Mills. Atlanta Judging Center
- [15] *Phragmipedium* Sorcerer's Apprentice 'Willowcreek' FCC/AOS (*longifolium* x *sargentianum*) 91 pts. Exhibitor: Jay Klock; photographer: Ramon de los Santos. California Sierra Nevada Judging Center
- [16] *Vanda* Green Light 'Grass Valley' AM/AOS (*vietnamica* x *falcata*) 80 pts. Exhibitor: Ted McClellan; photographer: Ramon de los Santos. California Sierra Nevada Judging Center





- [1] *Dendrobium schneiderae* 'Queensland' HCC/AOS 79 pts. Exhibitor: James G. Morris; photographer: Ramon de los Santos. California Sierra Nevada Judging Center
- [2] *Phalaenopsis bellina* 'Star' AM/AOS 82 pts. Exhibitor: Ben Belton; photographer: James Curtis. Carolinas Judging Center
- [3] *Phalaenopsis* Joy Spring Canary 'Ben Belton' AM/AOS (Buena Jewel x Yungho Gelb Canary) 85 pts. Exhibitor: Ben Belton; photographer: James Curtis. Carolinas Judging Center
- [4] *Clowesetum* Manny Tavarez 'Congratulations Caroline' AM/AOS (*Catasetum expansum* x *Clowesia warczewitzii*) 81 pts. Exhibitor: Mark Margolis; photographer: Carmen Johnston. Florida-Caribbean Judging Center
- [5] *Rhyncattleanthe* Princess Takamado 'Jocelyn' AM/AOS (Love Sound x *Cattleya Beaufort*) 80 pts. Exhibitor: James G. Morris; photographer: Ramon de los Santos. California Sierra Nevada Judging Center
- [6] *Fredclarkeara* Saturn Sky 'Big God' HCC/AOS (Mormodia Painted Desert x *Catasetum* Frilly Doris) 79 pts. Exhibitor: Elena Turner; photographer: James Curtis. Carolinas Judging Center
- [7] *Paphiopedilum* Prohill 'Hampshire' HCC/AOS (Hampshire Prolific x Winston Churchill) 77 pts. Exhibitor: Arnold J. Klehm; photographer: Nile Dusdieker. Chicago Judging Center
- [8] *Rhyncattleanthe* Tropical Upgrade 'Lady Stella' AM/AOS (Guess What x *Cattleya* Tropical Sunset) 82 pts. Exhibitor: Yife Tien; photographer: Carmen Johnston. Florida-Caribbean Judging Center
- [9] *Bulbophyllum* Amy Woolf 'A-doribil' AM/AOS (A-doribil Anna Roth x *longissimum*) 82 pts. Exhibitor: Bill Thoms & Doris Dukes; photographer: Kay Clark. Florida North-Central
- [10] *Paphiopedilum* Toni Semple 'MBF' HCC/AOS (*haynaldianum* x *lowii*) 79 pts. Exhibitor: Marble Branch Farms; photographer: James Curtis. Carolinas Judging Center
- [11] *Cattleya gaskelliana* 'Maria' JC/AOS. Exhibitor: Wojciech Klikunas, Ph.D.; photographer: Carmen Johnston. Florida-Caribbean Judging Center
- [12] *Phalaenopsis* Pylo's Eagle 'Lady Stella' AM/AOS (Dragon Tree Eagle x Chien-lung Red Eagle) 81 pts. Exhibitor: Yife Tien; photographer: Carmen Johnston. Florida-Caribbean Judging Center
- [13] *Bulbophyllum* Amy Woolf 'Barry's Sweetie' HCC/AOS (A-doribil Anna Roth x *longissimum*) 78 pts. Exhibitor: Bill Thoms & Doris Dukes; photographer: Kay Clark. Florida North-Central Judging Center
- [14] *Gomesa* Autumn Splash 'Mocha Moose' HCC/AOS (Cloud Ears x *forbesii*) 78 pts. Exhibitor: Woodland Orchids; photographer: James Curtis. Carolinas Judging Center
- [15] *Brassocattleya* Nakornpathome Silver 'Aubrey Teal' CCM-AM/AOS (Binosa x *Brassavola nodosa*) 84-80 pts. Exhibitor: Bob Meyer; photographer: James Curtis. Carolinas Judging Center
- [16] *Ceratostylis retisquama* 'Memoria Ann and Ernie Meyer' CCM/AOS 80 pts. Exhibitor: Bob Meyer; photographer: James Curtis. Carolinas Judging Center





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- [1] *Phalaenopsis* Bredren's Imp 'Liz Hamilton' AM/AOS (LD's Bear King x *mannii*) 80 pts. Exhibitor: Bredren Orchids and Phillip Hamilton; photographer: Phillip Hamilton. Florida North-Central Judging Center
- [2] *Phalaenopsis violacea* f. *alba* 'Whiteout' HCC/AOS 79 pts. Exhibitor: Krull-Smith; photographer: Wes Newton. Florida North-Central Judging Center
- [3] *Paphiopedilum* Magic Lantern 'Fajen's Snowball' JC/AOS (*micranthum* x *delenatii*). Exhibitor: Fajen's Orchids; photographer: Kay Clark. Florida North-Central Judging Center
- [4] *Phalaenopsis* Joy Spring Canary 'Blue Ridge' HCC/AOS (Buena Jewel x Yungho Gelb Canary) 78 pts. Exhibitor: Mike Mims; photographer: Wes Newton. Florida North-Central Judging Center
- [5] *Papilionanda* Naoki Kawamura 'M & N 20th Anniversary' AM/AOS (Arjuna x *Vanda cristata*) 81 pts. Exhibitor: Naoki Kawamura; photographer: Kay Clark. Florida North-Central Judging Center
- [6] *Phalaenopsis* Venimp 'Bredren' AM/AOS (*venosa* x Malibu Imp) 80 pts. Exhibitor: Bredren Orchids and Phillip Hamilton; photographer: Wes Newton. Florida North-Central Judging Center
- [7] *Phalaenopsis bellina* 'Zeus' AM/AOS 87 pts. Exhibitor: Krull-Smith; photographer: Wes Newton. Florida North-Central Judging Center
- [8] *Phalaenopsis bellina* 'Eros' AM/AOS 85 pts. Exhibitor: Krull-Smith; photographer: Wes Newton. Florida North-Central Judging Center
- [9] *Vanda* Royal Sapphire 'Chad's Orange Sunset' HCC/AOS (Waianae Blue x Yip Sum Wah) 78 pts. Exhibitor: Chad Whetstone; photographer: Kay Clark. Florida North-Central Judging Center
- [10] *Vandachostylis* Azure 'MV Gliese' HCC/AOS (*Rhynchostylis gigantea* x *Vanda coerulea*) 78 pts. Exhibitor: Stuart Henderson; photographer: Wes Newton. Florida North-Central Judging Center
- [11] *Phalaenopsis bellina* 'Prometheus' AM/AOS 84 pts. Exhibitor: Krull-Smith; photographer: Wes Newton. Florida North-Central Judging Center
- [12] *Phalaenopsis bellina* 'Artemis' AM/AOS 82 pts. Exhibitor: Krull-Smith; photographer: Wes Newton. Florida North-Central Judging Center
- [13] *Bulbophyllum* Elizabeth Ann 'A-doribil Sunset' CCM-AM/AOS (*longissimum* x *rothschildianum*) 87-83 pts. Exhibitor: Bill Thoms & Doris Dukes; photographer: Kay Clark. Florida North-Central Judging Center
- [14] *Phalaenopsis* Samera 'Bredren's Blue Heaven' AM/AOS (*bellina* x *violacea*) 80 pts. Exhibitor: Bredren Orchids and Phillip Hamilton; photographer: Wes Newton. Florida North-Central Judging Center
- [15] *Phalaenopsis* Nobby's Purple Eagle 'Krull-Smith' AM/AOS (Black Eagle x George Vasquez) 81 pts. Exhibitor: Krull-Smith; photographer: Wes Newton. Florida North-Central Judging Center
- [16] *Phalaenopsis* Lamb's Passion (Zheng Min Etching 'Joy' x Hanover Passion 'Ching Ruey' AM/AOS) AQ/AOS. Exhibitor: Bredren Orchids and Phillip Hamilton; Hybridizer: Beth Lamb; Photographer: Wes Newton. Florida North-Central Judging Center





- [1] *Phalaenopsis bellina* 'Apollo' AM/AOS 81 pts. Exhibitor: Krull-Smith; photographer: Wes Newton. Florida North-Central Judging Center
- [2] *Vanda denisoniana* 'Garrett's Orange Delight' AM/AOS 83 pts. Exhibitor: David and Sharon Garrett; photographer: Wes Newton. Florida North-Central Judging Center
- [3] *Paphiopedilum* Hampshire Fair 'Stephanie's Success' AM/AOS (Faire-Maud x *fairrie anum*) 83 pts. Exhibitor: Dennis Seffernick; photographer: Katie Payeur. Great Lakes Judging Center
- [4] *Cattleya* Featherrae 'Paradise' HCC/AOS (Canhamiana x Blue Moon) 78 pts. Exhibitor: Carol Stuht; photographer: Lynn O'Shaughnessy. Great Lakes Judging Center
- [5] *Dichaea trulla* 'Whisper GaGa's Green Grass' CBR/AOS. Exhibitor: Laura and Wes Newton; photographer: Wes Newton. Florida North-Central Judging Center
- [6] *Vandachostylis* Christine Joan 'Garrett's Green Meanie' AM/AOS (Mishima Lime x *Vanda vietnamica*) 82 pts. Exhibitor: David and Sharon Garrett; photographer: Wes Newton. Florida North-Central Judging Center



- [7] *Vandachostylis* Christine Joan 'Garrett's Limeade' AM/AOS (Mishima Lime x *Vanda vietnamica*) 86 pts. Exhibitor: David and Sharon Garrett; photographer: Wes Newton. Florida North-Central Judging Center
- [8] *Phalaenopsis bellina* ('Jim Krull' AM/AOS x 'Judy Smith') AQ/AOS. Exhibitor and Hybridizer: Krull-Smith; photographer: Wes Newton. Florida North-Central Judging Center
- [9] *Bulbophyllum* Doris Dukes 'Whisper Dazzling Duo' CCM/AOS (*fascinator* x *rotschildianum*) 81 pts. Exhibitor: Laura Newton and Dolores Smith; photographer: Wes Newton. Florida North-Central Judging Center



- [10] *Gastrochilus obliquus* 'MV Yellow Jackets' CCM/AOS 84 pts. Exhibitor: Stuart Henderson; photographer: Wes Newton. Florida North-Central Judging Center
- [11] *Phragmipedium* Bright Spot 'Littlefrog Inferno' AM/AOS (Memoria Dick Clements x Twilight) 87 pts. Exhibitor: Rob Halgren; photographer: Katie Payeur. Great Lakes Judging Center
- [12] *Paphiopedilum* Yang-Ji Hawk 'Wacousta' AM/AOS (*sanderianum* x *anitum*) 83 pts. Exhibitor: Dot Potter Barnett; photographer: Lynn O'Shaughnessy. Great Lakes Judging Center
- [13] *Vanda* Hawaiian Verde 'Tom's Surprise' HCC/AOS (*sanderiana* x *vietnamica*) 77 pts. Exhibitor: Thomas Jurek; photographer: Lynn O'Shaughnessy. Great Lakes Judging Center



- [14] *Angraecum cultriforme* 'Bryon' CBR/AOS. Exhibitor: Bryon K. Rinke; photographer: Bryon Rinke. Great Plains Judging Center
- [15] *Rhyncholaeliocattleya* Stan Hutto 'Stan's Vision' AM/AOS (*Cattleya* Lorraine Shirai x Dickie Brooks) 80 pts. Exhibitor: New Vision Orchids; photographer: Lynn O'Shaughnessy. Great Lakes Judging Center
- [16] *Angularia* Denise Barrow 'Mid-Michigan' AM-AD/AOS (*Anguloa clowesii* x *Maxillaria striata*) 81 pts. Exhibitor: Jack Shumaker; hybridizer: Leon Glicenstein; photographer: Lynn O'Shaughnessy. Great Lakes Judging Center





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- [1] *Gastrochilus acutifolius* 'Bryon' HCC/AOS 77 pts. Exhibitor: Bryon K. Rinke; photographer: Bryon Rinke. Great Plains Judging Center
- [2] *Paphiopedilum* Memoria Robert Wimmer 'Beverly, Brad & Patty' AM/AOS (Rainbow Sky x Coconut Candy) 80 pts. Exhibitor: Max C. Thompson Photographer: Bryon Rinke. Great Plains Judging Center
- [3] *Phalaenopsis* I-Lan Peoker 'M & B' HCC/AOS (Golden Peoker x I-Lan Cinderella) 79 pts. Exhibitor: Max Thompson and Bryon Rinke; photographer: Bryon Rinke. Great Plains Judging Center
- [4] *Leptotes unicolor* 'Bryon's Pink' AM/AOS 81 pts. Exhibitor: Bryon K. Rinke; photographer: Bryon Rinke. Great Plains Judging Center
- [5] *Cattleya trianae* f. *alba* 'Mirtha Isabel' AM/AOS 81 pts. Exhibitor: Ben Oliveros and Orchid Eros; photographer: Glen Barfield. Hawaii Judging Center
- [6] *Paphiopedilum* Ma Belle 'Ginger' HCC/AOS (*malipoense* x *bellatulum*) 78 pts. Exhibitor: Jill Stackley; photographer: Bryon Rinke. Great Plains Judging Center
- [7] *Cattleya percivaliana* f. *coerulea* 'Stevie Ray Vaughan' AM/AOS 83 pts. Exhibitor: Ben Oliveros and Orchid Eros; photographer: Glen Barfield. Hawaii Judging Center
- [8] *Dendrobium rosellum* 'Bryon' CCM/AOS 85 pts. Exhibitor: Bryon K. Rinke; photographer: Bryon Rinke. Great Plains Judging Center
- [9] *Masdevallia kuhniorum* 'Karlene' CCM-AM/AOS 87-86 pts. Exhibitor: Karlene Sanborn; photographer: Bryon Rinke. Great Plains Judging Center
- [10] *Maxillaria parviflora* 'Bryon' CBR/AOS. Exhibitor: Bryon K. Rinke; photographer: Bryon K Rinke. Great Plains Judging Center
- [11] *Paphiopedilum* Spring Egret 'Slipper Zone Another' HCC/AOS (Egret's Moon x Spring Wolf) 79 pts. Exhibitor: Lehua Orchids; photographer: Glen Barfield. Hawaii Judging Center
- [12] *Paphiopedilum* Delightfully Macabre 'Slipper Zone Desire' HCC/AOS (Luna Magic x Macabre Delight) 78 pts. Exhibitor: Lehua Orchids; photographer: Glen Barfield. Hawaii Judging Center
- [13] *Dendrobium polysema* 'Green Goblin' AM/AOS 82 pts. Exhibitor: Jungle Mist Orchids; photographer: Glen Barfield. Hawaii Judging Center
- [14] *Bulbophyllum* Karen Lewis 'Timbucktoo' AM/AOS (*phalaenopsis* x *echinolabium*) 88 pts. Exhibitor: Sarah Pratt; photographer: Bryon Rinke. Great Plains Judging Center
- [15] *Restrepia* Walnut Valley Elegance 'Bryon' AM/AOS (*elegans* x *dodsonii*) 81 pts. Exhibitor: Bryon K. Rinke; photographer: Bryon Rinke. Great Plains Judging Center
- [16] *Cattleya wittigiana* 'Mac Daddy' AM/AOS 83 pts. Exhibitor: Ben Oliveros and Orchid Eros; photographer: Glen Barfield. Hawaii Judging Center





- [1] *Paphiopedilum* Ghostly Contrasts 'Slipper Zone Yellow Hug' HCC/AOS (Magical Contrasts x Macabre Contrasts) 78 pts. Exhibitor: Lehua Orchids; photographer: Glen Barfield. Hawaii Judging Center
- [2] *Paphiopedilum* Odette's Moon 'Slipper Zone Fullness' HCC/AOS (Luna Shadow x Odette's Charm) 78 pts. Exhibitor: Lehua Orchids; photographer: Glen Barfield. Hawaii Judging Center
- [3] *Paphiopedilum* Delightfully Macabre 'Slipper Zone Syn Superb' HCC/AOS (Luna Magic x Macabre Delight) 77 pts. Exhibitor: Lehua Orchids; photographer: Glen Barfield. Hawaii Judging Center
- [4] *Paphiopedilum* Jeweled Venus 'Slipper Zone The Sixth Too' AM/AOS (Jewel Green x Parisienne Venus) 80 pts. Exhibitor: Lehua Orchids; photographer: Glen Barfield. Hawaii Judging Center
- [5] *Paphiopedilum* Ghostly Contrasts 'Slipper Zone Passed By' HCC/AOS (Magical Contrasts x Macabre Contrasts) 75 pts. Exhibitor: Lehua Orchids; photographer: Glen Barfield. Hawaii Judging Center
- [6] *Paphiopedilum* Ghostly Contrasts 'Slipper Zone Ratta Tat Tat' HCC/AOS (Magical Contrasts x Macabre Contrasts) 77 pts. Exhibitor: Lehua Orchids; photographer: Glen Barfield. Hawaii Judging Center
- [7] *Paphiopedilum* Delightfully Macabre 'Slipper Zone Tall Glamour' HCC/AOS (Luna Magic x Macabre Delight) 76 pts. Exhibitor: Lehua Orchids; photographer: Glen Barfield. Hawaii Judging Center
- [8] *Paphiopedilum* Fred's Style 'Slipper Zone Joyful Aura' HCC/AOS (Fred's Aura x Egret's Jewel) 79 pts. Exhibitor: Lehua Orchids; photographer: Glen Barfield. Hawaii Judging Center
- [9] *Paphiopedilum* Mystically Fred 'Slipper Zone Gracefulness' AM/AOS (Mystically Wood x Fred's Moon) 81 pts. Exhibitor: Lehua Orchids; photographer: Glen Barfield. Hawaii Judging Center
- [10] *Paphiopedilum* Jeweled Moon 'Slipper Zone Joyfully' HCC/AOS (Macabre Moon x Egret's Jewel) 79 pts. Exhibitor: Lehua Orchids; photographer: Glen Barfield. Hawaii Judging Center
- [11] *Paphiopedilum* Jeweled Venus 'Slipper Zone Delight' HCC/AOS (Jewel Green x Parisienne Venus) 75 pts. Exhibitor: Lehua Orchids; photographer: Glen Barfield. Hawaii Judging Center
- [12] *Paphiopedilum* Jeweled Venus 'Slipper Zone Relentlessly Excessive' HCC/AOS (Jewel Green x Parisienne Venus) 77 pts. Exhibitor: Lehua Orchids; photographer: Glen Barfield. Hawaii Judging Center
- [13] *Paphiopedilum* Jeweled Venus (Jewel Green 'Greenery' x Parisienne Venus 'Pink Joy') AQ/AOS. Exhibitor and Hybridizer: Lehua Orchids; photographer: Glen Barfield. Hawaii Judging Center
- [14] *Paphiopedilum* Jeweled Venus 'Slipper Zone Stridently' HCC/AOS (Jewel Green x Parisienne Venus) 77 pts. Exhibitor: Lehua Orchids; photographer: Glen Barfield. Hawaii Judging Center
- [15] *Paphiopedilum* Jeweled Venus 'Slipper Zone Blushing Gently' HCC/AOS (Jewel Green x Parisienne Venus) 78 pts. Exhibitor: Lehua Orchids; photographer: Glen Barfield. Hawaii Judging Center





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- [1] *Paphiopedilum* Fluttering Fred 'Slipper Zone Gracefully Light' HCC/AOS (Montera Moth x Fred's Aura) 76 pts. Exhibitor: Lehua Orchids; photographer: Glen Barfield. Hawaii Judging Center
- [2] *Paphiopedilum* Jeweled Venus 'Slipper Zone and the Fifth' HCC/AOS (Jewel Green x Parisienne Venus) 78 pts. Exhibitor: Lehua Orchids; photographer: Glen Barfield. Hawaii Judging Center
- [3] *Paphiopedilum* Puna Moon 'Slipper Zone Flying Dawn' HCC/AOS (Oriental Jewel x Macabre Moon) 78 pts. Exhibitor: Lehua Orchids; photographer: Glen Barfield. Hawaii Judging Center
- [4] *Paphiopedilum* Petula's Sensation 'Slipper Zone Double Play' AM/AOS (Macabre Contrasts x Petula's Flame) 81 pts. Exhibitor: Lehua Orchids; photographer: Glen Barfield. Hawaii Judging Center
- [5] *Paphiopedilum* Puna Moon 'Slipper Zone Brightness' AM/AOS (Oriental Jewel x Macabre Moon) 80 pts. Exhibitor: Lehua Orchids; photographer: Glen Barfield. Hawaii Judging Center
- [6] *Paphiopedilum* Puna Moon 'Slipper Zone Glowing Green' HCC/AOS (Oriental Jewel x Macabre Moon) 78 pts. Exhibitor: Lehua Orchids; photographer: Glen Barfield. Hawaii Judging Center
- [7] *Catasetum* Calcasieu 'Janice' HCC/AOS (*cirrhaeoides* x *rectangulare*) 79 pts. Exhibitor: Steve Moffitt; photographer: Malcolm McCorquodale. Houston Judging Center
- [8] *Paphiopedilum* Puna Moon (Oriental Jewel 'White Promise' x Macabre Moon 'Pale Face') AQ/AOS. Exhibitor and Hybridizer: Lehua Orchids; photographer: Glen Barfield. Hawaii Judging Center
- [9] *Clowesetum* Joy Prout 'Mark's Joy' AM/AOS (*Clowesia* Rebecca Northen x *Catasetum* *semicirculatum*) 81 pts. Exhibitor: Mark Prout; photographer: Melissa Garner. Mid-America Judging Center
- [10] *Cattleya walkeriana* 'Soft Touch' AM/AOS 82 pts. Exhibitor: Ben Oliveros and Orchid Eros; photographer: Glen Barfield. Hawaii Judging Center
- [11] *Cattleya trianae* (Coerulea) 'Sebastian' AM/AOS 86 pts. Exhibitor: Ben Oliveros and Orchid Eros; photographer: Glen Barfield. Hawaii Judging Center
- [12] *Phragmipedium* Living Fire 'Rogan's Lady Kathleen' AM/AOS (Sorcerer's Apprentice x *besseae*) 82 pts. Exhibitor: John Rogan; photographer: Bayard Saraduke. Mid-Atlantic Judging Center
- [13] *Cattleya coccinea* 'Melpomene' AM/AOS 83 pts. Exhibitor: Ben Oliveros and Orchid Eros; photographer: Glen Barfield. Hawaii Judging Center
- [14] *Cycnodes* Bob Lewis 'Raymond Lussier' HCC/AOS (*Cychnoches warszewiczii* x *Mormodes ignea*) 77 pts. Exhibitor: Raymond Lussier; photographer: Thang Dam. Toronto Judging Center
- [15] *Diodonopsis pygmaea* 'André Raymond' CCM/AOS 82 pts. Exhibitor: Laura Bonnell; photographer: Thang Dam. Toronto Judging Center
- [16] *Paphiopedilum charlesworthii* 'Wonder World' AM/AOS 84 pts. Exhibitor: Sergey Skoropad; photographer: Bayard Saraduke. Mid-Atlantic Judging Center





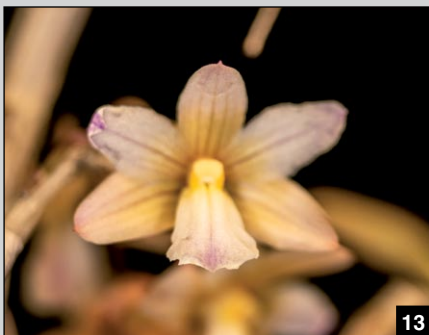
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- [1] *Dendrobium* Mini Snowflake 'Morrigh' CCE/AOS (*aberrans* x *johnsoniae*) 96 pts. Exhibitor: Jeff Morris; photographer: Bryan Ramsay. National Capital Judging Center
- [2] *Cattleya jenmanii* 'Canaima's Lifeblood' HCC/AOS 78 pts. Exhibitor: Plato Mathews; photographer: Bryan Ramsay. National Capital Judging Center
- [3] *Cattleya jenmanii* (Rubra) 'Canaima's Deva' HCC/AOS 79 pts. Exhibitor: Plato Mathews; photographer: Bryan Ramsay. National Capital Judging Center
- [4] *Cattleya labiata* var. *semi-alba* 'Ho-Chan' HCC/AOS 78 pts. Exhibitor: Plato Mathews; photographer: Bryan Ramsay. National Capital Judging Center
- [5] *Paphiopedilum* Wössner Mini Goldi 'Michael's First' HCC/AOS (*primulinum* var. *primulinum* x *helenae*) 76 pts. Exhibitor: Michael Summers; photographer: Bryan Ramsay. National Capital Judging Center
- [6] *Paphiopedilum villosum* var. *annamense* 'Lily' HCC/AOS 77 pts. Exhibitor: Fred Allen; photographer: Maurice Garvey. Northeast Judging Center
- [7] *Phragmipedium* Belle Watling 'Morrigh' CCM-AM/AOS (Memoria Dick Clements x Sunset Glow) 88-83 pts. Exhibitor: Jeff Morris; photographer: Bryan Ramsay. National Capital Judging Center
- [8] *Paphiopedilum henryanum* f. *christae* 'Poe Creek' CHM-HCC/AOS 84-79 pts. Exhibitor: Woodstream Orchids; photographer: Bryan Ramsay. National Capital Judging Center
- [9] *Cattleya maxima* 'Wild Girl' AM/AOS 80 pts. Exhibitor: Plato Mathews; photographer: Bryan Ramsay. National Capital Judging Center
- [10] *Masdevallia monicana* 'J & L' CHM/AOS 82 pts. Exhibitor: J & L Orchids; photographer: Maurice Garvey. Northeast Judging Center
- [11] *Bulbophyllum elassonotum* 'Morrigh' CCM/AOS 87 pts. Exhibitor: Jeff Morris; photographer: Bryan Ramsay. National Capital Judging Center
- [12] *Phragmipedium* Misty Run Sunrise 'Penns Creek' AM/AOS (Waunakee Sunset x *fischeri*) 82 pts. Exhibitor: Woodstream Orchids; photographer: Bryan Ramsay. National Capital Judging Center
- [13] *Dendrobium calcariferum* 'Irene' CHM/AOS 83 pts. Exhibitor: Al & Irene Messina; photographer: Maurice Garvey. Northeast Judging Center
- [14] *Dendrobium tongii* 'Irene' CHM/AOS 81 pts. Exhibitor: Al & Irene Messina; photographer: Robert Hesse. Northeast Judging Center
- [15] *Phragmipedium* Yelva Myhre 'Oxblood' AM/AOS (Rosalie Dixler x *kovachii*) 84 pts. Exhibitor: John McCallen; photographer: Ken Jacobsen. Pacific Central Judging Center
- [16] *Phalaenopsis hieroglyphica* f. *flava* 'Woodstream' CCE/AOS 90 pts. Exhibitor: Woodstream Orchids; photographer: Bryan Ramsay. National Capital Judging Center

LINDLEYANA

×*Cattlianthe dabeibaensis*

A New Natural Hybrid Intergeneric Hybrid for Colombia

By Andrea Niessen, Juan Carlos Uribe and Ruben P. Sauleda



ABSTRACT A new natural intergeneric hybrid of *Guarianthe hennisiana* (Rolfe) van den Berg and *Cattleya warscewiczii* Rchb. f. (Orchidaceae) was discovered in the Department of Antioquia, Colombia.

Hybridization is common, occurring in 25 percent of plant species (Baack and Rieseberg 2007). Stebbins (1950) stated, "Occasional hybridization between recognizable species . . . is the rule in flowering plants" and suspected that certain groups of plants produced hybrids more than others (Stebbins 1959). Natural hybrids and hybrid swarms are especially common in the genus *Encyclia* Hook. However, only one natural hybrid of *Encyclia* Hooker, *Encyclia ×ortizii* Sauleda, and one well known natural hybrid of *Cattleya* Lindl., *Cattleya ×hardyana* Sander, have been reported for Colombia. In the genera *Encyclia* and *Cattleya*, Colombia does not appear to have many natural hybrids in these genera. Possibly as more natural areas are explored and the orchid flora of Colombia becomes better known, more natural hybrids will be discovered.

Plants of a natural hybrid of *Guarianthe hennisiana* (Rolfe) Van den Berg and *Cattleya warscewiczii* Rchb. f. have been found in several areas where both parental species are sympatric. The plant described here is from the area of Dabeiba. Additional plants have been observed in the areas of Cañasgordas and Urabá.

×*Cattlianthe dabeibaensis* Sauleda, R. P., A. Niessen and J. C. Uribe. 2029. *New World Orchidaceae – Nomenclatural Notes.* Nomenclatural Note – Issue No. 55. ePublished.

Guarianthe hennisiana (Rolfe) Van den Berg (*Cattleya patinii* Cogn.) × *Cattleya warscewiczii* Rchb. f

TYPE Ex hort. Niessen and Uribe, s. n., 2016. Cultivated by A. Niessen and J.C. Uribe. Plant originally found growing with *C. warscewiczii* in the area of Dabeiba, Department of Antioquia, Colombia. (Holotype: HPUJ).

DIAGNOSIS Plants of ×*Cattlianthe dabeibaensis* Sauleda, Niessen and Uribe have both unifoliate growths, typical of *C. warscewiczii* Rchb. f. and bifoliate growths, typical of *Gur. hennisiana*, on the same plant. Height of the hybrid is intermediate between the parents. The bifoliate leaves of the hybrid are longer than *Gur. hennisiana* and the unifoliate leaves of the hybrid are wider and shorter than those of *C. warscewiczii*. The flowers of ×*Cattlianthe dabeibaensis* are smaller than those of *C. warscewiczii* but larger



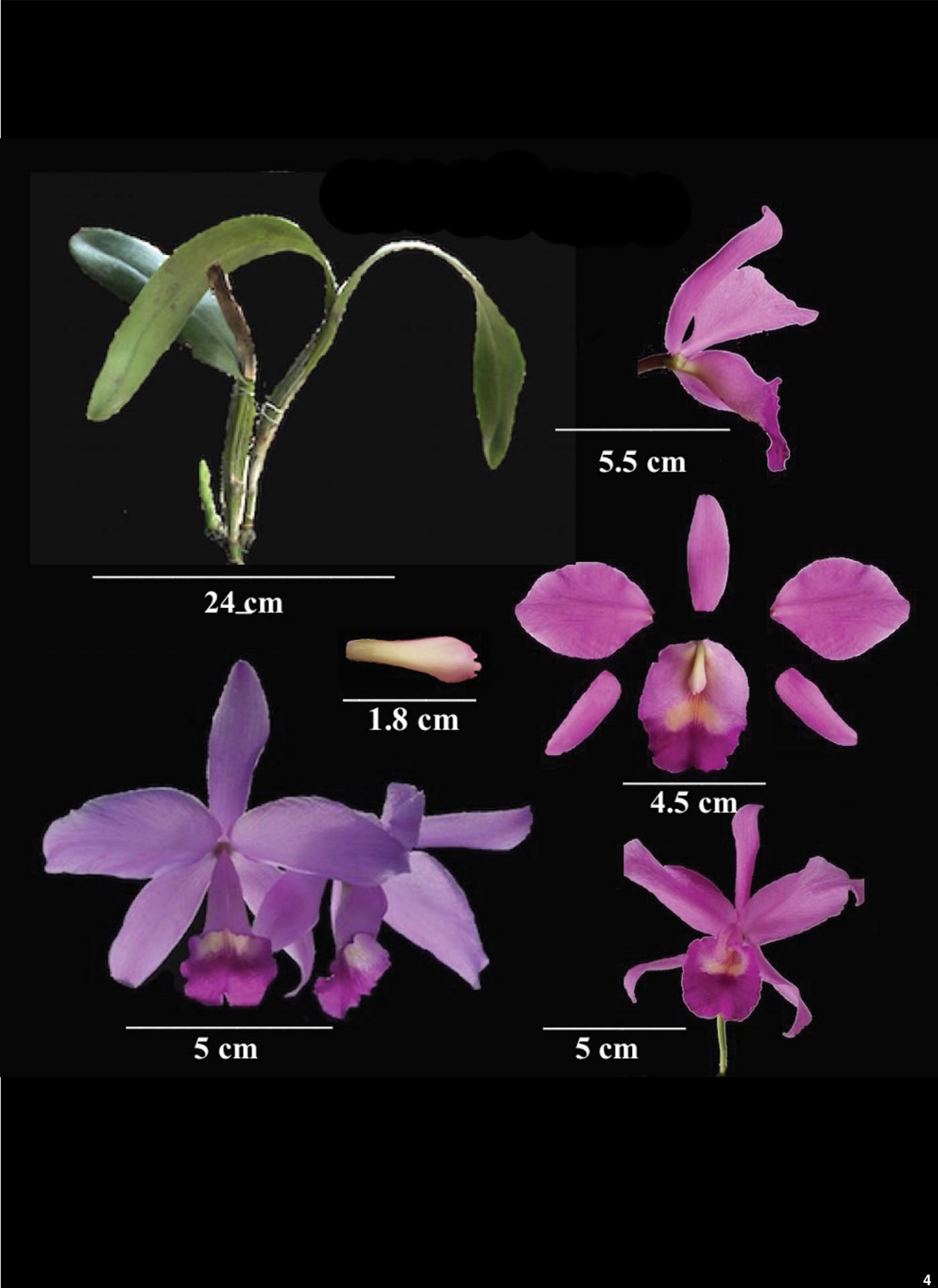
than *Gur. hennisiana*. The petals are similar to *C. warscewiczii*, which are much larger than *Gur. hennisiana*. The labellum resembles *Gur. hennisiana* in shape but is longer, resembling *C. warscewiczii*. The characteristic spots of *C. warscewiczii* on the disc of the labellum are present in most morphs of the hybrid.

DESCRIPTION Plant epiphytic, rhizomatous, to 30 cm tall; roots many, thick, canescent; primary stem or rhizome short, stout, creeping, enclosed by imbricating scarious sheaths; secondary stems modified into pseudobulbs, erect, clustered, linear oblanceolate to 28 cm

[1] ×*Cattlianthe dabeibaensis* Sauleda, Niessen and Uribe.

[2] *Cattleya warscewiczii* Rchb.f., one of the parents of the natural hybrid.

[3] The other parent of the natural hybrid is *Guarianthe hennisiana* (Rolfe) van den Berg illustrated here by 'Munjeet' AM-CCM/AOS (photograph by Judith Higham). Inset close-up is 'Carol Marine' AM/AOS photographed by Charlotte Randolph. Individual plants of the natural hybrid will exhibit characters in between those of the parents.





long, 4 cm thick, basally enclosed by scarios sheaths, 1 to 2 leaved at apex; leaves coriaceous, stiff, linear-lanceolate, obtuse, to 24 cm long, 5 cm wide; inflorescence terminal, to 20 cm tall, peduncles slender, erect, distantly several sheathed, to eight flowers; flowers purple; floral sheath to 8 cm tall, 2.5 cm wide; floral bracts ovate, acute, concave, to 6 mm long, 3 mm wide; ovary pedicellate, slender, to 6 cm long; sepals purple, elliptic, obtuse, to 4.0 cm long, 2 cm wide; petals purple obovate, obtuse, to 4.5 cm long 4.0 cm wide; labellum free from column, elliptic, to 4.5 cm long, 3.5 cm wide, basally light to dark purple, apically dark purple, with two light yellow spots in front of the column; column white or flushed with light purple at edges, basally light green, elongate, to 1.8 cm long, 6 mm wide; anther yellow rarely white.

References

- Baack, E.J. and L.H. Rieseberg. 2007. A Genomic View of Introgression and Hybrid Speciation. *Current Opinion in Genetics and Development* 17(6):513–518.
 Stebbins, G.L. 1950. *Variation and Evolution in Plants*. Columbia University Press, New York.
 Stebbins, G.L. 1959. The Role of Hybridization in Evolution. *Proceedings of the American Philosophical Society* 103, No. 2.

[4] Composite plate prepared by the authors illustrating the new natural hybrid.

[5–8] Several clones of the natural hybrid illustrating some of the variation expected. Plants will vary from those that are mostly bifoliate taking after the *Gur. hennisiana* parent to those that are predominantly unifoliate after the *Cattleya warscewiczii*. Similarly, flower size and number will vary across the range of the parents. Because both parents are found in several color forms in nature, the natural hybrid is also expected to exhibit a range as well although only lavender individuals have yet been identified.

FEBRUARY

1–2—Madison Orchid Growers Guild “Orchid Quest,” Olbrich Botanical Gardens, 3330 Atwood Ave., Madison, WI; Contact: Terri Jozwiak, 608–592–7906; lodijoz@charter.net

1–2—Orchid Society of Greater St. Louis “Orchids on Safari,” Missouri Botanical Garden, 4344 Shaw Blvd., St. Louis, MO; Contact: Erin Vasconcelles, 217–725–7749; showchair@osogsl.org

1–2—Venice Area Orchid Society Annual Show & Sale, Venice Community Center, 326 S. Nokomis Ave., Venice, FL; Contact: Carol Wood, 941–497–4995; cwood12@msn.com

6–9—Deep Cut Orchid Society Show & Sale, Dearborn Market, 2170 Route 35 South, Holmdel, NJ; Contact: Brenda Pauwels, 732–687–7805; dcos.show.chair@gmail.com

7–9—Newport Harbor Orchid Expo and Sale “Orchids on Parade,” Westminster Mall, 1025 Westminster Mall, Westminster, CA; Contact: Richard Hara, 714–651–9970; worknut49@aol.com

8—*Diablo View Orchid Society “Valentine’s Orchid Show & Sale,” First Lutheran Church, 4000 Concord Blvd., Concord, CA; Contact: Jackie Krstulovich, 510–278–3654; jackie.jak@gmail.com

8–9—Boca Raton Orchid Society Show “In Love With... Orchids,” Safe Schools Institute, 1790 NW Spanish River Blvd., Boca Raton, FL; Contact: Carla Lacher, 561–843–6134; cmlacher@hotmail.com

8–9—Southern Ontario Orchid Society Orchid Show & Sale, Toronto Botanical Garden, 777 Lawrence Avenue East, Toronto, Ontario, Canada; Contact: Cathy Dunn, 416–697–8747; show@soos.ca

11–13—Maui Orchid Society Valentine’s Show, Maui Mall, 70 East Kaahumanu Ave., Kahului, Maui, HI; Contact: Bert Akitake, 808–250–1585; jakitake@hotmail.com

13–16—Sociedad Dominicana de Orquideologia “Orquifiesta 2020,” National Botanical Garden of Santo Domingo, Av. Republica de Colombia, Av de Los Proceres, Santo Domingo, Rep. Dominicana; Contact: Maritza Camacho, 809–707–0644; maritzacamacho05@yahoo.com

14–16—Asociación Orquideologica de Escazú “Festival de Orquideas Escazú 2020,” Avenida Escazú, Escazú, San Jose, Costa Rica; Contact: Gabriel Antich Artavia, (506) 8874–5558; di.rbzam@gmail.com

14–16—Batavia Orchid Society Show, DuPage County Fairgrounds, 2015 Manchester Rd., Wheaton, IL; Contact: Larry Sexton, 630–406–8460; orkiddoc@aol.com

14–16—*Greater Orlando Orchid Society Annual Show & Sale, Orlando Garden Club Inc, 710 East Rollins Street, Orlando, FL; Contact: John Meyer, 407–695–2122 or David White, 407–712–3818

15–16—Greater Cleveland Orchid Society 2020 Spring Show & Sale, Cleveland Botanical Garden, 11030 East Blvd., Cleveland, OH; Contact: Marc Pollack, 440–565–7529; marcpoll@sbcglobal.net

15–16—Miami Valley Orchid Society Show, Cox Arboretum MetroPark, 6733 Springboro Pike, Dayton, OH; Contact: Kristen Mason, 513–502–5408; orchidbiochem@aol.com

15–16—Orchid Society of Highlands County “Orchids From the Heart,” Agri-Civic Center, 4509 George Boulevard, Sebring, FL; Contact: Susie Whitehead, Lori Coon, Marlen Martinez, 863–446–0189; cmghmartinez@gmail.com

15–16—Port Saint Lucie Orchid Show “Orchid Jungle Book,” Port Saint Lucie Botanical Gardens, 2410 SE Westmoreland Blvd., Port Saint Lucie, FL; Contact: Claudia Young, 757–879–2142; oma.young@ymail.com

15–17—National Capital Orchid Society Annual Show & Sale, Homestead Gardens, 743 West Central Avenue, Davidsonville, MD; Contact: Gary R. Smith, 410–349–7112; orchid.impaired@gmail.com

19–23—Asociación Guatemalteca de Orquideologia National Show, Salón Sicial José Mariano Arzú Castillo, Cerveceria Centro Armerican, SA. 3g Avda. 17–16 Finca El Zapote, Zona 2, Gautemala City; Contact: Julio Fonseca, 502–5411–0694; jfonsecaorchids@gmail.com

20–23—San Francisco Orchid Society “Pacific Orchid Exposition,” Hall of Flowers at Golden Gate Park, 1199 9th Avenue, San Francisco, CA; Contact: Jeff Harris, 650–303–6205; info@orchidsanfrancisco.org

21–23—St. Croix Orchid Society Show “20/20 A Vision of Orchids,” St. George’s Botanical Gardens, 127 Estate St. George, Frederiksted, USVI; Contact: Michelle Thurland–Martinez, 340–690–1330; mmthurland@gmail.com

21–23—Virginia Orchid Society Show “PICTURE THIS,” Strange’s Florists, Greenhouses and Garden Center, 12111 West Broad Street, Richmond, VA; Contact: Gary Marshall, 412–521–2877; g.marshall@chatham.edu

22–23—Amherst Orchid Society Show, Smith Vocational and Agricultural High School, 80 Locust St. (Rt. 9), Northampton, MA; Contact: Marc D. Gray, 802–348–7926; bulbophyllum@myfairpoint.net

22–23—Greater Lansing Orchid Society Orchid Show, Michigan State University,

Plant & Soil Sciences Bldg., 1066 Bogue St., East Lansing, MI; Contact: Peter Ostlund, 517–449–5248; p.ostlund@yahoo.com

22–23—Naples Orchid Society Show, Naples Botanical Garden, 4820 Bayshore Drive, Naples, FL; Contact: Richard Phippen, 239–775–5220; rhippen@comcast.net

28–29—Jamaica Orchid Society Show, Jamaica Horticultural Society Show Hall, Gibson Drive, Kingston, Jamaica; Contact: Claude W. Hamilton, 876–927–6713; hamlynorchids@aol.com

28–March 1—Mobile Area Orchid Society 43rd Show, Bellingrath Gardens and Home, 12401 Bellingrath Road, Theodore, AL; Contact: Joseph Paine, 251–209–1008; joe6w@aol.com

28–March 8—Pennsylvania Horticultural Society “2020 Philadelphia Flower Show,” Pennsylvania Convention Center, 1101 Arch Street, Philadelphia, PA; Contact: Betty Greene, 215–988–8826; bgreene@pennhort.org

29–March 1—Greater Cincinnati Orchid Society Spring Show & Plant Sale, Krohn Conservatory, 1501 Eden Park Drive, Cincinnati, OH; Contact: Cheryl Jaworski, 812–438–2898; jaworchid@gmail.com

29–March 1—Orchid Society of the Royal Botanical Gardens “39th Annual Orchid Show,” Royal Botanical Gardens, 680 Plains Road West, Burlington, ON, Canada; Contact: Ben Boers, 905–979–4886; bmboers@hotmail.com

29–March 1—Victoria Orchid Society Spring Show & Sale, Our Lady of Fatima Hall, 4635 Elk Lake Dr., Victoria, BC; Contact: Alida Bower/Cat Fruitiger Co Chair, 250–514–2965; ledaboyes@hotmail.com

MARCH

6–7—Greater North Texas Orchid Society Show “Orchid Majesty,” Richardson Civic Center, 411 W Arapaho Rd., Richardson, TX; Contact: Linda Horton, 972–977–6969; henry.horton4@verizon.net

6–8—Central California Orchid Society Spring Show, Fresno Home and Garden Show, Fresno Fair Grounds, 1121 S. Chance Ave., Fresno, CA; Contact: Gordon Wolf, 209–999–0181; gwsangca@yahoo.com

6–8—Martin County Orchid Society Show, Martin County Fairgrounds, Building G, 2616 SE Dixie Hwy., Stuart, FL; Contact: Debbie Wilson, 561–351–1515; davedebwilson@hotmail.com

6–8—Maryland Orchid Society Show & Sale, Maryland State Fairgrounds, 2200 York Road, Timonium, MD; Contact: Marc Kiriou, 443–509–0084; gothiclord01@yahoo.com

6–8—Orchid Society of the Ozarks “10th

Annual Orchids in the Garden,” Botanical Garden of the Ozarks, 4703 North Crossover Road, Fayetteville, AR; Contact: Stephen Marak, 479-841-4275; samarak@cox.net

6-8—Triad Orchid Society Show, A.B. Seed Education Annex, 8432 Norcross Road, Colfax, NC; Contacts: Will Bottoms, 336-420-8872; wlbottoms@gmail.com/Tammy Goldberg, 336-491-3670; famgoldberg@hotmail.com

7-8—2020 Greater Akron Orchid Society Spring Show, Rohr & Sons Nursery—Garden Center, 7211 Portage Street NW, Massillon, OH; Contact: Jane Bush, 440-429-5779; bushjj@juno.com

7-8—Mount Baker Orchid Society Show & Sale, Skagit Valley Gardens, 18923 Peter Johnson Road, Mount Vernon, WA; Contact: Elizabeth Pernotto, 360-647-1752; betsyp1045@gmail.com

7-8—Northeastern Wisconsin Orchid Society Spring Show, DoubleTree by Hilton, 150 Nicolet Road, Appleton, WI; Contact: Dave Bluma/Lorraine Heydon, 920-869-2247; lorrainesgems@yahoo.com

7-8—Tampa Bay Orchid Society Show “Orchids 20/20 Perfect Vision,” Tampa Scottish Rite Center, 5500 Memorial Highway, Tampa, FL; Contact: Eileen Hector, 813-368-7353; TampaBayOrchidSociety@verizon.net

12-15—Asociación Caldense de Orquideología “XV Exhibition of Orchids,” Recinto del Pensamiento, Kilometro 11 Viaal Magderlena, Manizales, Colombia; Contact: José Fernando Jimenez Velez, (+57) 3122735889; ferjimenez69@hotmail.com

13-14—Englewood Area Orchid Society “Orchids by Lemon Bay,” Englewood United Methodist Church, 700 E Dearborn Street, Englewood, FL; Contact: Mary Anne DiGrazia, 941-697-9237; tommaryanne@centurylink.net

13-15—Orchid Society of Coral Gables Show, Fairchild Tropical Botanic Garden, Garden Room, 10901 Old Cutler Road, Coral Gables, FL; Contact: Melana Davison, 760-212-8919; orchidiva@att.net

14-15—Calcasieu Orchid Society “Easter Parade of Orchids,” 1911 Historic City Hall Arts & Cultural Center, 1001 Ryan Street, Lake Charles, LA; Contact: Keith Joiner, 318-614-3516; kjoiner2000@yahoo.com

14-15—Denver Orchid Society Spring Show & Sale “High on Orchids,” Denver Botanic Gardens, 1007 York Street, Denver, CO; Contact: Shirlee McDaniels, 303-905-7014; shirlee5280@gmail.com

14-15—Illinois Orchid Society Spring Show & Sale “Living Gems,” Chicago

Botanic Garden, Nichol’s Hall, 1000 Lake Cook Rd., Glencoe, IL; Contact: David Kirk, 847-563-0212; david.kirk.a@gmail.com

14-15—Orchid Society of Western Pennsylvania Annual Spring Show “An Orchid Journey,” Crowne Plaza Hotel, 164 Fort Couch Road, Pittsburgh, PA; Contact: Sheila Nathanson, 412-576-1704; mnsan@gmail.com

20-22—Gulf Coast Orchid Alliance Show, North Collier Regional Park, 15000 Livingston Road, Naples, FL; Contact: Jim Longwell, 239-340-5520; jlongwell1@comcast.net

20-22—North Carolina Piedmont Orchid Society Show, Daniel Stowe Botanical Garden, 6500 South New Hope Road, Belmont, NC; Contact: Linda T. Wilhelm, 704-393-1740; orchidfrau@bellsouth.net

20-22—Windward Orchid Society Show, Samuel Wilder King Intermediate School, 46-155 Kamehameha Highway, Kaneohe, HI; Contact: Susan L. Lim, 808-728-1014; slim@hawaiiintel.net

21-22—Ann Arbor Orchid Society “Orchid Festival,” Methaei Botanical Gardens, 1800 North Dixboro Rd., Ann Arbor, MI; Contact: Abby Skinner, 517-816-7979; skinne11@msu.edu

21-22—Illowa Orchid Society Spring Show, Quad City Botanical Center, 2525 4th Avenue, Rock Island, IL; Contact: Deno Kandis, 309-737-2672; emkandis@mchsi.com

21-22—Jacksonville Orchid Society Show, Garden Club of Jacksonville, 1005 Riverside Ave., Jacksonville, FL; Contact: Eric Cavin, 904-334-8519; dirt2021@yahoo.com

21-22—London Orchid Society Show, Mother Teresa Catholic Secondary School, 1065 Sunningdale Road East, London, ON, Canada; Contact: Sean Moore, 519-645-7747; spmoore@rogers.com

21-22—Nutmeg State Orchid Society Show “Come See Our Bloomers,” West Hartford Meeting & Conference Center, 50 South Main St., West Hartford, CT; Contact: Sandy Myhalik, 860-677-0504; myhalik@comcast.net

21-22—Spokane Orchid Society Show & Sale, Spokane Community College – Student Lair, 1810 N. Green St., Spokane, WA; Contact: Jim Pearce, 509-299-5152; info@spokaneorchidsociety.org

21-22—Wisconsin Orchid Society Show “Spring 2020 Orchid Festival,” Milaeger’s Garen Center, 4838 Douglas Ave., Racine, WI; Contact: Richard Odders, 262-632-3008; odders2445@gmail.com

27-29—Genesee Region Orchid Society Spring Show & Sale, Rochester Museum & Science Center, Eisenhart Auditorium,

657 East Avenue, Rochester, NY; Contact: Jonathan Jones, 585-721-7150; jonathanjones2012@gmail.com

27-29—Manitoba Orchid Society Show “Orchid Celebration,” Breezy Bend Country Club, 7620 Robin Blvd., Headingley, Manitoba, Canada; Contact: Rick Askinis, 204-470-1856; raskinis@hotmail.com

27-29—Orchid Society of Alberta “Orchid Fair 2020,” Enjoy Centre, 101 Riel Drive, St. Albert, AB, Canada; Contact: Darrell Albert, 780-903-2299; darrell.albert@albert-it.com

27-29—San Diego County Orchid Society Spring Show “Orchid Magic,” Scottish Rite Center, 1895 Camino del Rio South, San Diego, CA; Contact: Deborah Halliday, 858-756-3578; debhallid@gmail.com

27-29—San Joaquin Orchid Society Annual Show, Sherwood Mall, 5308 Pacific Ave., Stockton, CA; Contacts: Patricia Reece, 209-824-2300; patty@mynewyorkdiamonds.com; Nanette La Belle, 209-405-0056

27-29—Terrebonne Orchid Society Show & Sale, Southland Mall, 5953 West Park Ave., Houma, LA; Contact: Karen Breaux/Denise Mitchell, 985-709-6348; kfbreaux@bellsouth.net

28-29—Central Florida Orchid Society Show “It’s Raining Orchids,” National Guard Armory, 2809 S Ferncreek Ave., Orlando, FL; Contact: Teri Scott, 407-463-0274; teriscottfla57@aol.com

28-29—Greater Omaha Orchid Society “33rd Annual Orchid Show & Sale,” Lauritzen Gardens, 100 Bancroft St., Omaha, NE; Contact: Jim Pyrzynski, 402-734-4112; jpyrzynski@cox.net

28-29—Jamaica Orchid Society Show, Jamaica Horticultural Society Show Hall, Gibson Drive, Kingston, Jamaica; Contact: Claude W. Hamilton, 876-927-6713; hamlynorchids@aol.com

28-29—Michigan Orchid Society Spring Show, United Food & Commercial Workers Union Bldg., 876 Horace Brown Drive, Madison Heights, MI; Contact: Joe Peterson, 248-528-1453; jandjandabbey@aol.com

28-29—Nature Coast Orchid Society Spring Show 2020, VFW Post 8681, 18940 Drayton Street, Spring Hill, FL; Contact: Steve Mattana, 218-556-1895; stevemattana123@gmail.com

28-29—Sonoma County Orchid Society Spring Show & Sale, Santa Rosa Veteran’s Memorial Building, 1351 Maple Ave., Santa Rosa, CA; Contact: Alison Bies, 207-844-0909; orchidswtf@gmail.com

Events preceded by an asterisk (*) in this listing will not be judged by the AOS.

Too cold in the winter greenhouse?

Stick one side of Velcro disks a foot apart onto the inside of the north side of the greenhouse to fit the shape of the foil-covered, bubble-wrap-type batts like the material used as jackets for hot water heaters. It can be purchased in rolls. The foil will reflect light back into the greenhouse and the bubble wrap will help insulate against the cold. It may also be used to insulate the west side of the greenhouse on the outside to help keep the greenhouse cool during the summer months.
— Jean Allen-Ikeson

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HOME REMEDIES

— Rather than expensive and potentially dangerous herbicides, spray full-strength vinegar to kill weeds between pavers and on greenhouse floors. (Do not spray on orchids.)

— Aspirin (just $\frac{3}{4}$ of one 325 mg tablet per gallon of water) helps protect plants from fungal and viral pathogens when used as a spray. More is NOT better. Do not exceed this amount.

— Homemade insecticide (mix in a 1 gallon [3.8 L] jug): 1 pint (0.5 L) rubbing alcohol, 1 pint (0.5 L) 409 spray cleaner, and 3 quarts (2.8 L) water. Apply as a spray.

— Isopropyl (rubbing) alcohol can be put into an empty spray bottle and used to treat scale, mealybugs, thrips, aphids, red spider mites and perhaps other pests. It works only while wet and must contact the insect.

— Neosporin has been reportedly used to treat orchid crown rot; remove rotted area of plant before treatment.



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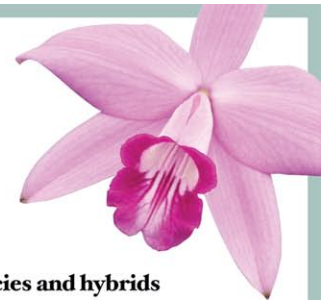
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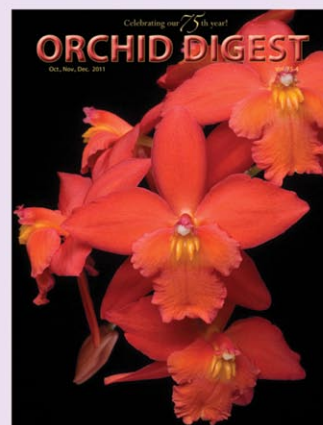
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Hangers for small pots

HAVE RECENTLY purchased a number of small and young orchids in 2-inch (5.1-cm) pots. I wanted to hang them in close proximity to my humidifier to keep them well hydrated and also wanted them to be secure as I also have a fan that moves them around quite a bit.

I found these pot hangers on Amazon and thought I would give them a try. Similar products may be available at your local orchid supply such as browardorchidsupply.com. They come in 3-inch (7.6-cm) and 6-inch (15.2-cm) galvanized steel.

I had to take my pliers and squeeze them tighter to hold my thinner pots as they were designed for clay pots but otherwise they hold firmly. They work great hanging from a variety of spots...benches, underneath other orchids, trellises, hanging baskets, etc. And the best part...I have room for more orchids!

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

American Orchid Society
SPRING MEMBERS MEETING
 hosted by the
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For more information
 visit the News and Events page on
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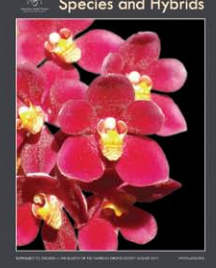


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CATTLEYA



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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.

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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**For Advertising Information,
Contact: Kevin Hall,
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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.

Orchids as Aphrodisiac, Medicine or Food

Eng Soon Teoh. Hardcover, 376 pages, 394 color pictures, 35 black and white illustrations; also available as an ebook (<https://doi.org/10.1007/978-3-030-18255-7>). Published in 2019 by Springer International Publishing, Gewerbestrasse 11, 6330 Cham, Switzerland. ISBN: 978-3-03018254-0; 978-3-030-18255-7. Available from Springer.com (<https://www.springer.com/gp/book/9783030182540>) for €9.51 (approximately \$43.95) hardbound (ebook €2.01/~\$35.60).

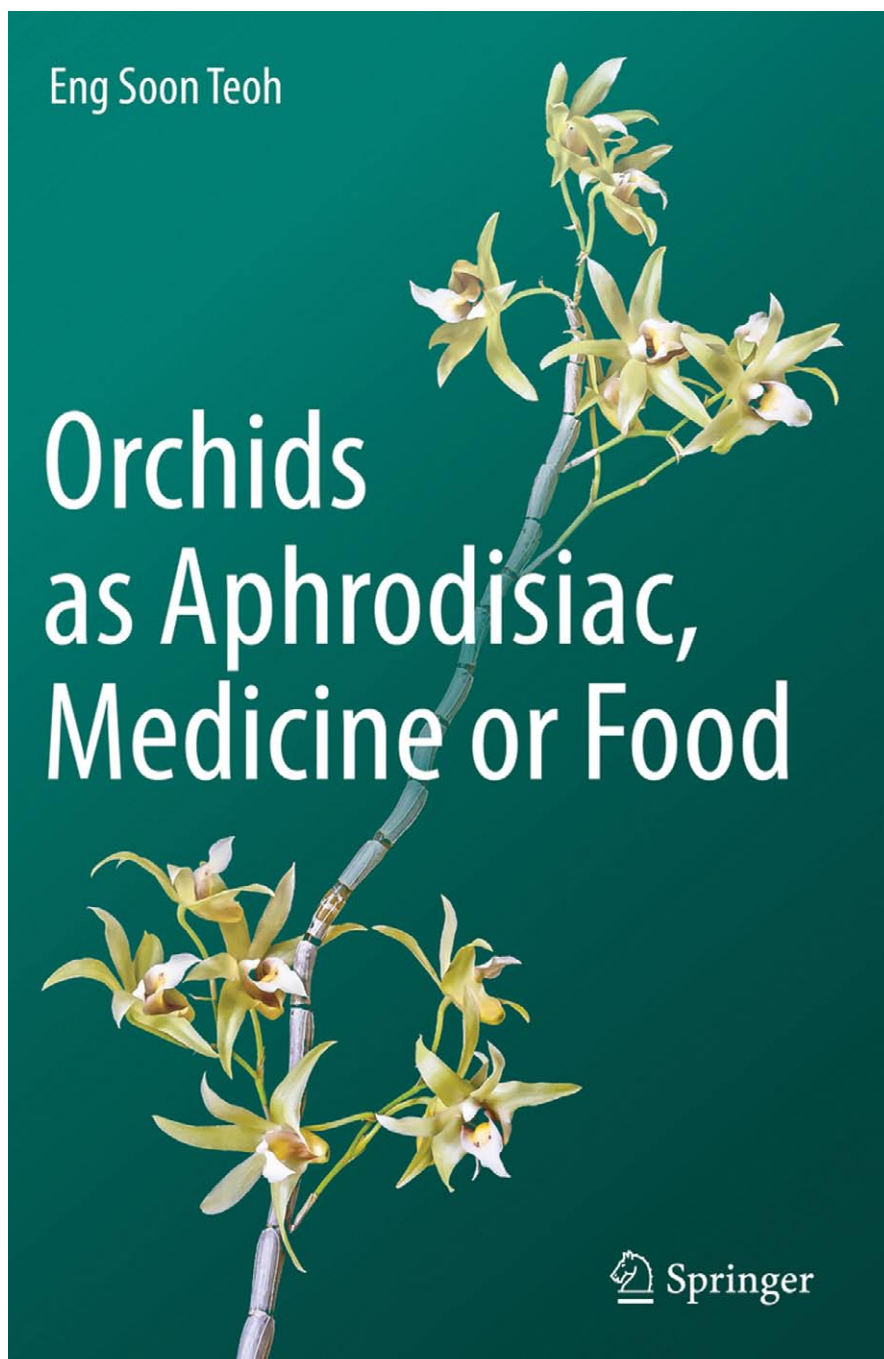
YOU LOVE ORCHIDS? You find their history fascinating? You want to know things that you have not read or learned before? Are you a hobbyist, grower, enthusiast, scientist or just curious and love to know about the fascinating history and science of orchids? Then this excellent book is for you.

Orchids as Aphrodisiac, Medicine or Food explores with new details and information the history and science of orchids. The book involves modern day and historical tales that are guaranteed to delight the orchid enthusiast and historian. Did you know that it involves Casanova, Madame Pompadour and Queen Elizabeth I? Do you know how the ancient Greeks, and specifically which ones, described a technique to determine which plants had value to the well-being of people? Doctors, pharmacists, healers and others promoted these ideas through the Renaissance. Various religions and beliefs played a part, and even today there is international intrigue, a rush to find medical cures for cancer and other ailments that involve orchids. There is also a battle between environmentalists and scientists anxious to find cures from the myriad of chemicals found in orchids and the fungi that are part of the orchid biome.

Dr. Teoh has for decades broken new ground through vigorous research and documentation and is constantly bringing new light to this amazing subject.

His previous works, *Medicinal Orchids*, *Orchids of Asia* and *Orchids in a Garden City*, are well known and a joy to read. As with previous texts this wonderful book includes many excellent images, photographs and illustration. Many of the photographs are by Dr. Teoh and were taken in their native locations.

— Paul Alan Wetter, MD, a judge in the AOS West Palm Beach Center, is Professor Emeritus at the University of Miami School of Medicine. He is a pioneer in minimally invasive surgery and has numerous honors for his contributions to the field. Paul became interested in orchids the late



1960s when he was studying the natural history of South Florida. Miami has been his home since childhood and he has been growing orchids as a hobby ever since,

with a special interest in epiphytic orchids in the subtropical garden (email: paul@sfs.org).

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