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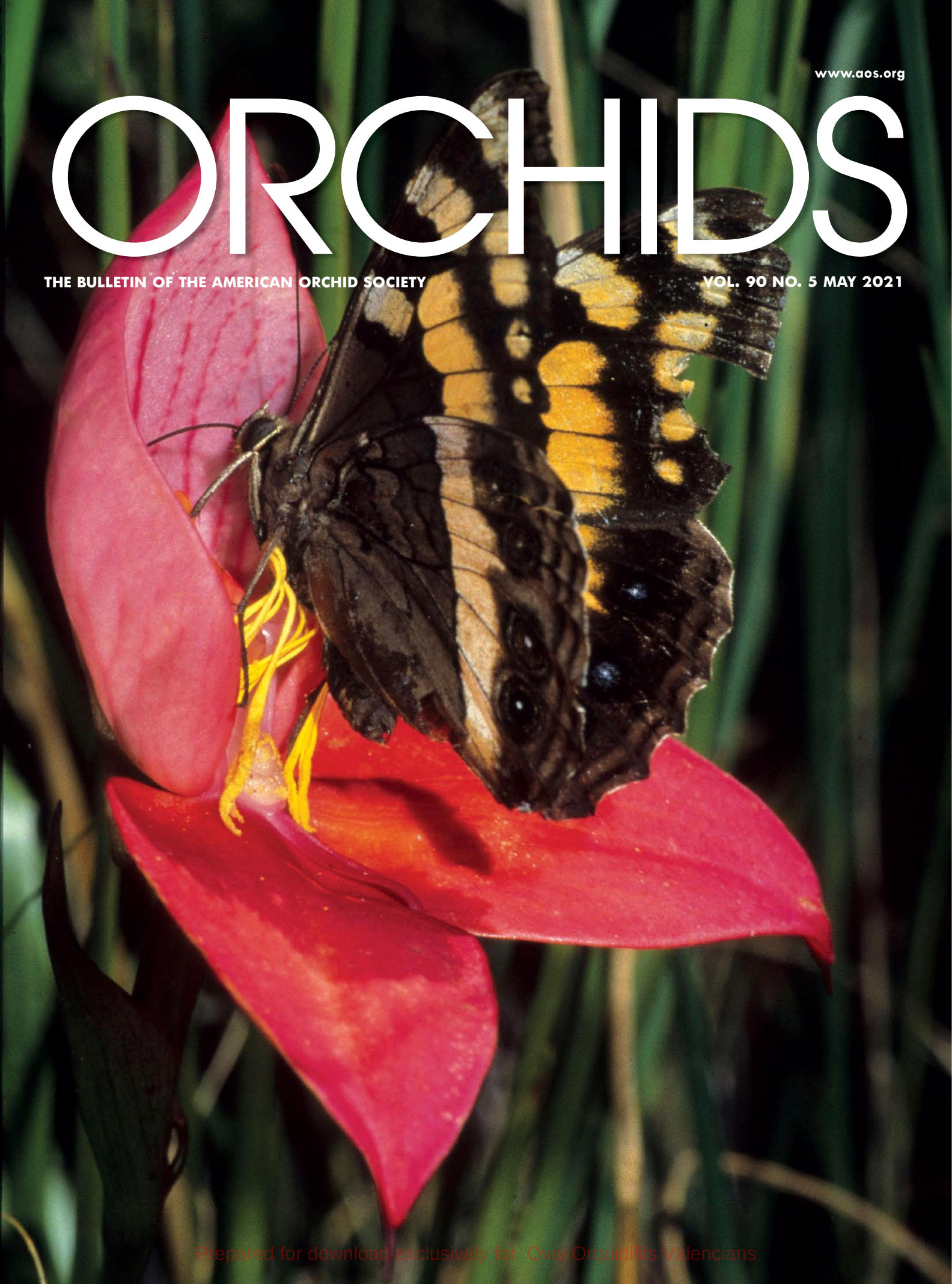
ORCHIDS

THE BULLETIN OF THE AMERICAN ORCHID SOCIETY

VOL. 90 NO. 5 MAY 2021



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The Bulletin of the American Orchid Society

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Mail date: April 26, 2021.

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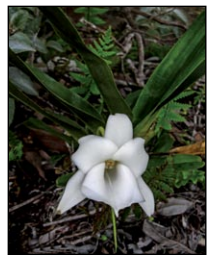
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FRONT COVER

The butterfly, *Meneris tulbaghia*, is the only known pollinator of *Disa uniflora*. This *Disa* species is commonly called the pride of Table Mountain in its native South Africa. Photograph by Steve Johnson.

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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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The American Orchid Society provides leadership in orchids

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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.

Acianthera(ay-see-AN-ther-a)
Aerides (ay-air-EE-deez)
Aeropetes (air-oh-PAY-teez)
alba (AL-ba)
alexandrae (al-leks-AN-dree)
amabilis (ah-MAH-bill-liss)
Anathallis (an-a-THAL-iss)
Angraecum (an-GRAY-kum)
Archaeopteryx (are-kee-OP-ter-iks)
Asperagales (a-spare-a-GAY-leez)
atricapilla (ah-trih-cap-ILL-la)
aurata (aw-RAY-ta)
Babiana (bab-ee-AY-na)
baptistii (bap-TIST-ee-eye)
Biermannia (beer-MANN-ee-a)
binectariferum (bye-nek-tar-IF-er-um)
bowringiana (bow-ring-ee-AY-na)
braceana (brace-AY-na)
brymerianum (brye-mur-ee-AY-num)
Calanthe (kal-AN-thee)
Cardiophylla (kar-dee-oh-FILL-la)
Catasetum (kat-a-SEE-tum)
Cattleya (KAT-lee-a)
caudata (kaw-DAY-ta)
Cleistes (KLY-steez)
Coelogyne (see-LODJ-ih-nee)
coutrixii (koo-TRIKS-ee-eye)
crassicornis (krass-ee-KOR-niss)
Cymbidium (sim-BID-ee-um)
Cynorkis (sin-ORE-kiss)
Dendrobium (den-DROH-bee-um)
difforme (dif-FORE-mee)
digbyana (dig-bee-AY-na)
Diplocaulobium (dip-loh-kaw-LOBE-ee-um)
Disa (DEE-za or DYE-sa)
Doritis (dore-EYE-tiss)
draconis (dra-KOH-niss)
Dracula (DRAK-yew-la)
Dysoxylum (dye-SOKS-ee-lum)
elegans (ELL-eh-ganz)
elongata (ee-long-AY-ta)
Epidendroideae (eh-pih-den-DROY-da-ee)
Epidendrum (eh-pih-DEN-drum)
Epulorhiza (eh-pew-loh-RYE-za)
Eulophia (yew-LOH-fee-a)
ghillanyi (gill-LAY-nee-eye)
Gladiolus (glad-ee-OH-luss)
glandulosa (gland-yew-LOH-sa)
Gongora (GONE-gore-a)
granulosa (gran-yew-LOH-sa)
Guarianthe (gwar-ee-AN-thee)
harveyana (har-vee-AY-na)
honghenensis (hong-en-EN-sis)
ibityana (ih-bit-ee-AY-na)
Jumellea (joo-MELL-la)
Kingidium (king-ID-ee-um)
Kingiella (king-ee-EL-la)
Lachenalia (lak-en-AY-lee-a)
Laelia (LAY-lee-a)
lageniforme (lag-en-ee-FORE-me)
lawrenceanum (law-rens-AY-num)
leporinum (leh-pore-EE-num)
liliastrum (lil-ee-AST-rum)
lobbii (LOBE-ee-eye)
lugens (LOO-genz)
Lycaste (lye-KAS-tee)
maculata (mak-yew-LAY-ta)
magdalenae (mag-deh-LEE-nee)
mannii (MAN-ee-eye)
Masdevallia (mas-deh-VAHL-ee-a)
Maxillaria (maks-ill-LAIR-ee-a)
megalantha (meg-a-LAN-tha)
melinantha (mel-in-AN-tha)
Miltoniopsis (mil-ton-ee-OP-sis)
montipelladensis (mon-tee-pell-lad-EN-sis)
muscosum (mew-SKOH-sum)
Myrmecophila (mir-meh-KOF-fill-la)
nilsonii (nil-SON-ee-eye)
oblongifolia (ob-long-ih-FOLE-ee-a)
ochreata (oh-kree-AY-ta)
Oncidium (on-SID-ee-um)
Orchidaceae (ore-kid-ACE-ee-ee)
Orchidoideae (ore-kid-OY-dee-ee)
Ornithochilus (or-nith-oh-KYE-lus)
Paphiopedilum (paff-ee-oh-PED-ih-lum)
papillosa (pap-ill-LOH-sa)
parishii (pare-ISH-ee-eye)
Phalaenopsis (fail-en-OP-sis)
Phragmipedium frag-mih-PEED-ih-lum)
Pleurothallis (plur-oh-THAL-liss)
polysticta (pol-ee-STIK-ta)
Ponerorchis (pon-er-ORE-kiss)
popowii (pop-POV-ee-eye)
Porroglossum (pore-oh-GLOS-sum)
prismatocarpa (priz-mat-oh-KAR-pa)
Psychilos (sye-KYE-los)
Pterostylis (ter-oh-STYE-liss)
racemosa (ras-see-MOH-sa)
Renanthera (ren-AN-ther-a)
Rhyncholaelia (rink-oh-LAY-lee-a)
Rhyncholaeliocattleya (rink-oh-lay-lee-oh-KAT-lee-a)
rosea (ROZE-ee-a)
rupestre (roo-PESS-tree)
rupicolous (roo-PIK-oh-lus)
sacculata (sak-kew-LAY-ta)
Sarcochilus (sar-koh-KYE-lus)
Sarcolaena (sar-koh-LEE-na)
Schomburgkia (shom-BURG-kee-a)
schuetzei (SHOOT-zee)
scottianum (skot-tee-AY-num)
shuttleworthii (shutl-WORTH-ee-eye)
sincorana (sin-kore-AY-na)
Sobralia (soh-BRAY-lee-a)
solomonense (sol-oh-mon-EN-say)
spathulata (spath-yew-LAY-ta)
sphacelatum (sfass-eh-LAY-tum)
stobartiana (stoh-bar-tee-AY-na)
taenialis (tay-nee-AY-liss)
tenebrosa (ten-eh-BROH-sa)
Thelyschista (tel-lee-SHISS-ta)
trianae (TREE-an-ee)
Trichoglottis (trik-oh-GLOT-tiss)
tripetaloides (try-pet-a-LOY-deez)
tulhaghia (tul-HAHG-ee-a)
uniflora (yew-nih-FLORE-a)
Vanilloideae (van-ill-OY-da-ee)

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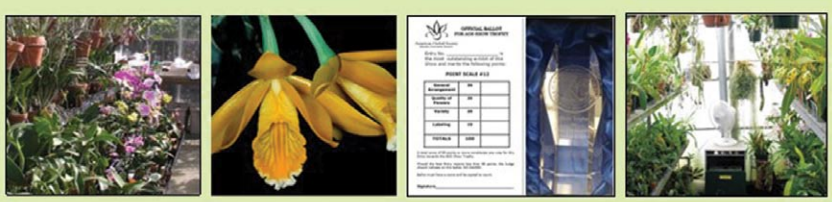

When	**May 04, 2021** 8:30pm EDT Tuesday	**May 31, 2021** 8:30pm EDT Monday	**June 08, 2021** 8:30pm EDT Tuesday	**June 17, 2021** 8:30pm EDT Thursday
Topic	Greenhouse Chat (Orchid Q&A) *Send in your Questions!*	*Prosthechea karwinskii* in Mexico, reintroducing a threatened species	Show Trophy Subjective or Objective	Greenhouse Chat (Orchid Q&A) *Send in your Questions!*
Presenter	**Ron McHatton** Chief Education and Science Officer	**Julia Douglas** AOS Conservation Grant Recipient	**Marc Burchette** Head of Biltmore Estate Orchid Collection	**Ron McHatton** Chief Education and Science Officer

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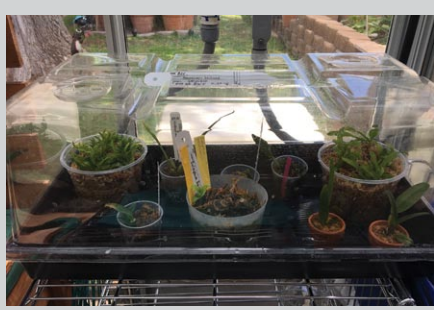
Woodstream Orchids – Bill Goldner

Vegetable Starter Trays for Orchid Seedlings

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

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



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

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

MAKING SURE PEOPLE CAN REACH YOUR AFFILIATED SOCIETY IS NOW EASIER THAN EVER

There's a new easier way to keep your society's AOS information current.

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Click **Access your account and quick links**
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Help us ensure the AOS Corner, renewal notices and important correspondence reach you. Update any time you have a change.

Good News. Better News. Great News

THE GOOD NEWS is that more and more places are opening up for in-person meetings. I have received information from many orchid societies that they are back to having in-person meetings and the folks are enjoying it. It is wonderful to see our fellow members, share our experiences, listen to talks, have raffles and sales, bring in plants for judging, etc., etc., etc. The orchid world is coming back to life! Some societies are even combining in-person meetings with virtual settings for those that might not be ready to meet in person. And that is okay too.

Judging centers are having AOS judging events more often now as well. Judging is something that must be done in person. Judges need to be there to appreciate a flower — the color, the substance, the texture — and this can only be done in person. For everyone's well-being, many events are being held outdoors in open spaces to provide distancing. It is something we have just come to accept for the last year. But it is so exciting to have judging back again!

Even better than that is the journey orchids have taken us on and the people we have met along the way. There is no question that many people have been woven into the fabric of the orchid world influenced by a person or persons whose passion is contagious. The experiences they have had and the knowledge they possess draws us to it. The American Orchid Society has been very fortunate to have attracted many such individuals. It is one of the reasons it is such a great organization.

Dr. Rob Griesbach is definitely one of these people. He received a PhD in genetics from Michigan State University in 1980. For the first 25 years of his career, he was doing research genetics in the Floral and Nursery Plants Research Unit of the US Department of Agriculture–Agriculture Research Service (USDA-ARS) conducting a broad-based research program in plant genetics and breeding. For the last 15 years, he has been the deputy assistant administrator in the Office of Technology coordinating and managing programs to facilitate the adoption of research outcomes across all of USDA-ARS. So, for most of his life he has worked in the field of agricultural in some form or another. You can see he is no stranger to the field. He has published many articles throughout his career, several of which involved orchids. One such article was "Development of Phalaenopsis Orchids for the Mass-Market," noting in the article that 75% of all orchid sales are phalaenopsis plants.

Rob is a former president of the AOS and now he is the chair of our Research Committee, and we are very fortunate to have him on board. His committee does work in his area of expertise. Under his guidance, the AOS awarded grants for two programs recently. One of the grants was to help fund a proposal on the spatial, ecological and temporal structure of orchid pollinator variability and the other one is to help fund a comparative analysis of terrestrial orchid seeds to inform ex situ conservation in Europe. Both these programs are very important to the study and conservation of orchids.

Here is the great news. The American Orchid Society Centennial Celebration during the fall 2021 Members' Meeting is shaping up very nicely. Amazingly, the official poster of the Centennial Celebration sold all 150 prints in two days! Perhaps that is not so amazing. The poster is a magnificent work of art done by the renowned Angela Mirro, who worked for many months to complete the perfect reflection of orchids of the Americas. There is so much more going on as we approach the six-month mark left for this wonderful event.

More than half of the tickets to the event have been sold, and there are still several months to go. At this rate, it will be sold out in no time! Also, I am very excited to share with you that we will have a remarkable group of performers to entertain guests throughout the evening, beginning with Bob Winkley, a classical pianist and member of the AOS, who will be playing the piano during the cocktail hour. We will have "live" trees, ladies at orchid tables and ballet dancers escorting guests to their tables for the dinner after the cocktail hour. During dinner, music students from the University of Miami will be playing soft background music while guests enjoy their gourmet dinners. It is going to be spectacular evening!

Auction item donations are coming in to add to the jewelry pieces from the

Barbara Ansly estate that will guarantee a lively and successful auction. A professional auctioneer has been hired to manage the auction. It is going to be a spectacular event.

The success of the Centennial will be a success for orchids on a global plane because the proceeds of the event are earmarked for orchid conservation. These stunning flowers that have drawn attention for centuries deserve our consideration and care so that they are here for generations to come who will appreciate them as we do.

The AOS Centennial Celebration and the fall Members' Meeting will be here before we know it. I would urge everyone interested, who has not yet registered for the meeting, to do so as soon as possible. There will be so much going on for everyone. Details are on the AOS site (www.aos.org). Do not hesitate or you might miss out!

See you then!

— Bob Fuchs, American Orchid Society President (email: bob@rforchids.com).

IX International Conference on Orchid Conservation "Soroa 2022"

THE SOROA BOTANICAL and Orchid Garden and the University of Artemisa announce the IX International Conference on Orchid Conservation "Soroa -2021," which will take place February 22–25, 2022 (NEW DATE) at our facilities.
The Symposium will feature scientific panels addressing such topics such as:

- In situ and ex situ Conservation
- Ecology and Population Dynamics
- Systematic
- Invasive Species
- Biotechnology
- Environmental Education

The Organizing Committee consists of:

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

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

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May: The Month of the Refraction — Valuing Light Levels

By Thomas Mirenda

SPRING HAS FINALLY sprung by April, but the real growing commences this month with the brilliant, cool light that finally appears; light unfettered by winter or early spring storm clouds or refracted into rainbows as the sun breaks through them. I have the greatest job, but even I can be seduced by a bright spring day to tarry in my garden in the morning or take a scenic detour on the way home. Light is among the most precious commodities to the orchid grower, but few of us understand what light really is. Light is energy, borne of the sun and traveling unimaginable distances through space to stimulate us, our plants and our world. This energy is processed and harnessed by plants to produce an incredible bounty. Virtually everything we eat, the clothes we wear, the structures we build and the air we breathe all come from this energy.

Thomas Mirenda

Even more incredible are the colors and forms that light allows us to see. I have a wild imagination, but there are many plants, and certainly numerous orchids, that I could never have conceived of. Light makes the visualization of these colorful subtleties and structures possible. I cannot imagine what it would be like to be without it, though so many are. This month, as light streams into our lives and personal spaces, I encourage you to ponder what an extraordinary thing light is and its importance to everything around us. Use it. Enjoy it. Love it.

UNBEARABLE LIGHTNESS Light is a crucial element in orchid growing. But the levels must be right for your plants. Cattleyas, dendrobiums and cymbidiums thrive in light that would burn up your phalaenopsis, masdevallias and miltoniopsis. Light levels change drastically this month and you must strive to provide the proper lighting so plants can grow optimally. Too much of this good thing can be detrimental, even lethal. In most orchid leaves, you are looking for a light grassy green color. Dark green leaves indicate the plant is in too much shade, while yellow or even red-tinted leaves usually indicate excessive light

SHADY LADIES It is imperative that you re-evaluate your light and shade situation this month. Greenhouses may need additional shade cloth or to be painted with shading compound. Adjustments must also be made on windowsills. As the sun rises higher each day, even plants in southern exposures may lack for direct sun as the sun's angle is suddenly above your house and not shining directly inside anymore. Monitor this light and move plants according to their needs to provide them with optimal conditions. Many growers begin moving plants outdoors this month (make sure night temperatures are warm enough). Do this carefully and, if possible, in stages. Even if your plants demand full sun, if they have been in a shady greenhouse or lightroom all winter, direct sun will be a shock to them. For best results, acclimate them gradually to higher light over a couple of weeks.

GLEN BARFIELD

Cattleya purpurata (Delicata) 'Shogun's Grace' CCM/AOS grown by Matthias Seelis, Shogun Orchids. *Cattleya purpurata*, in its many color forms, are fabulous additions to the May–June season. When exhibited, the magnificent specimen carried 35 immaculate flowers over 6 inches (16 cm) across on six inflorescences. And, *C. purpurata* is fragrant too!

"POTTERING" AROUND As much as you might want to go play in the delightful weather, you owe it to your orchids to spend a few hours each week repotting. The longer days and increased light levels have generated spurts of new growth on most orchids, and you want to repot orchids with new roots while they are still forming. If the timing is right, you can eliminate any repotting stress by transferring orchids to new media while the roots are just emerging. This requires careful observation. Look at your plants every day because lots of changes are occurring. It is your degree of engagement this month that will determine how well your orchids grow this year. Do not miss the opportunities that May provides.

WE HAVE NEEDS New growth on your orchids this month will also require stepped-up watering and fertilizing. This is truly the start of the summer growing season. A balanced fertilizer that does not rely on urea for its nitrogen content is advisable for your epiphytic orchids. It is tempting to overfertilize this month because things seem to be growing so quickly and earnestly. Do not fall into this trap. Excessive fertilizing now will produce large, soft, unsustainable growths that will be susceptible to rotting and other pathogenic problems. Stick to half-strength or even quarter-strength fertilizer applied at more frequent intervals to keep your orchids growing at the proper pace.

GET OUT THERE Even with all the work you have to do, this is the prime month for finding wild native orchids across North America and much of the Northern Hemisphere. Most bear short-lived flowers and must be caught at the right time. You are missing out if you do not at least try to find some of our lovely native species.

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

Vandaceous Orchids

Supplement to volume 90, Orchids magazine

As in the past, our annual supplement is largely underwritten by donations from our members. Even a small donation enables us to continue producing these in-depth special issues on specific groups of orchids.

Please consider making a donation.

American Orchid Society

vist us at www.aos.org

The Orchid Collection of the

Text and photographs by Arthur E. Chadwick

PUBLIC GARDENS ACROSS the country are trying their best to accommodate visitors who have been cooped up at home for months and want to experience a little freedom. Admission rules have tightened and reserved entrance times, mask requirements and social distancing are now the norm. Still, there is much to see, and orchids are leading the way.

The Denver Botanic Gardens has an innovative layout that allows attendees to peer into their fully stocked production greenhouses through the glass end walls and see the action. Six structures are open for viewing and, inside, workers can be seen potting, grooming, and watering a wide range of tropicals from pitcher plants and bromeliads to anthuriums and bananas. Of course, the orchids steal the show.

The garden was opened in 1966 with a single greenhouse and a modest number of donated orchids. Today, the permanent orchid collection approaches 2,500 plants and is supplemented with extras for special events.

Hobbyists are immediately taken by the extremely broad diversity of orchids being represented, with several hundred different genera in cultivation. Lesser-known types such as catasetums, coelogynes, draculas, gongoras, lycastes, masdevalias, maxillarias, renantheras, sarcochilus, schomburgkias, and sobralias can all be found and mostly in abundance. The plants are generously labeled with their complete botanical names and the public can access the entire living collection database to view individual pictures and blooming times.

It would take a master grower to keep up with the nuances of each orchid, and Nick Snakenberg, Curator of Tropical Collections and Associate Director of Horticulture, is up to the task. “Many of the early plants in the collection were donations from local orchid enthusiasts — several of whom had a strong interest in orchids from Mexico and Central America. Those early plants were mostly *Encyclia* and *Prosthechea* species and are still in the collection today.” Snakenburg has been tending to the epiphytes for 20 years.

As the greenhouse plants begin to bloom, they are rotated into a display house adjacent to the conservatory. Here,

1

2

Denver Botanic Gardens

they are nestled in and around a waterfall and stream in a naturalized setting. Guests can view these plants up close and take pictures. The conservatory itself has massive palm trees and greenery, but just a few resident orchids such as *Oncidium sphacelatum* and *Guarianthe bowringiana.*

Hobbyists will notice not only the diversity of the orchids but also the size of the plants. These are not the shy first-bloomers found in floral shops and nurseries, but rather sizable specimens boasting 10 or 20 pseudobulbs and multiple inflorescences. It takes years or even decades to develop good specimen plants. "I like to dispel the myth that all orchids fit on coffee tables," says Snakenberg.

A fascinating aspect of the collection is that about a quarter of the plants are mounted rather than being grown in containers. This technique involves fastening the pseudobulbs to pieces of wood which more closely approximates how orchids actually exist in nature — with their roots interwoven on tree bark. Growers must water these attached orchids every day to compensate for the lack of moisture normally held in potting media, but the public is treated to display plants that are both authentic looking and architecturally pleasing.

The orchid greenhouses are cleverly divided into three temperature zones — cool, intermediate and warm — which allows for growing a wide range of genera. In the wild, orchids live at varying elevations and require exact conditions to perform to their full potential. Thus, cool-growing species such as *Dracula* species are found in the cool house while sultry vandas thrive in the warm house.

The Denver Botanic Gardens is located in the heart of the Mile High City and not far from the airport. It is a year-round treat for orchid lovers with several annual events of particular interest — a grand display in the orangery as well as a local society show and sale. Public interest in plants and flowers has never been higher, and gardens like this make it worth the trip (www.botanicgardens.org).

— Arthur E. Chadwick is president of Chadwick & Son Orchids, which operates 11 greenhouses in Powhatan County, two retail stores in Richmond, Virginia and boards over 13,000 orchids for local clients. He is also a coauthor of The Classic Cattleyas*, now in its second printing, that describes the large-flowered species that make up today's hybrids. Arthur E. Chadwick along with his father, A.A. Chadwick, are regular contributors to Orchids magazine and their next book,* First Ladies and their Cattleyas: A Century of Namesake Orchids*, is due out this fall. (email: art@chadwickorchids.com; Website www.chadwickorchids.com).*

[1] The production greenhouses of the Denver Botanic Gardens are visible to the public who can peer in the glass ends and see the action.

[2] Inside the production greenhouses are a wide range of orchid genera — currently, several hundred in cultivation. The purple cattleya is a rare 1882 hybrid, *Cattleya* Callistoglossa.

[3] Some of the earliest donated plants to the orchid collection occurred in the 1960s and include large specimens of *Encyclia prismatocarpa*, a summer blooming species from Central America.

[4] Nick Snakenburg, Curator of Tropical Collections and Associate Director of Horticulture has been tending to the collection for 20 years. Photograph courtesy of the Denver Botanic Gardens.

A Cast of Thousands

Our Unsung Volunteers

FROM THE MINUTEMAN of our country's birth to today's caring voice on a charity's telephone, the volunteer has been both strength and mainstay of what is best in our culture. Happily, this tradition of service extends to the American Orchid Society and has been its chief asset from the formative days to last weekend's orchid show.

Perhaps the first significant volunteer in the AOS was Thomas Roland of Nahant, Massachusetts. His work in bringing together like-minded orchidists and their collaboration in writing the constitution and bylaws made possible the official organization of the AOS. They were volunteers all.

Their organizational meeting produced another tenet of orchid service that endures to this day. Members thought the best first step for their newly formed society would be to list the orchids found and grown in America. They agreed that the only person who could do this properly was Harvard Professor Oakes Ames, but as a small upstart group they hesitated to make demands on the time of the prominent educator. With some trepidation, they approached Ames and found that he was wholeheartedly in favor of the idea, the work and everything about the undertaking. From that day on, Professor Ames and his wife, talented artist Blanche Ames, gave enormous amounts of time, talent and expertise to the cause of American orchids. Their groundbreaking study, *An Enumeration of the Orchids of the United States and Canada*, was published in 1924.

The Ames's example may have been the first instance of unprecedented voluntary service for the betterment of the Society, but it was certainly not the last. For example, the most amazing community of orchid volunteers is the group known as orchid judges. These gypsies of the orchid show circuit gladly spend years learning their craft. They study constantly to master an evolving discipline. And they journey at their own expense to meetings and exhibits throughout the country, and in some cases far-flung parts of the world, to apply their skills.

Monthly orchid judging began on January 19, 1949, when the first session was held in New York City. But public fascination with orchids grew so rapidly that judging centers in other states soon became necessary. Today, it is doubtful that any other horticultural organization has such a large and dedicated group of experts performing as volunteers. The judging system of the AOS through March 2021 comprises 307 accredited, 46 associate, 76 student, 131 senior and 35 emeritus judges. This relatively small group provides judging services to growers covering all AOS sanctioned shows plus monthly center, supplemental judging and outreach judging sessions. And they do it freely.

GREG ALLIKAS

Behind the judging system, of course, lies the American Orchid Society, which in itself presents an unlimited array of opportunities for orchid service. Read the volunteer page of the monthly magazine — *Orchids* and marvel at the number of talented volunteers willing to give so many hours in orchid service at the national level.

In addition, the total time and effort given freely by thousands of individuals at the regional and local levels is outstanding. The late and legendary Rodney Wilcox Jones of New Rochelle, New York, is a case in point. President of the AOS in the 1940s, Jones and his wife maintained several greenhouses until his death at the age of 107. Jones had clear and specific thoughts on the value of volunteerism toward successful achievement. One year in the 1960s, the Greater New York Orchid Society staged a display of orchids at a Manhattan bank. During the show setup, Jones walked into the display area carrying two orchid plants. A young couple, new to the Society, walked over and asked him if he needed help bringing in more plants. "No," he replied, "I brought only these two plants. If everyone brings two plants," he added," we will have a wonderful display."

Chatting with the couple, Jones explained his reasoning. "If one person contributes too many plants, other people could feel intimidated or unneeded." Not surprisingly, orchid growers of all ages felt comfortable around Jones and were eager to join him in building a better Society.

No one took volunteerism to heart more than Varina Vaughn, a resident of West Palm Beach, Florida, who served as chairperson of the Affiliated Societies Committee. In 1967 at the Fall Trustees' Meeting, Vaughn was talking orchid business with Lois Holmes and her husband, Henry, who was then president of the Wisconsin Orchid Society. "I hear there is a group of orchid growers in Minnesota," Vaughn said. "Do you know anything about them?

"I know one of the members," Henry replied.

Vaughn shook her finger at Henry and admonished him. "Now, Henry, you get them into AOS. And they ought to join Mid-America, too."

On returning home, Henry wrote the Minnesota group and suggested a joint meeting with the Wisconsin Orchid Society.

In August, 1968, members of the Orchid Society of Minnesota joined those of the Wisconsin Orchid Society at a meeting in the Akers Greenhouses near Madison, Wisconsin. Carl Withner, PhD, spoke at the meeting. Impressed, the Minnesotans affiliated with the AOS and joined The Mid-America Orchid Congress as well.

In the last two decades of the 20th century, few growers manifested the spirit of true volunteerism to a greater degree than did Merritt Huntington, who lived in Kensington, Maryland. He held every office in the AOS at least once and served on and chaired most committees. He further served the orchid-growing public as an accredited judge. Anyone who attended an AOS Trustees meeting back then will recall his role at the auction where he auctions off plants and orchid memorabilia for outrageous prices.

Huntington mentored many students in the judging program and encouraged countless growers to become active in the AOS at local and national levels. It was on his recommendation that two AOS presidents received their first committee appointments.

"I look for someone who has a real interest in Society work," he said. "Then I encourage them to come to meetings."

That, after all, is all there is to it.

With Merritt's passing, that mantle was handed off to Alan Koch of Gold Country Orchids. Although auctions do not often bring outrageous prices these days, no one can argue that Alan's auctions are not raucous fun and, like Merritt, Alan has mentored many judges, current and former volunteers, officers and trustees.

Today, the AOS and its Affiliated Societies offer an unlimited array of opportunities for orchid service. Despite the number of persons working on their behalf, jobs remain for all who would take part. How does one start? The answer is too obvious. Volunteer. Whatever needs doing, offer to do it. Pick up the phone or email another volunteer who may be struggling with the demands of a job that can be made lighter by the addition of more hands and minds. If you do not know how to reach someone, any officer, trustee or the staff will be happy to link you up with the appropriate person.

Before you know it, you will find yourself personally involved in activities that will increase your pleasure in your hobby. Through some magic known only to those on the volunteer list, the added enjoyment of orchids always comes first to those who create it.

OUR ACTIVE JUDGING PERSONNEL

The list below is a complete listing of the judges active in the AOS system as of the spring 2021 Members' Meeting, their affiliated center and their judging status. Without this dedicated group of volunteers there would be no judging system.

Alamo Center
Center Chair: Alison Gallaway
Center Vice-Chair: Jeanne Buchanan
Eric C. Shepherd (accredited)
Stephen Van Kampen-Lewis (accredited)
Sallie Delahoussaye (senior)
Robert Webster (emeritus)
Cecily Maciejeski (associate)

Atlanta Center
Center Chair: Doug Hartong
Center Vice-Chair: David Mellard, PhD
Carson Barnes (accredited)
Barbara Barnett (accredited)
Helen (H.B.) Blythe-Hart (accredited)
Patricia B. Cleveland (accredited)
Barney H. Garrison (accredited)
David R. Janvrin (accredited)
Francis J. Lewandowski (accredited)
Myron Palmer (accredited)
Cynthia F. van der Wiele, Ph.D. (accredited)
Charles G. Wilson (accredited)
Susan M. Wilson (accredited)
Peter R. Furniss (emeritus)
Aileen K. Garrison (emeritus)
D. Lowell Jacks (emeritus)
Ray Bullard (senior)
Gail Furniss (senior)
Thomas R. Harper (senior)
Chesley R. Lyon (senior)
Margaret P. Lyon (senior)
Cathy C. Meincer (senior)
William P. Meincer (senior)
Mary A. Roberts (senior)
Michael Sinn (senior)
Robert E. Stanton (senior)
Bailey Santwire (student)

California-Sierra Nevada Center
Center Chair: Susan Wedegaertner
Center Vice-Chair: Tom Pickford
Cecil Bullard (accredited)
Ramon de los Santos (accredited)
Kevin Hill (accredited)
Carol Klonowski (accredited)
Nancy McClellan (accredited)
Bill Sanders (accredited)
Dave Sorokowsky (accredited)
Dennis Wade (accredited
Alan Koch (emeritus)
George Vasquez (emeritus)
Kathy Barrett (senior)
Richard F. Buchter (senior)
Nick Burnett (senior)
Dennis Olivas (senior)
Jose Rodriguez (senior)
Charles Sims (senior)
Robert Terry (senior)
Denise Lucero (associate)
Lynne Murrell (associate)
Tyler Albrecht (student)
Marsha Henry (student)
Jeff Trimble (student)

Carolinas Center
Center Chair: Sarah Patterson
Center Vice-Chair: Tom Wise
Steve Arthur (accredited)
T. Anthony Curtis (accredited)
James Curtis (accredited)
Stan Hutto (accredited)
Roderick R. Jones (accredited)
Shan Nasser (accredited)
Linda Thorne (accredited)
Linda T. Wilhelm (accredited)
Harry A. Gallis, MD (emeritus)
James Harris, Ph.D. (senior)
Jannette Harris (senior)
Joy Lemieux (senior)
Robin B. Mentha (senior)
Donna M. Ullian (senior)
Marc Burchette (associate)
Jason Harpster (associate)
Will Bottoms (student)
Sharon Chaplinsky (student)
Robert Hydzik (student)
Arielle Jones (student)

Chicago Center
Center Chair: Lois Cinert
Center Vice-Chair: Nile Dusdieker
Kathy Creger (accredited)
Cheryl Erins (accredited)
Steven Gonzalez-Costa (accredited)
Lorraine Heyden (accredited)
Arnold Klehm (accredited)
Brian Lang (accredited)
Alexander Manuel (accredited)
Bil Nelson (accredited)
Leroy Peterson (accredited)
Dr. William Rogerson (accredited)
Larry Sexton (accredited)
James F. Spatzek (accredited)
Anthony Nuccio (senior)
Andrew Coghill-Behrends (associate)
James Vlasic (student)

Cincinnati Center
Center Chair: Glenn Evans
Center Vice-Chair: Jordan Hawley
Stephen Benjamin (accredited)
Timothy Brooks (accredited)
Rebecca Dandekar (accredited)
Ann DePrez (accredited)
Jim France (accredited)
Teresa Huesman (accredited)
Barry Jones (accredited)
Hideka Kobayashi (accredited)
Michele Little (accredited)
Kristen Mason (accredited)
Kenneth Mettler (accredited)
Erich Michel (accredited)
Judy Neagle (accredited)
Alexa Noel (accredited)
Brian Spitler (accredited)
Russell Vernon (accredited)
Janice Yates (accredited)
Clarence C. Cardwell (senior)
Stephen Helbling (senior)
Francoise May (senior)
Lawrence Sanford (senior)
Ronald Williams (senior)

Dallas Center
Center Chair: Judith Anne H. Cook, MD
Center Vice-Chair: Linda Horton
Manuel Aybar (accredited)
Daniel Callahan (accredited)
Barbara McNamee (accredited)
Meir Moses (accredited)
Emily J. Quinn (accredited)
Jim Williams (accredited)
Jerry Brandenburg (emeritus)
Ronnie Brandenburg (emeritus)
Lee Gundlach, Ph.D. (senior)
Clair R. Ossian. Ph.D. (senior)
Tim Carr (associate)
James Diffily (associate)
Karl Varian (associate)
Vee Du (student)
Connie Koehler (student)
Cesar Uchima (student)

Florida-Caribbean Center
Center Chair: Jim Davison
Center Vice-Chair: Jill Sidran, Ph.D.
Armando Betancourt (accredited)
Thad Bielecki (accredited)
Melana Davison (accredited)
Jose Exposito (accredited)
Richard Fulford (accredited)
Claude Hamilton (accredited)
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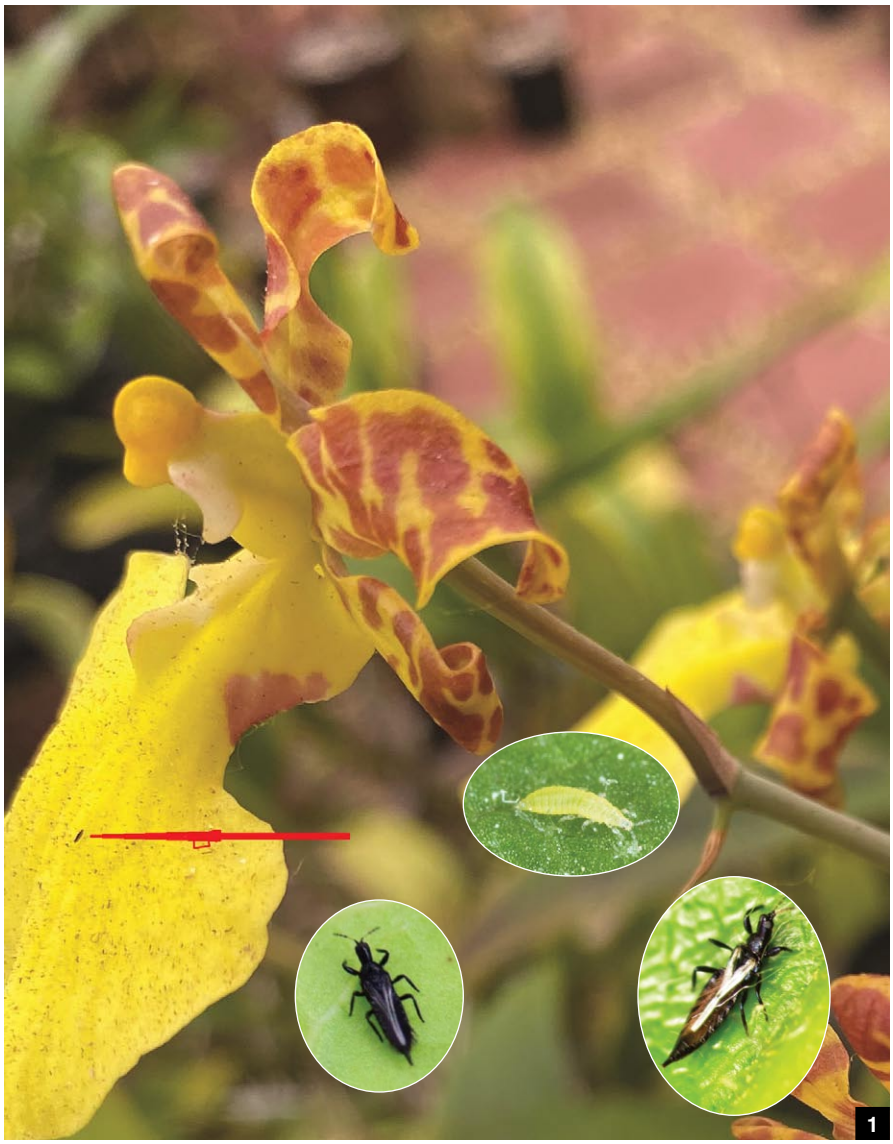
This seems to be the year for questions about thrips. These usually come in the form of "My buds did not open. Why?" or "What happened to the leaves on my plant?" or even "Is this virus?" Thrips (like sheep, one thrips or many thrips) are minute slender insects with fringed wings and oddly shaped mouthparts that pierce plant tissues and suck out the contents. How tiny are they? Most species are less than 0.04 inches (1 mm) long. For perspective, all those little dark flecks on the *Trichocentrum* lip in Figure 1 are dead thrips in various stages of their life cycle. Thrips, like many insects, have preferred hosts, damaging those preferentially, so depending on the diversity of your collection and the severity of the infestation, you may see issues with only a few plants or more widespread. Thrips attack all parts of the plant from roots to leaves to flowers so the damage they create can go more or less unnoticed before you realize the problem. Included on these pages is a "rogue's gallery" of examples of thrips damage on several different genera. The pictures on these pages are examples of damage thrips do. The red cattleya in Figure 2 illustrates the most often observed damage — bleaching of the color around the outside edges (red arrows). Because they are so tiny, they can actually work their way into developing buds and do enough damage from the inside out that the buds never open or open with varying amounts of crippling; the *Phal*. *schilleriana* in Figure 3 is an example (red arrows). Some of this damage was visible as the buds first opened and the thrips went on to destroy not only the open flowers but almost all unopened buds.

Not all that looks like it should be virus damage is virus damage. Figures 4 and 5 show damage that one might swear the result of virus and neither plant is virus. *The Cattlianthe* in [4] opened its first flowers prior to efforts to control the thrips and the inset photograph is a flower on the same inflorescence opened after treatment. On the other hand, the *Guarianthe* in [5] open nearly perfect flowers and the damage appeared over about a week, much like those of the red cattleya.

What about foliage? Is all that damage to those coelogyne leaves in Figure 6 a fungal problem? Not directly.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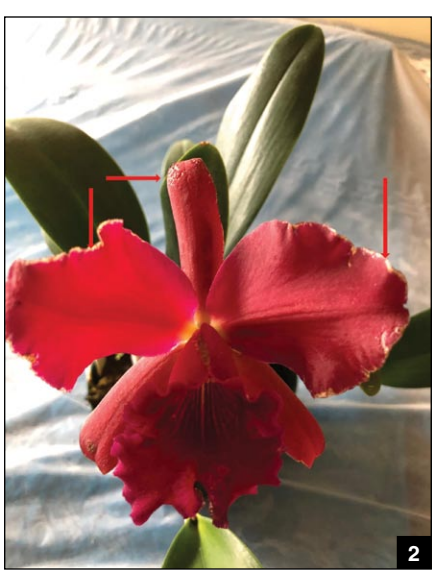
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These questions were part of one or more recent monthly webinar Q&As and compiled by Larry Sexton for inclusion here. Each month, a Q&A webinar is held during the first two weeks of the month. To view recorded Greenhouse Chats (Q&A webinars) or register for a future one, see https://www. aos.org/orchids/webinars.aspx. Send questions to greenhousechat@aos.org — *Ron McHatton, AOS Chief Education and Science Officer.*

After flowers, come the thin leaves of many orchid species. The damage often looks like mite damage and the only definitive way to tell the difference is to either find mites or thrips. In this case, it was thrips that damaged the foliage surface followed by collapse and death of the damaged tissue. Eventually, if the thrips population gets high enough, they will damage even the foliage of cattleyas, often causing the death of a very narrow strip of tissue down the edges of the leaves.Thrips prefer flowers first, but their next favorite thing is thin leaved foliage. They will also go after harder leaf orchids such as Cattleyas.

Lastly, thrips will also attack exposed roots, especially those of vandaceous orchids causing the formation of annual constricted rings of brown tissue much like those noted in Figure 7. Here it's the tender new root tip that is damaged, dies back (the dark ring) and when the next growth cycle comes along, the root starts growing again from the damaged tip only to be once again damage forming another ring.

As for other minor insect infestations, thrips can be controlled with horticultural soaps, oils, Neem and even rubbing alcohol. Make sure you get all surfaces covered, as mature thrips have wings and, although not good flyers they are good enough to get to any missed surface and wait until the event passes.

Once the infestation gets bad enough, it becomes very difficult to get rid of them without using pesticides.

If you think you have a thrips problem, I suggest you review the Pest Management webinar on our website (www.aos.org/orchids/webinars.aspx) for proper treatment. **What follows is my personal treatment regime and not a recommendation from the AOS.**

I use, in rotation, three pesticides with different modes of action starting with acephate 97% (Orthene) granular material not the liquid concentrate at 2 tsp/gallon with a bit of spreader-sticker to increase wetting efficiency. Water first, then apply pesticide making sure all surfaces are covered AND potting mix. Repeat in a week. Note that the smell of acephate is really potent and plant damage has been reported at high temperatures and bright light. I apply pesticides only in the late afternoon after the heat of the day has subsided.

About a week after the second acephate application, I treat with an imidacloprid product. Imidacloprid is most efficiently taken up by the roots so getting good root coverage is even more important than foliage. Once again, treatment is only done after the heat of the day has passed. This first application is followed a week later by a second application.

About a week following the second imidacloprid application, the collection is treated using a third pesticide such as bifenthrin or an insect growth regulator listed for thrips. Growth regulators are expensive but they are very effective and many of them are not harmful to beneficial insects. If using an insect growth regulator the best control is two treatments at 5 day intervals because the regulator is only effective on specific growth stages. Otherwise the second treatment follows a week after the first.

And lastly, a word of caution about pesticides. Orthene (acephate), imidacloprid and other non-growth regulating chemicals are indiscriminant killers — they kill both beneficial insects such as bees and butterflies as well as the bad actors. That is not usually a problem in an enclosed greenhouse or shadehouse but is a concern used in the open.


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[1] *Trichocentrum splendidum* flower covered in dead and dying thrips. Red arrow indicates an adult thrip for perspective. Inset photographs courtesy of ProMix Corp.

[2] Note the bleached tissue around the edges of this flower.

[3] Thrips can enter developing buds and destroy the flower from the inside out. They can often be a cause of premature bud drop.

[4] One might swear this *Laeliocatanthe* is virused but the inset photograph shows a flower that opened after treatment and the plant tests free of virus.

[5] These flowers opened perfectly, only to be ruined over about a week and a half by thrips.

[6] At first glance, the damage thrips can cause to the foliage of some orchids looks like that caused by mites and the only definitive way to separate them is actually find the creature.

[7] Thrips can attack roots as well. In vandaceous orchids, they cause annular brown rings like those identified by red arrows.

GENUS OF THE MONTH

Disa

by Thomas Mirenda

Wisdom, Pride and Legend

SPRING AND SUMMER in South Africa must be heaven for anyone who enjoys beautiful flowers. With myriad brilliantly colored bulbous beauties in such famous cultivated genera as *Gladiolus*, *Babiana* and *Lachenalia*, orchids from South Africa seem far less appreciated, barely known and not nearly cultivated enough. Thought to be comprised of at least 175 species, *Disa* is a large and diverse genus of terrestrial orchids, mostly from South Africa but with species occurring as far north as Tanzania and east into Madagascar.

Karl Heinrich Bergius named the genus for Disa, a heroine of a Swedish folk tale. The god-king at that legendary time, Freyr, had decreed that because of a famine, the elderly and infirm members of the population should be sacrificed to the gods. Thinking this excessively cruel, Disa, daughter of a provincial chieftain, in her wisdom, came up with other solutions to the crisis. But the king did not want to hear of it and made it difficult for her to present her solutions. She had to visit him, but in order to test her cleverness, Freyr forbade her to come by foot, by horse, wagon or boat. She was forbidden to be dressed or undressed. The visit was not to take place within a year or within a month, during daytime or nighttime, nor when the moon was waxing or waning. Proving her sly wisdom, she harnessed two youths to a sled alongside a goat and she rode straddling them. She wore a net instead of clothes, and she arrived at dusk the third day before Yule, a day not counted to the year but considered an additional day between two years. I dare say she and her coterie were quite a sight. The netlike pattern on the dorsal sepal of *Disa uniflora* reminded Thunberg of this legend and so he named the genus in her honor.

Yes, that is correct; I said dorsal sepal. Although many look at disas and see what they think are nonresupinate flowers, in most species, it is actually the sepals rather than the petals that are showy.

The petals and lip in disas are often small and almost vestigial, and the lip, however inconsequential, points downward like other resupinate orchids. The most famous species, *D. uniflora*, also known as the pride of Table Mountain, has been cultivated, line bred and hybridized for many years with several color forms in brilliant reds, oranges, pinks and, more rarely, yellow. These plants make long-lasting flowers and are easily grown if their basic requirements are considered. *Disa uniflora* grows streamside, often in live sphagnum moss and, therefore, thrives in moist but fresh conditions similar to those in which you would grow phragmipediums. The difference is that disas are much more sensitive to dissolved impurities and additives in municipal water, with chlorine and especially fluoride being particularly toxic and deadly.

Unlike many terrestrial and epiphytic orchid species, which disperse their seeds though the air, riparian species such as these disas spread their seeds through the water. Disa seed is somewhat larger than normal dustlike orchid seeds that must be germinated in a flask or lab. These can be sown directly on fresh live sphagnum moss and germinate in about a month.


ROSS LEACH


WALTER ORCHARD

[1] One of the prettiest, *Disa crassicornis*, is unfortunately rare in cultivation. Seeds are occasionally available from South African nurseries but unless freshly collected, are unlikely to be viable. Photograph by Steve Johnson.

[2] *Disa uniflora* 'Samantha' AM/AOS grown by Walter Orchard is a spectacular representative of the bright red color forms of this species.

[3] This coveted xanthic form of *D. uniflora* is rare in the wild. These, unfortunately, do not grow as strongly as the typical red form.

Two provisos here are that seed must be extremely fresh because they are only viable for a short period after harvesting and care must be taken that the living sphagnum does not overtake and smother the tiny, slow-growing seedlings.

Although *D. uniflora* is certainly the most famous and widely cultivated species in the genus, there are many other superb species to try. *Disa crassicornis* has delicious pink blossoms, often with dark purple or magenta blotches. Although smaller, *Disa glandulosa* has gorgeous colors and blooms over a long period. There are also many oddities in this diverse genus, including *Disa lugens* with its extraordinary fringed lip and the supposedly sexually deceptive species, *Disa atricapilla*, which is visited only by male wasps. Indeed these colors and shapes indicate that disas, unlike many other genera, have an array of pollinators, many with unusual strategics. The fascinating work of South African orchid ecologist Steve Johnson, PhD, at the University of KwaZulu-Natal in Pietermaritzburg, has uncovered many of these bizarre relationships. *Disa harveyana*, for example, is pale in color and has a nectar spur similar to many moth-pollinated flowers, but it and its relatives in the *Disa draconis* complex use various long- and short-tongued flies as pollinators with the spurs varying in length along with the size of the fly's proboscis. *Disa uniflora*, despite being so showy, offers nectar to its insect partner, the mountain pride butterfly (*Aeropetes tulhaghia*), whereas many other similar species such as *Disa racemosa*, *Disa tripetaloides* and others with bright colors deceive and offer no reward. These butterflies will approach anything red, including backpacks and T-shirts, which would explain the rarity of yellow-flowered *D. uniflora* plants in the wild.

Many growers I have known over the years have jumped through some extraordinary hoops to grow these plants. Because the plants come from the cool-climate of the Western Cape of South Africa and need excellent quality water, cultivating disas creates some daunting challenges for growers in a hot summer climate. My good friend Jim Pluskota maintained a bench full of these beauties for many years in greenhouse space he rented in New York. I marveled at how he could keep them so well in greenhouses that got well into the 90s F (35 C) during the summer. But he had an ingenious system. First, he would collect rainwater, store and refrigerate it in a special cooler to about 40 F (4 C). Second, at midday,


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ROBERTA A. STILLMAN


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WALTER ORCHARD


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WALTER ORCHARD


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STEVE JOHNSON

[4] Because disas die back each autumn, and the extant tubers are usually divided into individual plants, large specimens with multiple growths, such as this magnificent *D. uniflora* 'Hyun Sook' CCM/AOS, are the exception and not the rule.

[5] The lips of most *Disa* species are small and seemingly inconsequential, but *Disa lugens* has one of the most elaborate lips in all of the Orchidaceae.

[6] *Disa tripetaloides* has an extensive natural range. It is found along streams in the coastal mountains of Cape Town and eastward for several hundred miles. Highly floriferous, its small flowers often bear attractive dark spots on their dorsal sepals.

[7] *Disa aurata* is very similar to *D. tripetaloides* and was formerly included in that species. It differs in its bright yellow coloring and longer lateral sepals.

when the greenhouse was hottest, he set a pump on a timer to fill the hydroponic tray on which his plants were growing with this cooled, pure water. It seemed to work magically and required a minimum of care and dilute amounts of fertilizer. Although this is certainly not the only way to grow disas, it gives those of us willing to try them some idea of what is needed to be successful.

Even though the disas discussed here are considered evergreen, they die back after they bloom. (In addition, there are some completely deciduous species, but these are not in general cultivation.) When the plants die back, in autumn, they have usually produced one or more new tubers that will grow into next year's flowering plants. It is important to repot them annually and discard last year's spent tuber and any attached growth, even if it seems to be partially green. While many growers in South Africa use a coarse sandy or gravelly mix to repot their disas, sphagnum mixed with some perlite has been used with great success. Oregon-based orchid grower Walter Orchard uses perlite and Supersphag, a product from New Zealand, which consists of sphagnum fines. The ratio of perlite to Supersphag is usually about 1:1 by volume (after the compressed Supersphag has been wetted and (fluffed). The most important things to remember are to use good-quality water, cool the root systems and provide fresh water daily. While they can do well in standing water, rather than the running water in their natural habitat, near waterfalls and the sides of streams, it must be drained and changed frequently to avoid pathogens and causing the sphagnum moss to become waterlogged. Bright but diffused light is appropriate and while they can handle some heat in summer if there is sufficient airflow around them, they do better when kept below 80 F (27 C). They can go well into the 50s F (13 C) or even 40s F (7 C) at night.

Disas can be expensive to buy as adult plants, though a few specialty growers carry them. Probably the best way to acquire them would seem to be to grow them from seed. Inquire with your orchid society to see if anyone in your area is growing these spectacular beauties and see if fresh seed is available from them in season. There are also some mail-order sources for the seed, but I stress again that their viability is short. Fresh seed is an absolute must. Good luck exploring disas.

STEVE JOHNSON

[8] The dark colors and sinuous shapes of *Disa atricapilla*, an unusual species, are mimicking a female wasp. Only male wasps are known to visit these flowers in the wild, offering yet another example of sexual deception in orchids.

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

Sylvia Strigari

Diplocaulobium lageniforme

Text by Isler F. Chinchilla and Franco Pupulin/Watercolor by Sylvia Strigari

Tribe Epidendreae
Sutribe Malaxideae
Genus Diplocaulobium *(Rchb. f.) Kraenzl.*

Diplocaulobium lageniforme (J.J.Sm.) Kraenzl., *Pflanzenr.* 340. 1910. Basionym: *Dendrobium lageniforme* J.J. Sm., *Icon. Bogor*. 1:86 t. 116 B. 1903. TYPE: [Western New Guinea. Papua:] Hab. Niederl. Neu Guinea, am Sungei Maroka [April 1901], *Jaheri s.n.* (holotype: BO; isotypes: AMES-21504/00090129; U-1460580).

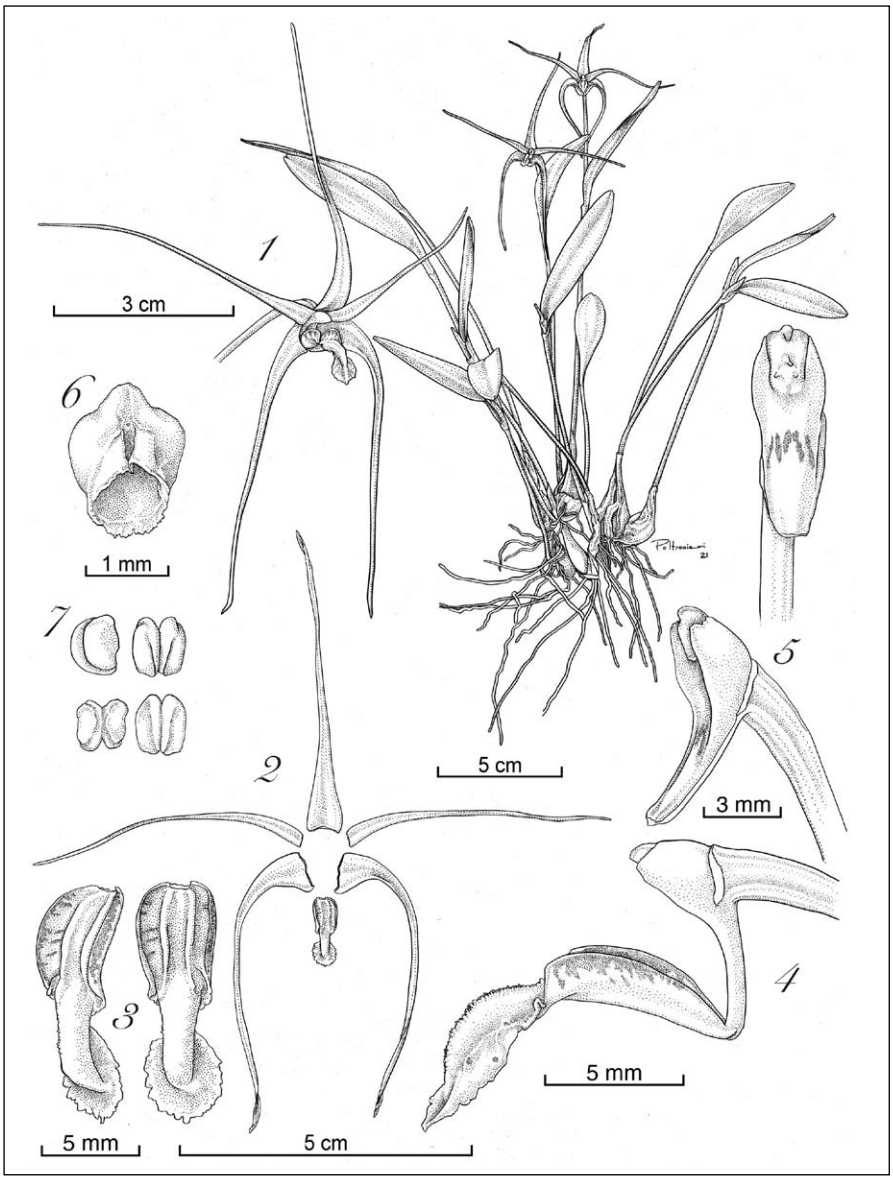
Epiphytic, caespitose, erect *plant*, up to 24 cm tall. *Roots* slender, flexuous, ca. 9 cm long, 1 mm in diameter. *Pseudobulbs* obclavate, heteroblastic 5.5–14.0 cm long, with the thickened, conical to ovoid, green- to lime-colored, smooth, fleshy base 1.0–2.5 × 0.5– 1.5 cm, tapering into an erect, elongated, thin, terete stem, the base of pseudobulbs covered with 1–2 brown, lanceolate, acute, papyraceous cataphylls 2.0–4.0 × 0.7–1.4 cm, shedding as the pseudobulb matures. *Leaves* 1, articulate from the apex of the pseudobulb, erect, coriaceous, elliptical to lanceolate or oblanceolate, obtuse, emarginate, 3.5–7.5 × 1.0–2.3 cm. *Inflorescence* terminal, one-flowered, arising from a compressed, conical, papyraceous spathe 10–17 mm long at apex of pseudobulb; peduncle abbreviated. *Floral bracts* much shorter than the ovary, triangular, acute, ca. 3 mm long. *Pedicel* plus *ovary* erect, arcuate, clavate, terete, yellowish white, 3.5–5.0 cm long. *Flowers* spreading, resupinate, fragrant, ephemeral, the sepals and petals white, yellowish above the middle, the lip white, with margins and transversal stripes purple at the lateral lobes, callus and column yellowish white, the column foot whitish with purple stripes below the middle, the anther cap yellow and the pollinia chrome yellow-colored. *Dorsal sepal* triangular, long caudate, erect, arcuate, recurved, 5.2 × 0.6 cm, 3-veined. *Lateral sepals* free, triangular, long caudate, pendulous, deeply recurved, 5.2 × 0.7 cm, 3-veined. *Petals* narrowly triangular, long caudate, suberect, arcuate, recurved, sometimes slightly incurved near apex, 4.8 × 0.3 cm, 1-veined. *Lip* mobile, attached to the apex of the column foot, trilobed, pandurate, fleshy, papillose, porrect, arcuate, 13.5 × 5 mm; lateral lobes erect, semielliptic, rounded, margins entire, incurved, 2.0 × 6.5 mm; midlobe recurved, subgeniculate, spatulate, rounded (apically sucker-shaped in natural position), with an obtuse, convex, arcuate, densely glandular-papillose central callus 6.0 × 1.6 mm × 1.3 tall, the sinuous to denticulate margins flattened to slightly recurved, 7 × 4 mm; disc with single inconspicuous central keel apically attenuated, and two lateral keels extending to the base of the midlobe, parallel, straight between the lateral lobes, becoming apically sinuous, divergent and attenuated on the midlobe; mentum short, chin-shaped. *Column* short, stout, subovoid, obtuse, dorsiventrally complanate, canaliculate, apically provided with two small, acute, incurved teeth, 3.2 × 2.7 mm, extended at the base into a long foot 5.0 × 2.2 mm. *Anther cap* cucullate, obovate, truncate, obtuse, bilocular, 1.7 × 1.3 mm. *Pollinia* four in two semiorbicular, dorsiventrally complanate hemipollinaria, 0.6–0.7 mm long.

The genus *Diplocaulobium* (J.J. Sm.) Kraenzl (now included in *Dendrobium* Sw.). was created in 1910 by the German botanist and orchid taxonomist, Friedrich Wilhelm Ludwig Kränzlin (1847–1934), to segregate 28 species previously classified in *Dendrobium* section *Diplocaulobium* Rchb. f. by his compatriot, the great professor, botanist and taxonomist, Heinrich Gustav Reichenbach (1824–1889), who was one of the greatest orchidologists of all time (Kränzlin 1910). The generic name derives from the Greek *diplo*, double, *kaulos*, stalk, and *bios*, life, referring to the dimorphic pseudobulbs, thickened at the base and apically stalk-shaped, and the epiphytic habit typical of the genus. Indigenous people from eastern New Guinea have used different *Diplocaulobium* species to treat infected wounds (Teoh 2019).

The long, fibrous stems of some *Diplocaulobium* species usually turn yellow when dried. Due to its fibrousness and beauty, the strips of the stem have been used for weaving or decoration. For example, indigenous people from Papua New Guinea and the Moluccas Islands, used the dried stems of *Diplocaulobium* to weave belts, girdles and bracelets, and plants are often grown in villages. In Bougainville Island and the Solomon Islands, the dried stems of *Diplocaulobium solomonense* Carr are braided into amulets (Pridgeon et al. 2014, under *Dendrobium* sect. *Diplocaulobium*). Plants of *Diplocaulobium* are sometimes grown commercially, mainly in orchid collections. In cultivation, they usually require warm and wet conditions throughout the year, and a well-draining substrate (Pridgeon et al. 2014). No information was found on the phytochemical composition for *Diplocaulobium*, but because it is genetically closely related to (and now included in) *Dendrobium* Sw., it could have compounds similar to those documented in several *Dendrobium* species, such as alkaloids, bibenzyl, fluorenones, phenanthrenes and sesquiterpenes. Similarly, mycorrhizal fungi of genus *Epulorhiza* R.T. Moore (Tulasnellaceae) were identified in mature roots of two species of *Dendrobium*, so *Diplocaulobium* could have mycorrhizal fungi belonging to the same family or genus. This should be evaluated in future research.

Proposals for the systematic classification of *Diplocaulobium* date from 1910, and DNA-based phylogenetic studies from the early 1990s. However, to date, there is not solid correspondence between morphological and molecular studies. Because the different authors have not agreed on the circumscription of the genus, they have placed it as an infrageneric section of *Dendrobium* (*Den*. sect. *Diplocaulobium*) (e.g. Schuiteman 2011; Pridgeon et al. 2014), a still poorly understood "super genus," which in its very broad traditional classification seems an artificial group. However, *Diplocaulobium* is a morphologically well-defined genus and the DNA sequences of the sampled species support its generic monophyly (Dressler 1993; Clements 2006; Takamiya et al. 2014). *Diplocaulobium* is geographically bounded around Malaysia, Australia, New Caledonia, and Samoa and Fiji. The relationships between and within this genus, along with *Dendrobium* and its sections or segregated genera require further investigation.

Diplocaulobium includes epiphytic plants with monophyllous, dimorphic, heteroblastic pseudobulbs, which are thickened at the base and stalk-shaped apically, terminal, one-flowered inflorescence, arising from a spathe at the apex of the pseudobulb, short-lived and often very ephemeral flowers, with the lip trilobed, and the disc with one



Diplocaulobium lageniforme. The plant.
1. Flower.
2. Dissected perianth.
3. Lip, enlargedm (three quartres and abaxial views).
4. Column and lip, lateral view.
5. Column, ventral view and 3/4 views.
6. Anther cap.
7. Pollinarium in several views.

All drawn from *JBL-28227* by Sara Poltronieri.

inconspicuous central keel and two lateral keels, parallel and straight between the lateral lobes, which extend to the base of the midlobe. *Diplocaulobium* can be distinguished from *Dendrobium* and related taxa by the inflorescence arising from a spathe at the apex of pseudobulb (not present in *Dendrobium*). It comprises more than 100 species, which have been recorded from Peninsular Malaysia, Singapore, Sumatra, Borneo, Sulawesi, Moluccas, New Guinea, Philippines, Australia, Solomon Islands, New Caledonia, Fiji and Samoa and Caroline Islands. Plants of *Dendrobium* are found in lowland to montane forests, below 2,000 m elevation. The center of diversity of the genus is in New Guinea, with more than 80 recorded species (Kränzlin 1910; Millar 1978; Clements 2006; Pridgeon et al. 2014; de Vogel et al. 2021: treated as *Den*. sect. *Diplocaulobium*).

Diplocaulobium lageniforme was created by Kränzlin (1910) by transferring *Dendrobium lageniforme* J.J. Sm. to the genus *Diplocaulobium*, in the same monograph that described this genus. *Dendrobium lageniforme* was described by the great Dutch botanist Johannes Jacobus Smith (1867–1947), who derived the name from the Latin *lagena*, a big earthen jar with handles or bottle with a narrow neck, and *forma*, form (Smith 1903), probably referring to the column with a slender foot and the arched lip that seems the handle of a jar. The type specimen of *Den*. *lageniforme* was collected in the Merauke (or Maro) River basin, Papua New Guinea (then under Dutch domain, currently belonging to Indonesia), during the botanical expedition to the Dutch South New Guinea, Thursday Island, Tanimbar and Ambon, lead by Jaheri (1857–1926). Jaheri was an Indonesian botanical assistant and collector at the Buitenzorg Botanical Garden Herbarium (now Bogor Botanical Gardens), who performed numerous expeditions to the Malay Archipelago. Botanical collections in Western New Guinea began as early as 1770, when Sir Joseph Banks accompanied Captain James Cook during the first voyage around the world and collected 30 plants along the coast of southwestern New Guinea. However, until 1850 biological exploration in New Guinea was occasional, and it was not until 1872 that the great Italian naturalist Odoardo Beccari organized the first major botanical collection in western New Guinea. The reign of Queen Wilhelmina (1880–1962), marked the beginning of numerous scientific expeditions, mostly financed by the Dutch government, which significantly exceeded the number of German expeditions in northeastern German New Guinea. These explorations lasted to 1939 when the Second World War began and were then resumed in the 1950s.

Diplocaulobium lageniforme is distinguished from other species in the genus by its trilobed, pandurate lip, with erect, rounded, incurved lateral lobes, wider than long, and stained crosswise with wine to purple; the midlobe has a central convex, obtuse, densely glandular-papillose callus and sinuous to denticulate margins, and the disc is provided with two lateral keels, straight and parallel between the lateral lobes, extending to the base of the midlobe. It is endemic to the lowland forests of western New Guinea, in the Merauke Regency (Smith 1903; Kränzlin 1910). The presence of a single, somewhat fragrant, short-lived flower, suggests bees as the most probable pollinators of *Dip*. *lageniforme*. Reports

on melittophily (pollination by bees) have been documented in some species of *Dendrobium*, therefore, it not unexpected that this pollination syndrome also occurs in *Diplocaulobium*.

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Yellow Sticky Traps

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

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

Selected Botanical Terms

acute – pointed
apical – at or from the top
arcuate – arched
articulate – having a clear joint between two separable parts
attenuate – gradually tapered
bilocular – having two chambers
bract – modified or specialized leaf
caespitose – clumped or clumping
canaliculate – grooved
cataphyll – reduced small leaf
caudate – having an extended tail
caudicle – the slender stalklike appendage of pollen masses in orchids
clavate – club-shaped
complanate – held in one plane
concave – curved inward like the inside of a sphere
conical – cone-shaped
convex – shaped like the outside of a sphere
coriaceous – leathery
cucullate – hooded
denticulate – toothed
dorsiventrally – flattended like a leaf blade
elliptic – oval
emarginate – having a notched margin
endemic – occuring only in a particular country or area
entire – smooth
ephemeral – very short lived
epiphyte – a plant that uses another plant as a means of support
flexuous – thin and flexible
geniculate – bent at a sharp angle
hemi – half; often used synonymously with semi-
heteroblastic – significantly and abruptly changing in form
incurved – curved inward
inflorescence – the entire flowering structure including the peduncle and rachis
lanceolate – narrow oval tapering to a point at each end
oblanceolate – broad, rounded apex and tapering base
mentum – spur-like chin
obclavate – inverted club-shaped; widest near the base
oblanceolate – having a broad, rounded apex and tapering base; inverted lance-shaped
obovate – egg-shaped, narrowest basally
obtuse – blunt
orbicular – round, shaped like an orb
ovoid – egg-shaped
pandurate – fiddle-shaped
papillose – with small, nipple-like projections
papyraceous – papery
peduncle – the part of an inflorescence before the rachis or section to which the flowers are attached
porrect – held forward more or less parallel to the column
recurved – curved backward
resupinate – carrying the lip lowermost
semi – half or nearly
sinuous – wavy
spathe – modified leaf, sheathing bract
spatulate –spoon-shaped
sub – somewhat less than; i.e., subsperical would refer to almost but not quite a sphere
sympodial – producing new growths at intervals along a more or less horizontal rhizome
terete - cylindrical or pencil-shaped
trilobed – having three lobes
transverse – across the main axis
truncate – terminated abruptly as if cut off

Cattleya elongata Barb. and Rolfe 1877

Cattleya with the elongated stalk

by Judith Rapacz-Hasler and Spiro Kasomenakis
Photographs, unless otherwise credited, by Spiro Kasomenakis

SYNONYMS *Cattleya alexandrae* Linden and Rolfe 1892, *Cattleya alexandrae* var. *elegans* Rolfe 1892, *Cattleya alexandrae* var. *maculata* auct.1895, *Cattleya alexandrae* var. *rosea* auct. 1895, *Cattleya alexandrae* var. *tenebrosa* Rolfe 1892, *Cattleya nilsonii* Regel 1889

HISTORY *Cattleya elongata* was originally discovered in the province of Minas Gerais in Brazil and described by Barbosa Rodrigues in 1877 in *Genera et Species Orchidearum Novarum*. Subsequently, plants were found by Linden's collectors in Pernambuco far to the north of the original location and exported to Brussels because they thought that they had found an undescribed species. The plants flowered and were subsequently described by Linden and Rolfe in the *Gardeners' Chronicle* as *Cattleya alexandrae* as Rolfe was unaware of Rodrigues' prior publication. Rolfe corrected his misinterpretation in the *Orchid Review* in 1894.

HABITAT *Cattleya elongata* is a rupicolous (rock-dwelling) orchid species that is found in Bahia, Minas Gerais and Pernambuco, Brazil. It is spread throughout the outcrop islands in *campo rupestre* (rupestrian grassland) vegetation of the Chapada Diamantina in the northeastern part of the country. The *campo rupestre* is a discontinuous montane, subtropical ecoregion occurring across three different biomes in Brazil. Originally, *campo rupestre* was used to characterize the montane vegetation of the Espinhaço Mountain Range, but recently this term has been broadly applied by the scientific community to define high-altitudinal, fire-prone areas dominated by grasslands and rocky outcrops.

The Chapada Diamantina National Park lies at the center of Bahia State and forms the northern part of the Espinhaço Mountain Range. Technically this region is considered a part of the caatinga biome, a type of desert vegetation and contains some of its highest elevations, most of it above 1,640 feet (500 m). The vegetation is a product of the physiographic conditions, known as cerrado or tropical savanna, and consists of rocky plains and dry forests, all of which harbor a great deal of biodiversity with a high degree of endemism.

The region is considered to have a mesothermic climate of the Cwb type (subtropical highland or temperate, oceanic with dry winters), according to the Köppen climate classification, published in 1884 (a German botanist and climatologist, first developed this system, basing it on earlier research. According to Köppen, vegetation and climate are intricately linked. The vegetation that grows in a region is dependent on the temperature and precipitation there, which are two key factors of climate). Normally these dry, high-altitude *cerrados* are cooler than the surrounding areas with an average annual temperature under 72 F (22 C). The territory of the Chapada Diamantina runs roughly between the cities of Mucugê to the south and Lençóis in the northeast. This region is named the Serra do Sincorá Ridge, which is also the home of a lovely species, namely, *Cattleya*


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[1] *Cattleya elongata* flowering among shrubs, vellozias and aroids.

[2] Leaves of *Cattleya elongata*. Photograph courtesy of Wikimedia: https:commons.wikimedia.orgwikiCattleya_elongata

[3–4] *Cattleya elongata* grows in exposed locations, often among cacti and xerophytic bromeliads.

(*Laelia) sincorana*.

There are huge canyons with rivers of brownish water and several waterfalls. The trails that crisscross the area were once used by miners in their search for diamonds, for which the area is still famous.

Large colonies of *Cattleya elongata* grow among low vegetation on the rock surface, and among shrubs, cacti, bromeliads, grasses, vellozias, aroids, as well as orchids such as species of *Sobralia*, *Cleistes*, *Epidendrum*, *Maxillaria* and *Thelyschista ghillanyi*, a rare, endemic terrestrial species. An alba form of *C. elongata* has been found in Pernambuco and Minas Gerais and described by Barros and Bat in 2004 (*C. elongata* f. *alba*).

One wonders how this tall plant anchored on naked rocks and fully exposed to the sun can survive this apparently adverse habitat. At first glance one can hardly comprehend how the plant gets water and nutrients to maintain the thick pseudobulbs and fleshy leaves. However, it should be pointed out that the stone is arenitic (medium sandy stone: arenite or arenaceous), not granitic, so it absorbs much more humidity. The roots grow long enough to reach between cracks under the stone and find small deposits of sand and decayed leaves gathered by the rain. Therefore, the hidden source of life is always there!

The plant is a large bifoliate, up to 2 feet (61 cm) tall, warm-to-intermediate growing, lithophytic species growing on bare rock outcroppings at elevations of 2,950–4,920 feet (900–1,500 m) in bright light with narrowly cylindrical pseudobulbs carrying two (sometimes up to four), apical, narrowly elliptic leaves. Plants bloom in the spring (March to May in the Northern Hemisphere) on a terminal, 8–24 inch (20–60 cm) long, two- to 10-flowered inflorescences. The flowers are fragrant, long-lived, heavy-textured and variable in color from white (*alba* form) to intense, deep purple. Withner (1988) describes the species' affinities to *Schomburgkia* (the section now moved to *Laelia*), which include plant habit, elongated stalk and flower structure.

The fragrant flowers are up to 3-1/8 inch across (8 cm) with heavy texture and are a rich coppery rose color with wavy sepals and petals, which gleam like polished satin. There can be as many as 10 or so flowers on the inflorescence. The lip is lighter in color than the petals. The side lobes form a hood over the column while the extended midlobe is bilobed with wavy edges. There is a patch of white


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at the base of the lip with an occasional touch of yellow.

CULTURAL CONSIDERATIONS *Cattleya elongata* should be grown in sunny conditions to flower well. The growing medium must be open (i.e., coarse fir bark or similar), and the plants given ample water and fertilizer when growing. Reduce water when the plant rests after flowering. Drainage is especially important in the cooler months, when the plant is not actively growing. Poor drainage or overwatering while resting will often lead to rotting of the plant.

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— Judith Rapacz-Hasler is a member of the AOS editorial board, spending half the year on Florida's west coast and the remainder in Europe (email: jorapacz@ wisc. edu). Spiro Kasomenakis has been growing orchids, and has been an AOS member, since the 1980s. He is looking forward to traveling again, and meeting old friends, as soon as it is safe to do so. 158-20 Powells Cove Boulevard, Beechurst, New York 11357 (email: kasomenakis@aol.com).

[5] An exceptionally good clone of *Cattleya elongata*.

[6] Water pools are often found among seemingly desert-like conditions. Note the Cattleya elongata flowering in the right foreground.

[7] The xerophytic *Acianthera ochreata* ,also grows in this habitat

[8] *Thelyschista ghillanyi*. Photograph courtesy of Cassio van den Berg

[9] *Anathallis montipelladensis*, a rare, tiny pleurothallid growing on rocks by water pools.

[10] *Sobralia liliastrum*. Photograph courtesy of Gary Yong Gee.

[11] *Encyclia megalantha* grows in the same conditions and flowers at the same time as *Cattleya elongata*.

HTD. del,J.N.Fitch lith.

Vincent Brooks,Day & Son

Women Illustrators: Harriett Ann Thiselton-Dyer

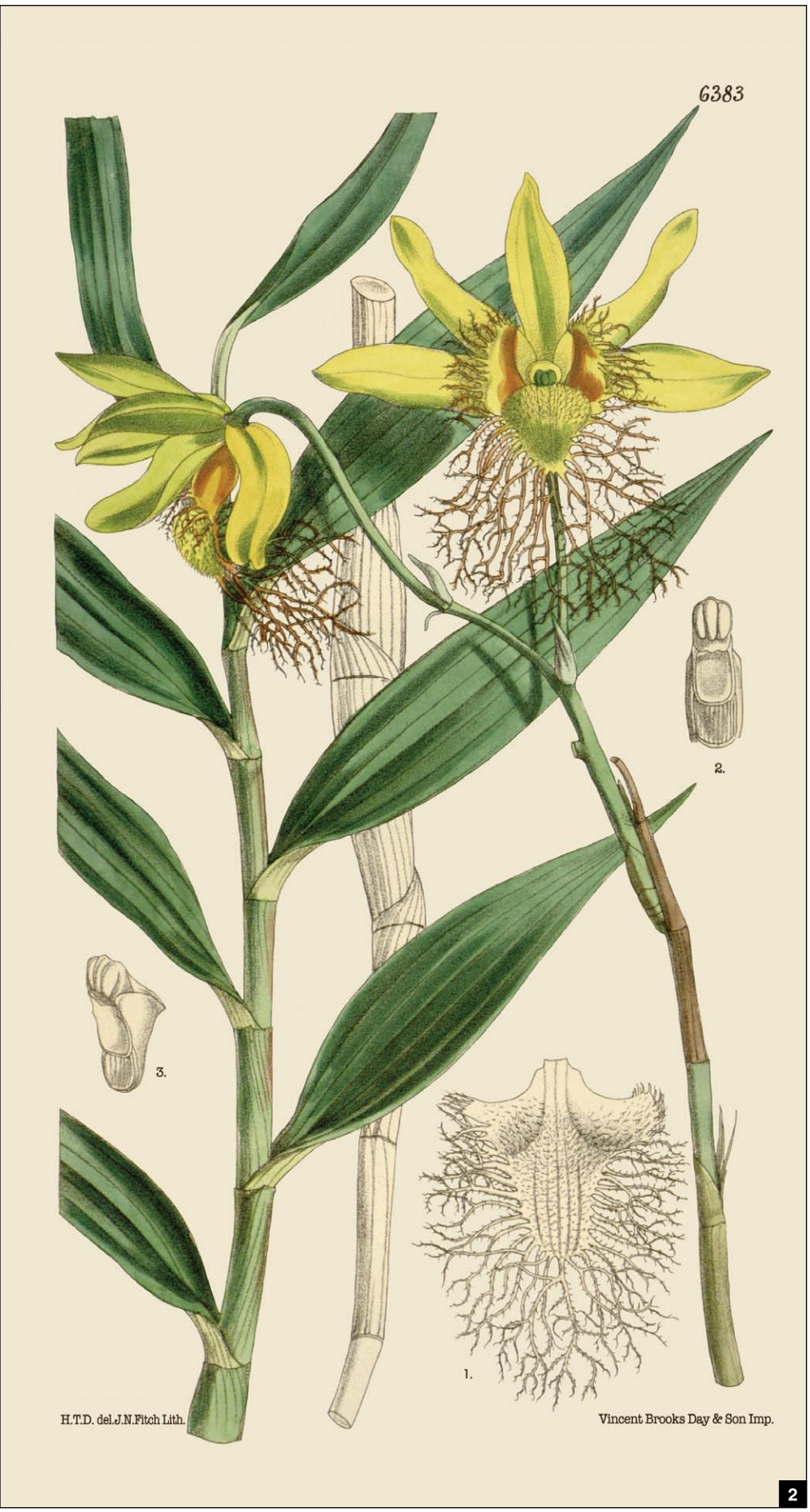
By Wesley Higgins and Peggy Alrich

ADVANCES IN THE printing processes during the 18th century allowed the colors and details of drawings to appear more accurate on paper. The assembly-line process required engravings or lithographs to be manually colored. The workers were, for the most part, anonymous women or children. Scientists needed colorists, or artists who could faithfully record the character and traits of species collections. As interest in botanical publications increased, the botanical illustrator came to be considered a respected profession. It was thought at the time that botanical illustration was only for women with time on their hands, those who dabbled in a spot of watercolors.

Historically, female botanists and botanical artists were rarely given as much credit as their male counterparts. By the 1800s, skilled women played an historic role to the advancement of scientific illustration as accomplished botanical illustrators and colorists. William Stearn comments: "The flower painter fails if the work lacks beauty, the botanical artist fails if the work lacks accuracy" (Stearn 1990). Harriet Anne Thiselton-Dyer belonged to a generation of English women that

emerged as accomplished botanical illustrators. Harriet Anne Hooker was born in Hitcham, Suffolk, England (June 23, 1854) to the botanist Joseph Dalton Hooker and Frances Harriet Henslow (daughter of botanist John Stevens Henslow). Joseph Hooker was the director of the Royal Botanic Gardens at Kew and editor of *Curtis's Botanical Magazine*. Harriet studied with the distinguished botanical illustrator Walter Hood Fitch, the lead artist for *Curtis's Botanical Magazine*.

Harriet married the botanist William Turner Thiselton-Dyer in 1877, who was later knighted and became the third director of Kew when Hooker retired. Lady Harriet Anne Thiselton-Dyer had a son (George, 1880) and a daughter (Frances, 1879). After Fitch resigned from the magazine in 1877 because of a dispute over payment, Thiselton-Dyer stepped in as illustrator to keep the magazine viable. She rendered 96 illustrations for publication during the period 1878–1880, until Matilda Smith took over as lead illustrator. In the period 1894–95, Thiselton-Dyer painted approximately 550 copies of Brazilian botanist João Barbosa Rodrigues's orchid paintings, which had been lent to her by the botanist Alfred Cogniaux, who was using some of them to illustrate a work on Brazilian flora. Unfortunately, the original drawings vanished in Brazil sometime after Rodrigues's death and are now lost,



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making Thiselton-Dyer's copies (housed at Kew Gardens) a uniquely valuable resource on Rodrigues's work. Thiselton-Dyer was also known as an accomplished gardener and had a reputation for being able to raise and work with difficult plants that other gardeners struggled with; one botanist recalled an instance when he sent her some plants pressed in newspapers, intending them as preserved specimens for the Gardens' herbarium, but Harriet managed to grow them instead. In 1905 the Thiselton-Dyers moved to the Cotswolds (Southern England). After her husband passed away (1928) Harriet moved to Weir Quay, Devonshire, England. She continued her gardening, botany and voluminous letter writing with other botanists and friends until her own death on December 16, 1945.

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ANTIQUE PLATES

[1] *Porroglossum muscosum*, *Botanical Magazine*, 123:t.7664 (1899).

[2] *Dendrobium brymerianum*, *Botanical Magazine*, 104:t.6383 (1878).

[3] *Angraecum scottianum*, *Botanical Magazine*, 109:t.6723 (1883).

[4] *Masdevallia polysticta*, *Botanical Magazine*, 104:t.6368 (1878).

[5] *Masdevallia caudata* as *Masdevallia shuttleworthii*, *Botanical Magazine*, 104:t.6372 (1878).

[6] *Pterostylis baptistii*, *Botanical Magazine*, 104:t.6351 (1878).

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First Ladies and Their Cattleyas

Rhyncholaeliocattleya Jill Biden

Hybrid takes a Ride on Air Force Two

BY ARTHUR E. CHADWICK AND A.A. CHADWICK/PHOTOGRAPHS, UNLESS OTHERWISE CREDITED, BY A.E.CHADWICK

UNTIL RECENTLY, MOST Americans had never heard of Wilmington, Delaware. The state itself is tiny and bears the nickname Small Wonder. My parents have lived there since 1960, growing orchids in their redwood greenhouses and raising a family.

Horticulturalists know the Wilmington area as a hotbed of plant activity, with the famed Longwood Gardens just over the Pennsylvania line and the annual Philadelphia Flower Show a short drive up I-95. Even closer is the sprawling 1,000-acre (404.7 ha) former DuPont estate known as Winterthur Museum, Garden & Library. Now Wilmington has a new attraction — the 46th President of the United States.

Joe and Jill Biden have been fixtures in Wilmington for as long as anyone can remember. They are regulars at the local grocery store, Janssen's Market, and most residents have had at least a sighting of the famous couple. My father once sat next to Mr. Biden at the barber shop.

Dr. Jill Biden, or Dr. B as her students call her, grew up about an hour north in Willow Grove, Pennsylvania. She met her future husband on a blind date while he was a freshman senator and they married a few years later. For most of her adult life, she has been an educator — teaching at nearby public schools and technical colleges.

On January 20, 2021 Jill Biden became the 16th consecutive First Lady to have a namesake cattleya hybrid. The time-honored orchid tradition dates back nearly a century to Mrs. Herbert Hoover and the wife of every president since has been recognized. The full collection of First Lady cattleyas resides at the Smithsonian in Washington, DC, where the blooming plants are rotated into public displays.

The Biden orchid, botanically known as *Rhyncholaeliocattleya* Jill Biden (Goldenzelle × Sea Swirl), was officially registered in 2013 while Jill Biden's husband was Vice President. The hybrid was bred by The Orchid Trail of Morrisville, North Carolina and named by Chadwick's.

1 ARHTUR E. CHADWICK

The flowers are large and frilly — the corsage type — and range from yellow to green with a delightful fragrance.

The lineage of this First Lady cattleya is well known in orchid circles. The first parent, *Rhyncholaeliocattleya* Goldenzelle (Fortune × *Cattleya* Horace), is a product of the 1980s California breeding scene and is one of the most widely used stud plants in history, with over 250 registered offspring. The American Orchid Society has granted prestigious flower quality awards to 30 different varieties of *Rlc*. Goldenzelle.

Orchid historians debate the exact origin of *Rlc*. Goldenzelle, but the story goes that multiple members of the South Coast Orchid Society were active in breeding at the time and often used the same stud plants. Ultimately, orchid judge and modest commercial grower John Hanes submitted the application

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to the Royal Horticultural Society for registration; however, generally speaking, it was a group effort. Ironically, Hanes spent most of his time with ladyslippers.

Long before John W. Hanes was immortalized by the success of *Rlc*. Goldenzelle, he first made an impact in the orchid world by helping to create an international standard of judging — one that could be used at World Orchid Conferences. He later started a small business out of his home, mightily called, Hanes Orchids of Distinction, in San Gabriel, California, where he made over 500 hybrids, mostly paphiopedilums. He and his wife, Tommie, who was also an AOS judge, were involved with all things orchid for over 60 years.

Goldenzelle delirium would not have been possible without the fine attributes of the parent, *C*. Horace (*trianae* × Woltersiana) — a 1938 tall-growing and stately big purple credited to the Belgian firm, Flandria, Ltd. or "F" in the RHS registry. Flandria registered so many hybrids during its three-decade (1929–1960) breeding spree that the Royal Horticultural Society got tired of writing the company name with every application and simply used the letter "F". For modern-day growers who are not familiar with the abbreviation "F," it takes a little research to figure out who or what is being referenced.

Flandria was a massive operation with over 1,000,000 sq ft (9.3 ha) under glass and self-described as "the largest horticulture company in the world." They grew much more than orchids, and their 1920s catalog cover lists azaleas, palms, bay trees, anthuriums, ficus, philodendrons, bromeliads and eurya. The nursery was founded in the east coast city of Bruges, which became the epicenter of European orchids with major competitors Sanders and Vincke close by.

Flandria's secret to success, as far as orchid interests were concerned, was their 1929 purchase of Theodore Pauwel's nursery, which was located just 50 miles (80.5 km) west in Merelbeke and had been nearly destroyed by German bombers in World War I. The Pauwels catalog of "Orchidees" was written entirely in French and catered to the well-to-do. At the time, Belgium was divided into three social classes and each had its own language, with French being that of the elite.

Theodore Pauwels began his career collecting plants in the wild before going into business for himself in 1888. Pauwels experimented with a wide range of orchids and registered some of the earliest ladyslipper hybrids, including the legendary *Paphiopedilum* Alma Gevaert (*lawrenceanum* × Maudiae) in 1911 that has been remade countless times and can be found in many collections today. His true love was cattleyas, however, and this is what Flandria specialized in.

By the time Pauwels moved to Bruges, he had amassed an impressive stud collection and went into overdrive with hybridizing. He brought his very best breeding stock — *Cattleya* Edithiae (Suzanne Hye × *trianae*), *Cattleya* Robertiana (Saint Gothard [1908] × *Cattleya* Amabilis [1904]) and *Cattleya* Woltersiana (Queen Mary [1911] × Rajah [1919]), among others. There was plenty of greenhouse space at Flandria and a sizable staff to pot the plants.

Beginning in 1929, Pauwels made hundreds of hybrids for Flandria. He crossed his three favorite studs with everything he could find, and it was just a question of time before he hit the jackpot.

ARHTUR E. CHADWICK

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DAVID OFF

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[1] This Jill Biden namesake cattleya is a lovely shade of yellow–green. The cross was officially registered with the Royal Horticultural Society in 2013.

[2] Later in 2013, Jill Biden's orchid was presented to her husband by our client and political activist, Molly Payne, when the Vice President visited Richmond, Virginia. Courtesy of Molly Payne.

[3] One parent of the Biden namesake is the well-known and highly decorated stud, *Blc.* Goldenzelle (Fortune × *C*. Horace) from 1982. Shown is 'High Noon'.

[4] The secret to the success of *Rlc.* Goldenzelle as a stud is its parent, *C*. Horace (*trianae* × Woltersiana) — a 1938 masterpiece bred by Theodore Pauwels of Flandria, Ltd. Shown is 'Maxima' AM/AOS.

Cattleya Horace (*trianae* × Woltersiana) in1938 was the jackpot.

Cattleya Horace is known for its perfect shape, in that the flowers are big and round with overlapping petals and a closed lip. The richly colored lavender blooms are not crowded and have plenty of space to open fully. The hybrid is typically a spring bloomer.

Recently, the American Orchid Society gave a flower quality award to *C*. Horace 'Maxima' AM/AOS — 70 years after it was created.

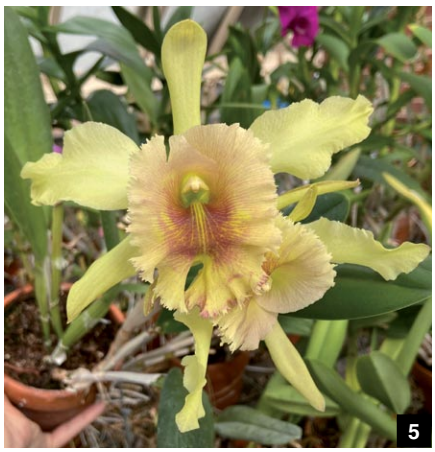
Over the years, breeders everywhere have benefited from Pauwel's efforts, as we find *C*. Horace as a parent in countless registrations. The resulting hybrids are the Who's Who of the cattleya world and include such classics as *Cattleya* Drumbeat (Bonanza [Bracey] ×), *Cattleya* Melody Fair (Stephen Oliver Fouraker ×), *Cattleya* Prism Palette (Colorama ×), *Rhyncholaeliocattleya* Tribute (Memoria Crispin Rosales ×) and, of course, *Rlc*. Goldenzelle (Fortune ×).

The other parent of *Rlc*. Jill Biden is *Rlc*. Sea Swirl (Greenwich × Mount Vernon [1979]) which produces flowers with an exotic greenish hue and originated in 1989 in the breeding program of Orchids by Hausermann in Villa Park, Illinois. The variety 'Whirlpool' AM/AOS was distributed worldwide and hobbyists still grow it today.

Most greenish hybrids begin with the only large-flowered species that comes close to green, and that is the unforgettable chartreuse-colored *Rhyncholaelia digbyana* from southeastern Mexico and Honduras. We find this species on both sides of *Rlc*. Sea Swirl, but what is a little different is the addition of the tall growing bifoliate *Cattleya granulosa* from Brazil. In the wild, *C. granulosa* grows in lowland areas that get routinely flooded during the rainy season and the plants have to hang onto shrubs and small trees to survive.

Shortly after *Rlc*. Jill Biden was registered, the Vice President was scheduled to appear in Richmond, Virginia on a campaign trip. Politicians regularly visit the city because of its close proximity to the U.S. Capitol and were nearly omnipresent during Virginia's recent two-decade run as a swing state.

We heard about the Biden's impending visit from a client and political activist, Molly Payne, who saw our "Jill" hybrid in bloom at the greenhouse. We wondered if this might be a good time to present the flowers. Timing is critical with perishable orchids as there is only a narrow window when the petals are their freshest.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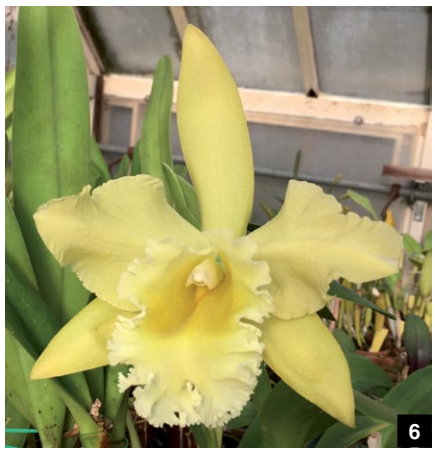
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Spouses sometimes accompany politicians to campaign events, and it was unclear if both Bidens would be in attendance. Our plan is always to give the flowers directly to the honoree — in this case, Jill Biden — but, given the short notice, the Vice President might have to do. We cut the flowers, placed them in a water tube, and let our client take them to the rally, where she presented the flowers

[5] The 1902 primary hybrid, *Rhyncholaeliocattleya* Mrs. J. Leemann (*Rl.* digbyana × *C. dowiana*), imparts great color and frilly lips, and can be found on both sides of the Biden parentage.

[6] Building on the great color of *Rlc.* Mrs. J. Leemann is the next generation, *Rhyncholaeliocattleya* The Baroness (× *C.* Ophir) from 1913.

[7] *Rlc.* Jill Biden grandparent *C.* Horace relies on several primary hybrids including the 1888 *Cattleya* Empress Frederick (*dowiana* × *mossiae*). Shown is A. A. Chadwick's remake.

[8] An unlikely semialba in the *Rlc.* Sea Swirl lineage is *Cattleya* Jane Dane (Britannia × President Wilson [1918]) from 1937, which combines a big purple with a yellow.

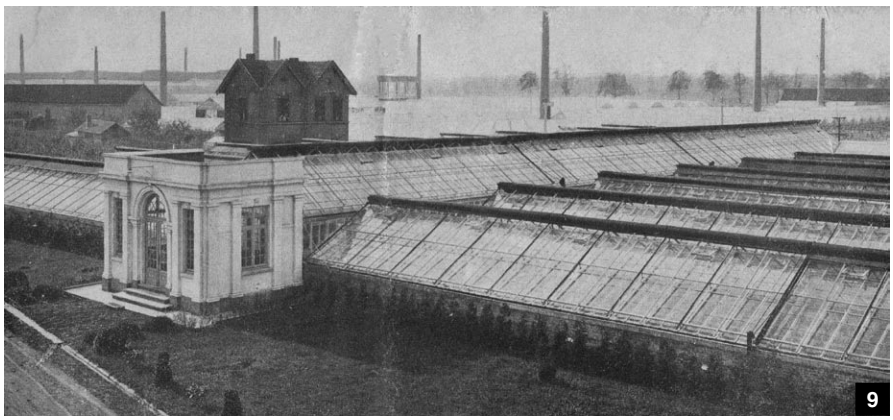
on stage to a grinning Joe Biden amidst a throng of cheers.

He loved the orchids and took them back to Wilmington that night for his wife to enjoy. This is likely the only time in history in which namesake orchids have been transported on Air Force Two, the official plane of the Vice-President. Once again, Delaware has lived up to its nickname, Small Wonder, and Jill Biden's hybrid now rests securely in the legacy of the First Lady cattleyas.

Acknowledgment

The authors thank Chris Flanders from Bruges, Belgium for his assistance with the history of Flandria, Ltd.

— Arthur E. Chadwick is president of Chadwick & Son Orchids, which operates 11 greenhouses in Powhatan County, two retail stores in Richmond, Virginia and boards over 13,000 orchids for local clients. He is also a coauthor of The Classic Cattleyas*, now in its second printing, that describes the large-flowered species that make up today's hybrids and this article will be included in the Chadwick's next book,* First Ladies and their Cattleyas: A Century of Namesake Orchids*, due out this fall. Arthur E. Chadwick along with his father, A.A. Chadwick, are regular contributors to Orchids magazine (email: art@chadwickorchids.com; Website www.chadwickorchids.com).*



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[9] Flandria, Ltd., was a massive operation in Bruges, Belgium. Shown are the greenhouses in the December 1952 *AOS Bulletin*. Courtesy of the American Orchid Society.

[10] Orchid breeder Theodore Pauwels and his wife, Liezie, visit Nice, France in 1924 prior to his joining Flandria, Ltd. Courtesy of their grandson, Roger Bonte.

[11] The bifoliate species, *C. granulosa*, occasionally appears in the background of greenish hybrids. In this case, it is both a grandparent and great grandparent to *Rlc.* Sea Swirl. This late 1800s print appeared as plate 14 in the French publication, *Dictionnarie Iconographique des Orchidees*. Courtesy of Charlie Harkness.

Orchids of Bhutan

Phalaenopsis Blume

BY STIG DALSTRÖM, CHOKI GYELTSHEN, NIMA GYELTSHEN, KEZANG TOBGAY, PEM ZAM, TANDIN WANGCHUK AND KEZANG RINZIN

THE GENUS *PHALAENOPSIS* Blume was established by Karl Ludwig von Blume in his *Bijdragen tot de Flora van Nederlansch Indië* (Blume 1825). The genus was based on *Epidendrum amabile* Sw., which became *Phalaenopsis amabilis* (Sw.) Blume and is certainly one of the most appreciated, commercialized and hybridized species (480 F_1 crosses) in this attractive genus. Today *Phalaenopsis* consists of about 75 accepted species, several natural hybrids and hundreds of synonyms (Royal Botanic Gardens, Kew 2020). In other words, this is a very popular group of orchids among growers and botanists, amateurs and professionals alike. The genus is distributed from India to southern China, Thailand, Indochina, Malaysia and Indonesia to the Philippines and New Guinea (Pearce and Cribb 2002). Four species are currently documented from Bhutan, but this number will probably increase in the future as "orchid hunting" has become a "movement" in that country in recent years. This is particularly true for the large number of dedicated forest rangers that are stationed all over the country.

The most commonly found *Phalaenopsis* species in Bhutan is *Phalaenopsis taenialis* (Lindl.) Christenson and Pradhan. It was originally discovered in Nepal by Nathaniel Wallich (1786–1854) or by some of his collectors and described as *Aerides taeniale* Lindl. by John Lindley in 1833. Then it was transferred to *Doritis taenialis* (Lindl.) Hook.f. in 1890, followed by the transfers to *Kingiella taenialis* Rolfe in 1917, *Biermannia taenialis* (Lindl.) T.Tang and F.T.Wang in 1951, *Kingidium taeniale* (Lindl.) P.F.Hunt in 1970 and *Polychilos taenialis* (LIndl.) P.S.Shim in 1982, to finally end up as a *Phalaenopsis* in 1986, where it currently resides (Pearce and Cribb 2002). Regardless of the nomenclatural instability, the actual species is remarkably stable and consistent in its appearance and in the color and shape of the flowers.

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Phalaenopsis taenialis usually grows as an epiphyte in middle- to upper-elevation hardwood forests from 3,275–8,190 feet (1,000–2,500 m) elevation, which makes it a rather cold-tolerant species. It seems to prefer growing epiphytically on *Alnus nepalensis* D.Don*, Schima wallichii* (DC) Korth.*, Callicarpa arborea* Roxb. and *Quercus* spp., but can also be found on *Rhododendron* spp. The name "taeniale" means being shaped like a tapeworm and refers to the shape of the flat and spreading roots, which can extend for a 3 ¼ feet (a meter) or more along the trunks and branches of rough-barked trees and shrubs. The roots contain chlorophyll and help the plant survive by performing photosynthesis during the long and dry winter when the leaves are shed to save moisture. The flowers are rather small

but attractive in pink to mauve colors and they can be displayed in dense clusters. After the peak of flowering, or after being pollinated, the individual flower turns pale orange-yellow. This post-pollination color change led Joseph Dalton Hooker (1894) to mistakenly describe *Doritis braceana* Hook.f., based on a drawing by a Mr. Brace, who was the curator of the herbarium at the Royal Botanic Garden in Calcutta (Kolkata) at the time. The drawing was made from a plant that flowered in the living collection and was subsequently sent to Hooker by James Sykes Gamble (1847–1925), an English botanist who specialized in the Indian subcontinent flora. A colored lithographic print of *Doritis braceana*, probably based on the drawing sent to Hooker, was then made by the Indian artist Gopal Chandra Dass (White 1999) and appeared in Hooker's *A Century of Indian Orchids* (1895). This plate shows a *Phal. taenialis* with an old or possibly pollinated flower in a typical dull yellowish post-pollination stage. Although this was an understandable mistake, and easy to make for somebody sitting in a dusty office in England and far away from the blazing heat of India, it had some unfortunate long-lasting taxonomical consequences. The epithet *Phalaenopsis braceana* has been frequently used in publications until present days, and usually for a Chinese species correctly described as *Phalaenopsis honghenensis* F.Y. Liu. Author Dalström and Paul Ormerod (2010) made an effort to straighten out this case of mistaken identity, but old habits die hard and the name *Phal. braceana* still appears now and then with photos of *Phal. honghenensis* or *Phalaenopsis stobartiana* Rchb.f.

Phalaenopsis mannii Rchb.f., was described in the *Gardener's Chronicle* in 1871 and is a well-known species among *Phalaenopsis* fans. It is also well used in hybridization (172 F_1 crosses) because of its bold markings on the sepals and petals. This species is named in honor of Gustav Mann (1836–1916), a German botanist who did some collecting in the Himalayan region and corresponded with Hooker at Kew. Until 2016 only a single report of this species was documented from Bhutan through an "unlocalized [sic] Grierson & Long specimen" (Pearce and Cribb 2002). But during an expedition in search for *Paphiopedilum* Pfitzer species, organized by the National Biodiversity Centre (NBC) in Serbithang, Thimphu (Gurung et al. 2016), a single plant of *Phal. mannii* was found growing epiphytically on a horizontal branch of a large tree, not far from the main road. It was the first time any of the team members had the pleasure of admiring the attractive flowers of this orchid in the wild. Four years later, in March of 2020, some orchid photos from the Nganglam area in southern Bhutan were sent to author Dalström for identification and among them was one showing a flowering *Phal. mannii*. The photo had been taken by Forestry Officer Tandin Wangchuk, the station chief of the Forest Range Office in Nganglam. The photo was in low resolution so a request for better photos in higher resolution was emailed back along with a suggestion to try to take some habitat photos where the plant grew. It did not take long before some stunning photos returned showing a large number of flowering plants of *Phal. mannii* growing epiphytically on *Ficus semicordata* Buch.-Ham.ex Sm., in their natural environment. But *Phal. mannii* also seem to prefer growing on *Shorea robusta* C.F.Gaertn., *Tectona grandis* L.f. and *Albizia* spp. Good photos of orchids in


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[1] Plate of *Phalaenopsis* (as *Doritis*) *taenialis* from "The orchids of the Sikkim-Himalaya", by George King and Robert Pantling, in Annals of the Royal Botanic Garden, Calcutta 8, pl. 266 (1898).

[2] *Phalaenopsis taenialis* from Nahi, Wangdue Phodrang.

[3] *Phalaenopsis taenialis* from Punakha.

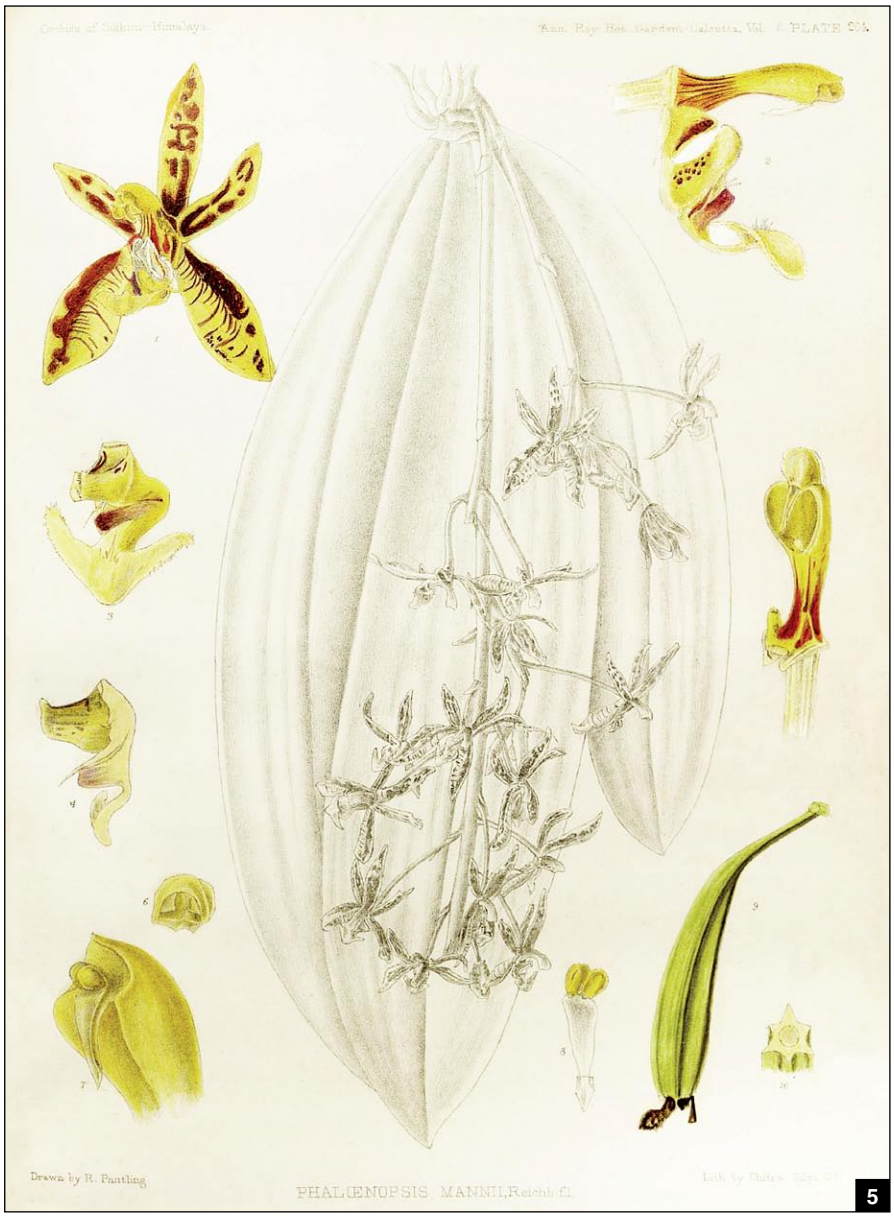
[4] Plate of *Phalaenopsis taenialis* as "*Doritis braceana*" from "A century of Indian orchids", by Joseph Dalton Hooker, in Annals of the Royal Botanic Garden, Calcutta 5, pl. 60 (1895).

their natural habitat are not only exciting to see, but also very educational and can tell growers a lot about the plant's requirements for a happy life.

Phalanopsis lobbii (Rchb.f.) H.R.Sweet is named in honor of Thomas Lobb (1817–1894), who collected for the Veitch nursery in England (Pearce and Cribb 2002). In 1845 he discovered the first plants of his *Phalaenopsis* species growing in the eastern Himalayas at an altitude of about 4,900 feet (1,500 m; Wikipedia 2020). It was originally described as *Phalaenopsis parishii* var. *lobbii* by Heinrich Gustav Reichenbach (1870) but elevated to species level by Herman Sweet (1980). No reports of this species were known from Bhutan until May of 2014 when a few plants were serendipitously discovered on a single *Dysoxylum binectariferum* Hook.f. tree along a road in southern Bhutan. One plant was in flower, which provided a quick identification and a very pleasant surprise for the NBC orchid team, consisting of Choki Gyeltshen, Nima Gyeltshen, Dupchu Wangdi and Stig Dalström at the time. Our squirrel-footed orchid grower Dupchu Wangdi quickly climbed the vertical trunk and managed to bring down a healthy-looking plant for the live orchid collection in the Royal Botanic Garden in Serbithang. *Phalaenopsis lobbii* also seems to prefer growing on *Tetrameles nudiflora* R.Br., *Toona* spp., *Albizia* spp. and *Dysoxylum* spp.

The fourth species of *Phalaenopsis* currently known from Bhutan has spent most of its scientific time as *Ornithochilus difforme* (Wall. ex Lindl.) Schltr., although it was originally described as *Aerides difformis* Wall. ex Lindl., based on a plant collected by Nathaniel Wallich, or by one of his collectors in Nepal. From *Ornithochilus difformis* it became *Sarcochilus difformis* (Wall. ex Lindl.) Tang and F.T.Wang in 1951, then *Trichoglottis difformis* (Wall. ex Lindl.) T.B.Nguyen and D.H.Duong in 1984 and finally *Phalenopsis difformis* (Wall. ex Lindl.) Kocyan and Schuit. in 2014 based on molecular evidence. All these name transfers may be uninteresting to the average grower but it is a good example how generic and specific concepts vary through time and among taxonomists, and probably will continue to vary in the future when we find even more revolutionary ways of classifying the world's biota that surrounds us.

Phalaenopsis difformis is a very common species in Bhutan, and inhabits a wide range of habitats, often growing together with *Phal. taenialis* in semi-shady to shady locations. The name



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THOMAS HÖJER


STIG DALSTÖM


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TANDIN WANGCHUK


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[5] Plate of *Phalaenopsis mannii*, from "The orchids of the Sikkim-Himalaya", by George King and Robert Pantling, in Annals of the Royal Botanic Garden, Calcutta 8, pl. 264 (1898).

[6] The first living plant of *Phalaenopsis mannii* is studied by the orchid team near Kalikhola in southern Bhutan.

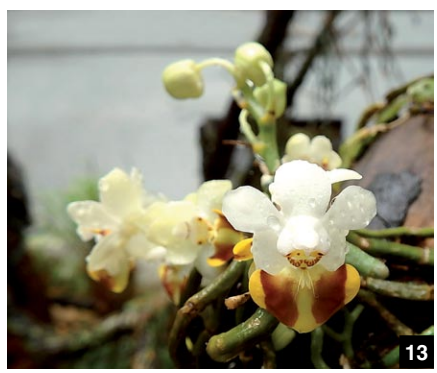
[7] *Phalenopsis mannii* in situ near Kalikhola in southern Bhutan.

[8] Close-up photograph of *Phalaenopsis mannii*, in situ near Kalikhola in southern Bhutan.

[9] *Phalaenopsis mannii*, in situ near Nganglam, southcentral Bhutan.

[10] *Phalaenopsis mannii*, in situ near Nganglam, southcentral Bhutan.

NIMA GYELTSHEN



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[11] *Phalaenopsis lobbii*, from "The orchids of the Sikkim-Himalaya", by George King and Robert Pantling, in Annals of the Royal Botanic Garden, Calcutta 8, pl. 263 (1898).

[12] *Phalaenopsis lobbi*, in situ near Panbang in southern Bhutan. Inset close-up, by Stig Dalström, of the precious flower of *Phalaenopsis lobbii*, photographed for the first time in Bhutan.

[13] *Phalaenopsis lobbii* in cultivation at the Royal Botanic Garden in Serbithang, Bhutan.

[14] The mighty Mangde Chhu river near Panbang, just before it enters Indian territory.

[15] Dupchu Wangdi rapidly ascending the vertical tree trunk to inspect *Phalaenopsis lobbii*.

[16] *Phalaenopsis difformis*, in cultivation at the Royal Botanic Garden in Serbithang, Bhutan.

[17] *Phalaenopsis difformis* (as *Ornithochilus fuscus*), from "The orchids of the Sikkim-Himalaya", by George King and Robert Pantling, in Annals of the Royal Botanic Garden, Calcutta 8, pl. 268 (1898).

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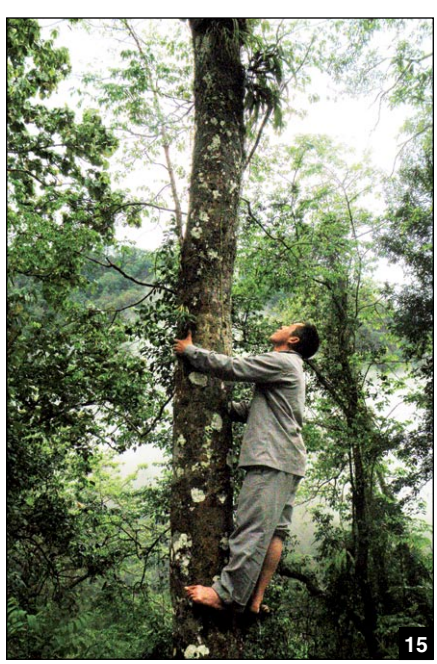

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Ornithochilus refers to the odd-looking lip of the flowers that can resemble, with a little imagination, a flying bird. The flower shape is quite unique for the genus and easily sets this species apart from all others.

To suggest particular cultivation guidelines for *Phalaenopsis* seems like a superfluous initiative from our point of view. We therefore simply refer to any of the many articles about how to grow orchids in general, and *Phalaenopsis* in particular, published by the American Orchid Society over the years.

Acknowledgments

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Origin and Diversification

BY JEN SCHMIDT

ORCHIDS HAVE CAPTURED the awe of mankind for centuries with their immense variation in flowers and odd growth habits. The same features that make these plants so fascinating also contribute to their extensive diversity. With more than 880 genera and 28,000 species, orchids are among the most species-rich plant families alive today. Such astounding orchid diversity begs the question: What makes orchids so special? Here I will introduce the current hypotheses for the origination of Orchidaceae as well as some of the more prominent adaptations that contributed to the vast diversity of this family.

ORIGINATION OF ORCHIDS Historically, the most common way to learn about our planet's evolutionary history has been through the fossil record. Some truly extraordinary finds have been uncovered over the years such as *Archaeopteryx*, one of the first feathered reptiles, or Lucy, one of our own species' distant ancestors. Although fossils are beautiful and vital to our understanding of our planet's past, relying on their use has some major drawbacks, particularly for plants. First, the most easily preserved parts of an organism are the hard, calcareous parts, such as the shells of marine creatures or the skeletons of dinosaurs. However, fleshy or soft body parts tend to be degraded before preservation can occur. Incidentally, plants are almost entirely soft tissue and lack structures that would be easily fossilized. Furthermore, fossilization occurs best when the specimen is rapidly buried before microbes can begin degrading it. This process occurs most readily in the ocean where sediments are constantly being deposited on the ocean floor. However, the ocean floor is not home to many plants. As a result, finding well-preserved orchid fossils is quite difficult.

Only as recently as 2007 has a plant fossil been unequivocally identified as an orchid (Ramírez et al. 2007). This fossil was a piece of amber containing a stingless bee with orchid pollen on its back from as long as 20 million years ago (MYA). Since then, a fungus gnat carrying orchid pollen from 45–55 MYA was discovered in Baltic

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[1] Adapted from Ramirez et al. 2007 with permission, this image shows a stingless bee trapped in amber with orchid pollen on its back. Scale bar = 1mm.

[2] This is an image taken from Poinar and Rasmussen 2016, with permission, depicting a piece of amber with a gnat bearing orchid pollen. Scale bar = 1.2mm.

[3] Orchid leaf impression caught in stone from Conran et al. 2009 with permission. Scale bars = 10mm.

[4] Family trees and phylogenies: a) depiction of a typical family tree, b) the same family tree as in (a) but viewed only through the maternal side and (c–d) the comparison of nodes in the two trees.

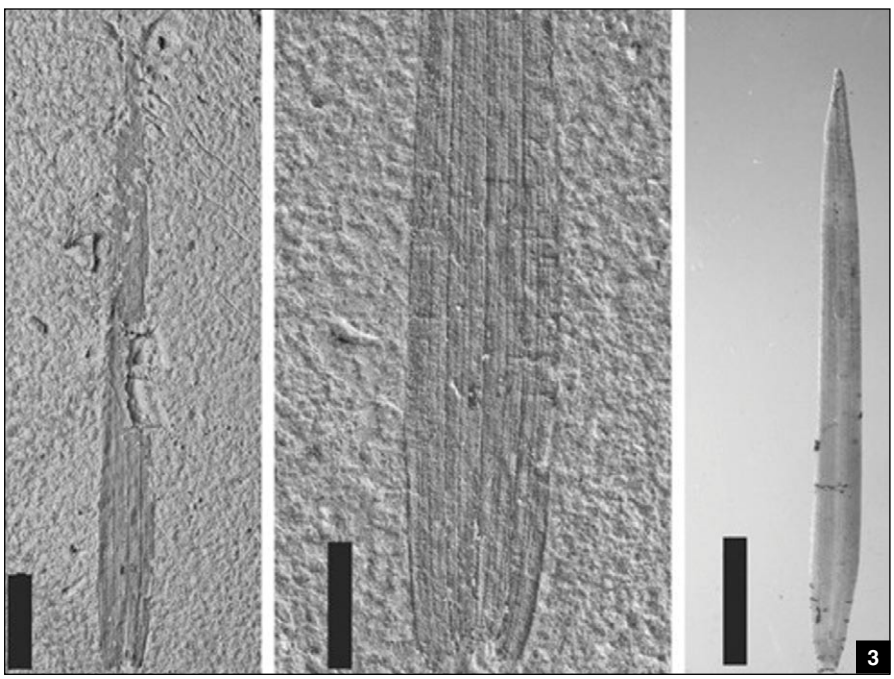
# of Orchids

amber, making it the oldest known orchid fossil (Poinar and Rasmussen 2017). While pollen-bearing insects caught in amber appear to be the most prevalent form of preserving orchid fossils, other fossils have been discovered. For instance, shortly after the first amber fossil was discovered, another research group found impressions of orchid leaves in a sedimentary rock (Conran et al. 2009). These fossils are magnificent specimens and certainly helped improve our understanding of the origins of orchids. However, because of the difficulty preserving orchid fossils, this sparse fossil record does not tell the whole story.

The current theory is that orchids are far older than the 55 million years that the fossil record suggests. New emerging molecular methods of dating organisms by their DNA sequences place the origin of Orchidaceae in the mid-Cretaceous, around 112 MYA. DNA is a complex instruction manual written in a simple four-code alphabet of bases: adenine, thymine, guanine and cytosine. The bases are translated and decoded to produce every biological component of living organisms. All the DNA in a given organism is packaged together in the genome that is passed from parent to offspring. Genotyping, decoding the entire genome, is useful because it shows evolutionary relatedness between organisms.

Phylogenetic trees are a common way to visually depict these evolutionary relationships. They can look complicated but are very similar to family genealogies. Consider a generic human family. For simplicity's sake, we will condense that tree down to only consider the maternal half of the family. First, we see that the siblings' last genetic ancestor was their mother. If we want to compare the siblings to their cousin, we must step back in time along the tree (away from the branch tips) to their most recent common ancestor — their shared grandmother. Because the siblings are related to the cousin by a more distant relative, the siblings share less DNA in common with their cousin.

In a way, phylogenies are just family trees at a much bigger scale. In fact, "sister" and "cousin" are sometimes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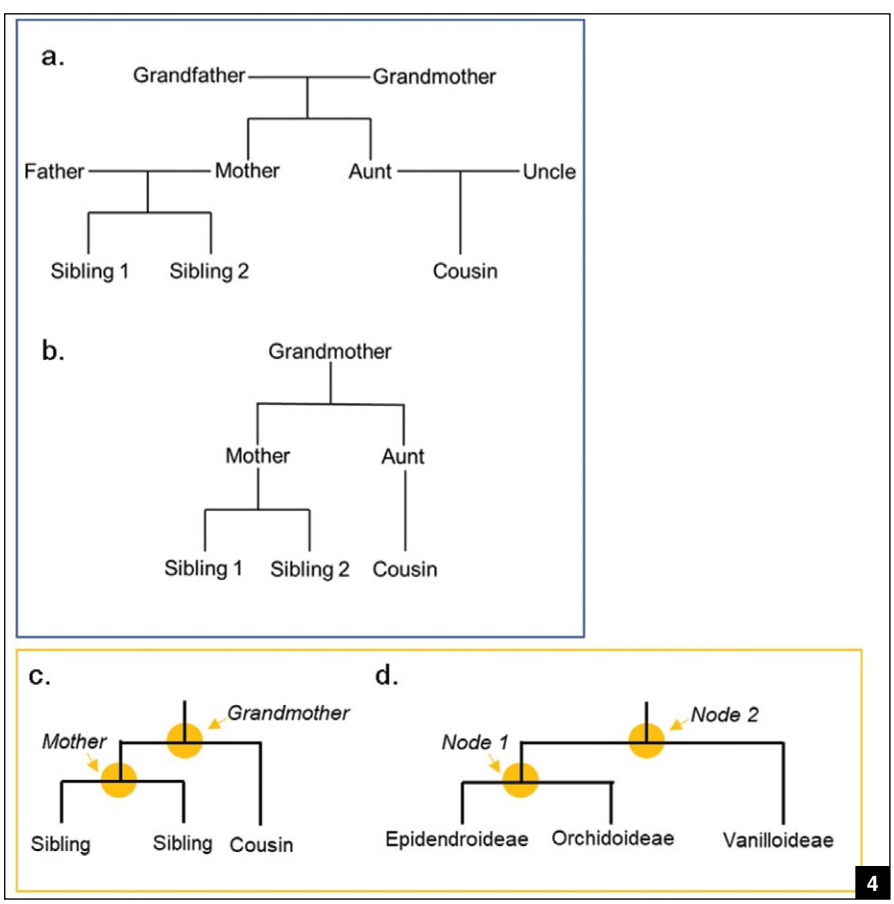

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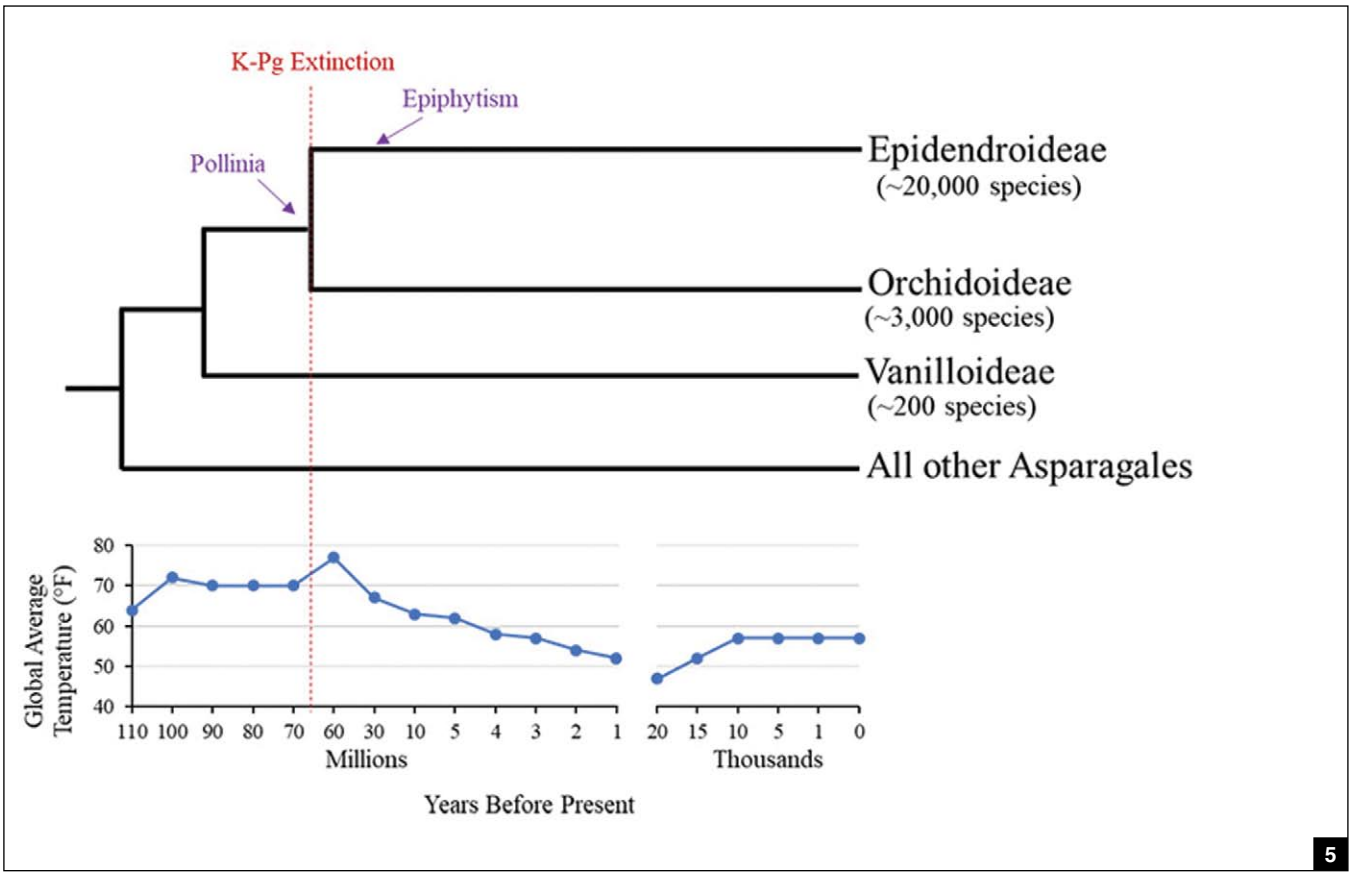

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[5] The current orchid phylogeny and global temperature. This reduced phylogeny shows three of the major subfamilies of Orchidaceae along with their position within the Asparagales. The bottom graph depicts the average global temperature since the origination of Orchidaceae.

used as descriptive terms to generalize relatedness between two groups. However, instead of considering one family like a genealogy, a phylogeny can consider the relationships between species, genera, or larger groups of organisms. Consider the abbreviated phylogenetic tree for three of the major Orchidaceae subfamilies. Epidendroideae and Orchidoideae could be called sister subfamilies because on this tree they descend from a relatively recent common ancestor, like the siblings in our generic family. Meanwhile, Vanilloideae is connected to the other two subfamilies at a node further back in time (left) along the tree, indicating that it is less related to Epidendroideae or Orchidoideae.

From this quick example, you can see that there is a time component to phylogenetic trees. Family trees are typically arranged with time moving from top to bottom (past to present). Phylogenies are often displayed with time moving left to right from past to present. The consistent feature to look at is that the tips of the branches are more recent than the internal nodes. The timescale used for a phylogeny is typically on the order of thousands, millions or hundreds of millions of years. Recently, evolutionary biologists have been able to assign more accurate dates to these timescales using a method called molecular clock dating. Molecular clock dating utilizes an interesting quirk about some genes in that they mutate at a very constant rate, replacing one nucleotide for another with enough consistency that it can be measured. By adding up the number of different mutations in that gene between two organisms, you can get a rough estimate of how long ago those two species diverged and became distinct species. For example, if we know that two organisms have eight differences in their sequence for a particular gene and that gene has one mutation every two million years, we can say that the two organisms diverged from their common ancestor approximately 16 MYA (8 mutations × 2 million years/1 mutation = 16 million years) because that was the last time they had identical sequences for that particular gene.

This concept has been applied to determining when Orchidaceae diverged from other flowering plants. In fact, Givnish and colleagues (2015) did exactly that by aligning the mutations in 75 orchid genes gathered from 39 different orchid species and 96 nonorchid plants to create a time-calibrated phylogenetic tree. Orchidaceae is a member of the monocot order Asparagales. Orchidaceae was the first family to diverge from all other Asparagales around 112 MYA. Vanilloideae, containing the widely known vanilla orchid, was the first subfamily to separate from the rest of the orchids, approximately 80–90 MYA. The remaining two subfamilies, Epidendroideae and Orchidoideae, split approximately 65 MYA (Givnish et al. 2015). With this phylogenetic tree as a guide, we can now look for patterns and anomalies in diversification to understand why there are so many species of orchids.

DIVERSIFICATION OF ORCHIDS To first understand how the vast diversification of orchids came about, we need to understand what the planet was like at that time period in Earth's history. The most recent estimate of orchids' origin is 112 MYA, during the mid-Cretaceous, the final of the dinosaurs' three periods. The breakup of the last

supercontinent, Pangea, was already well underway and the continents were fairly similar to their modern arrangement. However, the planet was much warmer. In fact, much of the planet was tropical or subtropical with the poles being more similar to a temperate climate than today's permanently frozen tundra (Hansen and Koch 1999). Thus, orchids arose in a warm, tropical environment with a widespread distribution across the planet. This tropical climate spurred diversification because there were no cold winters or glaciation periods to disrupt growth and reproduction of the plants. As a result, the plants could grow, mutate and reproduce uninterrupted for many generations.

The most rapid diversification of orchids occurred just after the Cretaceous–Paleogene (K-Pg) mass extinction that killed the dinosaurs 65 MYA. This mass extinction wiped out more than 75 percent of all species on the planet with widespread and devastating losses in terrestrial plants (Jablonski 1994). However, this massive plant die-off opened up vast numbers of new niches for the survivors, like orchids, to move into, spurring this proliferous diversification. In fact, the origin of the Epidendroideae and Orchidoideae subfamilies occurred right after the K-Pg event, giving rise to the most species-rich subfamilies in Orchidaceae.

The evolution of some novel traits among members of the orchid family also drove some smaller bouts of diversification. Chiefly, the vast variation in flower morphology (the shape and appearance of the flower) and several traits related to reproduction as well as the evolution of epiphytic growth all contributed to the immense diversity we find in orchids today.

Flower morphology is believed to be one of the greatest drivers of diversification in orchids (Givnish et al. 2015). Orchidaceae is full of some of the most magnificent adaptions to attract or, sometimes, deceive insects into pollinating them. Indeed, the shape, color and even the timing of flowering are all vital in attracting a particular pollinator. For instance, flowers that only produce a fragrance at night are targeting nocturnal pollinators. These flowers will likely never naturally crossbreed with flowers that bloom during the day. Orchids have also capitalized on an adaptation known as deceit pollination where they trick insects into pollinating them. This can be done by the flower mimicking an insect's favorite food, brooding site or even mate. Unsurprisingly, this technique requires the flowers to be a very specific shape, size and color to fool the target insect.

The pollinarium, the structure bearing the pollinia, also contributed to the diversification of orchid flower morphology. The placement and structure of the pollinia is highly specific for a given insect pollinator. For instance, the pollinia will have a different shape and structure for a flower that is pollinated by a moth than one that is pollinated by a fungus gnat. Therefore, even the smallest changes in pollinia structure can lead to the generation of new species because it can create a reproductive barrier. A reproductive barrier is anything that excludes individuals from mating with each other and producing, in an orchid's case, seed. Two orchids with differently shaped pollinia are unlikely to breed with each because they attract different pollinators and, therefore, their specific pollinator will never visit the other flower. As a result, these flowers and their progeny will begin to diverge in genetic make-up, eventually creating organisms that are separate species.

The origination of epiphytism is also thought to be a major contributor to the massive diversity in orchids (Givnish et al. 2015). Epiphytic orchids do not need a soil substrate to grow. They collect moisture from the atmosphere and nutrients from organic matter that gets caught near their roots. These orchids have several unique adaptations that allow them to grow in such environments, such as pseudobulbs or thick leaves to store water and a glue-like substance secreted from their roots to attach themselves to rocks or trees. This development allowed orchids to leave the crowded soils behind and move into new environments such as the sides of rocks or trunks of trees that lessened the pressure to compete for resources with terrestrial plants.

However, orchids managed to diversify even further than simply moving from soil to rocks and trees. In their native tropical habitats, different types of trees have different canopy structures that modulate light and humidity levels for the forest floor beneath them. As a result, some orchids have become specialists for growing under or on specific tropical trees (Givnish et al. 2015). This fine-tuned niche partitioning allowed orchids to diversify into tiny microhabitats within a given forest.

CONCLUSION It is important to keep in mind that phylogenies like the one presented here are simply hypotheses, educated guesses of the relatedness of organisms based on available facts. The current accepted hypothesis is that Orchidaceae arose in the mid-Cretaceous, about 112 MYA. The balmy climate of that time spurred initial diversification while the evolution of some unique characteristics added to diversity in the intervening millennia. These characteristics generally helped improve an orchid's chances of surviving and reproducing by reducing competition. Flower structures that are highly specific to a particular pollinator reduced competition for pollinators while the development of epiphytism allowed the orchids to leave the crowded forest floor. These are only a few of the more prominent adaptations orchids have evolved. Many of the bizarre quirks that make orchids so fascinating to us are merely their wild attempts to survive.

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Orchid Exploration

Eight Threatened Orchids of the Itremo Massif Protected Area, Central High Plateau of Madagascar

LANDY RITA RAJAOVELONA, LARRY SEXTON AND FRANCK RAKOTONASOLO
PHOTOGRAPHS BY LANDY RAJAOVELONA

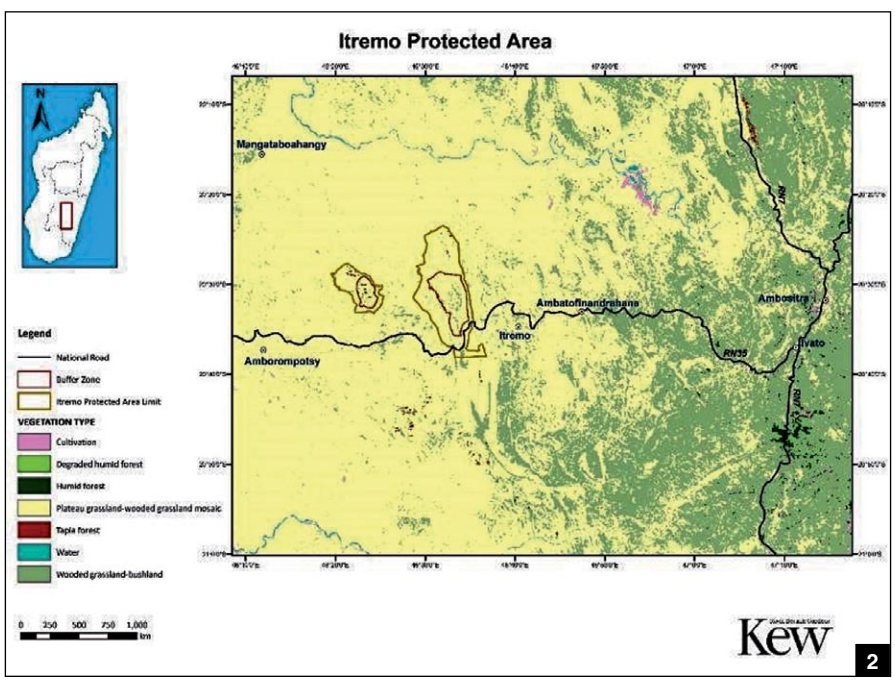
1

ORCHIDACEAE IS THE largest plant family, occupying first place for vascular plants in Madagascar (Callmander et al. 2011). It includes 970 accepted taxa, comprising 908 species and 62 subspecies and varieties, of which 84 percent of these are endemic to the island (WCSP 2020). OTnly 186 species have extinction risk assessments published on the International Union for Conservation of Nature (IUCN) Red List (IUCN 2020). Our preliminary assessments by using GeoCAT (Bachman et al. 2012) and applying IUCN criteria for all taxa show that 76 percent of Madagascar's orchids are threatened with extinction: classified as either critically endangered (CR), endangered (EN) or vulnerable (VU). Orchids are present in all habitat types across Madagascar. The humid forests are the richest area in species number, particularly the Central Highlands regions in northern, eastern and southern Madagascar.

As part of the research on Madagascan orchids and their associated flora, the Kew Madagascar Conservation Centre (KMCC) carried out multiple expeditions to the Central Highlands of Madagascar. This area is home to more than 30 percent of Madagascar's 970 orchid taxa, about 298 in total. The Itremo massif protected area (Itremo PA), situated in the region of Ambatofinandrahana, is one of the most important sites in the highlands for plant diversity. It is a newly protected area managed by KMCC where 86 species of orchids are recorded. About 60 percent of the orchid species of the Itremo PA are endemic to Madagascar, and 44 percent of these are threatened, mostly by seasonal fires and mining in the grasslands. Assessing the conservation status of a species is important to prioritize conservation measures and judge their effectiveness. Only 12 orchid species of the Itremo massif currently have assessments published in the IUCN website (IUCN 2020).

Table 1: Data on habitat, distribution, IUCN, trade (BGCI 2020), and conservation status of the eight (08) species

Species	Habit	Distribution	IUCN status	IUCN website	Trade	Botanic Gardens
Cynorkis cardiophylla	Terrestrial, lithophyte	Antananarivo, Fianarantsoa, Toliara	EN	No	No	No
Cynorkis melinantha	Terrestrial, lithophyte	Fianarantsoa	EN	No	No	No
Cynorkis papillosa	Terrestrial	Antananarivo, Fianarantsoa	EN	No	No	No
Cynorkis sacculata	Terrestrial, lithophyte	Antananarivo, Fianarantsoa	CR	Yes	No	No
Jumellea spathulata	Lithophyte	Antananarivo, Fianarantsoa	EN	No	Yes	Yes
Angraecum coutrixii	Lithophyte	Fianarantsoa	EN	Yes	Yes	Yes
Angraecum magdalenae	Lithophyte	Antsiranana, Antananarivo, Fianarantsoa	EN	No	Yes	Yes
Angraecum popowii	Epiphyte	Antananarivo, Fianarantsoa, Toamasina	EN	No	Yes	No



[1] *Angraecum coutrixii* growing in rock crevices.

[2] Map of the Itremo Protected Area.

ORCHID EXPLORATION IN THE ITREMO PA Itremo is a rocky massif composed of quartzite, mica schist and marble, extending across 105.8 square miles (274 km^2) and located at about 43.5 miles (70 km) west of Ambositra, in the Central High Plateau of Madagascar reaching up to 4,900 feet (1,500 m) in elevation. Eight endemic and threatened orchids captured our attention in the site: *Angraecum coutrixii, Angraecum magdalenae*, *Angraecum popowi*, *Cynorkis cardiophylla*, *Cynorkis papillosa*, *Cynorkis melinantha*, *Cynorkis sacculata* and *Jumellea spathulata*. These orchids flower during the rainy season, between October and April. There are other orchids such as *Eulophia racemosa* and *Eulophia ibityana* that bloom in August, while the anthesis of *Jumellea spathulata* is in September. In terms of species ecology, *Angraecum coutrixii*, *Angraecum magdalenae* and *Jumellea spathulata* are lithophytic species, living in clumps, and forming small subpopulations on quartzite rock outcrops, while *Angraecum popowi* is epiphytic on the endemic tree *Sarcolaena oblongifolia* (Sarcolaenaceae). These orchids are all remarkable for their flowers, large compared to their size and pristine white in color. The four *Cynorkis* species — *Cynorkis cardiophylla*, *Cynorkis sacculata*, *Cynorkis melinantha* and *Cynorkis papillosa* — have elongated tubers, and are deciduous and seasonal as they become dormant during the dry period. They are either terrestrial, growing in peaty soils among the vast grasslands and at the edge of forest galleries, or grow as lithophytes on granite

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rocky outcrops. All have small, brightly colored flowers about 0.4 in (1 cm) wide. These species belong to threatened categories as EN and CR and based on the IUCN (2012) categories and criteria. *Cynorkis sacculata* is assessed as CR because of its restricted distribution and the low number of mature individuals, estimated to be fewer than 50 plants in the wild. The remaining seven species are evaluated as EN because of their small distribution ranges, records from just a few localities and a small population size with mature individuals not exceeding 250. But for all eight species, there is a decrease in their population size and the quality of their habitat due to recurrent fires in their natural environment. The small size of their populations also makes them more vulnerable to environmental disturbances.

Data on each species were gathered from field trips and KMCC data from previous projects. Information on distribution, plant habit, trade and IUCN conservation status are presented in Table 1. In addition, data on the habitat and anthesis as well as a brief plant descriptions are cited below based on our field observations and according to Cribb and Hermans (2009) and Hervouet (2018).

***Angraecum coutrixii* Bosser**

DESCRIPTION Small herb about 2.54 inches (20 cm) tall. Leaves are dark green, oblong and leathery. Inflorescence: 1–2 large, white flowers, big compared to plant size; lip ovate, spur 1.96 inches (5 cm) long.

DISTRIBUTION Restricted to central Madagascar, Fianarantsoa province.

HABITAT AND ECOLOGY Lithophyte growing in small fragmented clumps on wet mosses on quartz inselbergs between 5,200 and 6,600 feet (1,600–2,000 m) elevation.

PHENOLOGY Observed in flower in December and January.

CONSERVATION STATUS EN (Contu et al. 2018).

***Angraecum magdalenae* Schltr. and H. Perrier**

DESCRIPTION This is one of the larger angraecums and can be up to 20 inches (50 cm) tall. Leaves are long, lanceolate and leathery. Inflorescence is shorter than leaves, less than 4 inches (10 cm) long, with 1–2 large, white flowers; lip concave, spur 4 inches (10–11 cm) long.

DISTRIBUTION Occurs in north and central Madagascar (Antsiranana, Antananarivo and Fianarantsoa provinces).

HABITAT AND ECOLOGY Lithophytic growing in tufts on quartz inselbergs between 2,600 and 6,600 feet (800–2,000 m) elevation.

PHENOLOGY Plants bloom in December.

CONSERVATION STATUS EN.

***Angraecum popowii* Braem**

DESCRIPTION Small slender herb, erect up to 12 inches (30 cm) tall, leaves semiterete; inflorescence 1–2 flowered, large (for size of plant), white; sepals and petals greenish, acuminate; lip white, triangular, spur up to 6 inches (14 cm) long.

DISTRIBUTION Found in east and central Madagascar (Toamasina, Antananarivo and Fianarantsoa provinces).

HABITAT AND ECOLOGY Epiphytic on trunks of *Sarcolaena oblongifolia* and *Tapia (Uapaca bojeri, Phyllanthaceae)* trees at approximately 4,000 feet (1,200 m) elevation.

PHENOLOGY Plants bloom in

[3] *Angraecum magdelenae* growing terrestrially.

[4] *Angraecum popowii* growing on its lichen-covered host tree.

[5] A clump of *Jumellea spathulata* growing on quartzite rocks

[6] *Cynorkis cardiophylla*

October–November.

CONSERVATION STATUS EN.

***Jumellea spathulata* (Ridl.) Schltr.**

First found in the Itremo PA by KMCC.

DESCRIPTION Herb to 12 inches (30 cm) tall, lithophyte in multiple small clumps in moss on quartz inselbergs. Leaves thick and ligulate, inflorescences with 1–2 large, white, crystalline flowers; lip ovate and spathulate, spur 1 inch (2.5 cm) long.

DISTRIBUTION Occurs in Central Madagascar (Antananarivo and Fianarantsoa provinces).

HABITAT AND ECOLOGY Lithophyte on granite rocky outcrops.

PHENOLOGY Plants bloom in December.

CONSERVATION STATUS EN.

***Cynorkis cardiophylla* Schltr.**

DESCRIPTION Small herb about 12 inches (30 cm) tall. Leaf singular, basal and cordiform; stem hirsute; inflorescence with 1–5 glandular flowers; sepals and petals purple, lip white and purple, five-lobed, spur tiny, up to 1/3 inch (1 cm) long, dark purple.

DISTRIBUTION Found in south and central Madagascar, provinces of Toliara, Fianarantsoa and Antananarivo.

HABITAT AND ECOLOGY Solitary lithophytes on wet quartz inselbergs. Subpopulations few, fragmented and small, between 5,000 and 7,900 feet (1,500–2,400 m) elevation.

PHENOLOGY Plants bloom in February–March.

CONSERVATION STATUS EN.

***Cynorkis melinantha* Schltr.**

DESCRIPTION Small herb up to 12 inches (30 cm) tall. Leaf singular, basal and linear; inflorescence with up to 10 flowers; sepals and petals yellow to orange, trilobed lip similar with red dots, spur conical, short, to 1/12 inch (3 mm) long.

DISTRIBUTION Restricted to south-central Madagascar, in Fianarantsoa province.

HABITAT AND ECOLOGY Solitary lithophytes on sandy quartz inselbergs in the middle of vast grasslands between 5,000 and 5,600 feet (1,500–1,700 m) elevation. Subpopulations small and fragmented.

PHENOLOGY Plants bloom in December–January.

CONSERVATION STATUS EN.

***Cynorkis papillosa* (Ridl.) Summerh.**

DESCRIPTION Slender herb up to 12 inches (30 cm) tall, inflorescence single-flowered; sepals and petals white and purple; lip entirely purple, spur very short, conical; leaf develops at the same time as flowers.

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[7] *Cynorkis melinantha*

[8] *Cynorkis papillosa*

[9] *Cynorkis sacculata*.

[10] Quartzite rocky hills characteristic of the area.

DISTRIBUTION Distributed across central Madagascar in the provinces of Antananarivo and Fianarantsoa.

HABITAT AND ECOLOGY Solitary terrestrial in peaty soil of marshes in the grasslands between 5,000 and 7,900 feet (1,500–2,400 m) elevation.

PHENOLOGY Plants bloom in November.

CONSERVATION STATUS EN.

***Cynorkis sacculata* Schltr.**

First discovered by the KMCC team in the Itremo PA.

DESCRIPTION Thin herb, up to12 inches (30 cm) tall; solitary terrestrial in small and fragmented populations, with one lanceolate leaf; hirsute stem and flowers, inflorescences with only one or two small flowers, brownish and glandular; lip whitish, trilobed.

DISTRIBUTION Distributed in Antananarivo and Fianarantsoa provinces.

HABITAT AND ECOLOGY Grows on wet quartzite rocks and on the edge of the forest galleries between 5,200 and 7,500 feet (1,600–2,300 m) elevation.

PHENOLOGY Blooms were observed in March.

CONSERVATION STATUS CR (Members of the IUCN SSC Madagascar Plant Specialist Group 2015).

TRADE AND CONSERVATION All spe-

cies of the family Orchidaceae are included in Appendices I and II of the Convention on International Trade in Endangered Species. Despite this regulation, *Angraecum magdalenae*, *Angraecum coutrixii*, *Angraecum popowi* and *Jumellea spathulata* continue to be locally sold and collected for international trade (Table 1). As their populations in the wild continue to decline, Red-Listing species using the IUCN threatened categories, building living collections available in cultivation and seed banking for ex situ conservation constitute the best ways to develop adequate conservation strategies. Only two of the species, *Angraecum coutrixii* and *Cynorkis sacculata*, are currently listed on the website of the IUCN Red List of Threatened Species (IUCN, 2020). A few living collections of *Angraecum coutrixii*, *Angraecum magdalenae* and *Jumellea spathulata* are held in botanic gardens (BGCI 2020). Their seeds have been collected by the KMCC team and stored at the Silo National des Graines Forestières, Madagascar, and the Millennium Seed Bank, United Kingdom, for long-term conservation.

Recently, orchid research in Madagascar has mainly focused on taxonomy, genetic diversity, mycorrhizal symbionts and laboratory propagation techniques. However, study of species population sizes and their changes in time, as well as their responses to habitat change should not be neglected to ensure the best possible understanding of the current situation, and preparation toward building an adequate approach to prevent orchid extinction (Wraith et al. 2020).

Acknowledgments

We express our gratitude to the manager of KMCC, and the Royal Botanic Gardens, Kew, United Kingdom, for funding these multiple field trips and to Henintsoa Razanajatova for maps of the Itremo Massif Protected Area. A special thanks to all who joined us during field trips. We are grateful to Dr. Mijoro Rakotoarinivo and Dr. Maria Vorontsova, for providing constructive criticisms leading to the completion of the article.

— Landy R. Rajaovelona is with the Kew Madagascar Conservation Centre, Antananarivo (email: l.rajaovelona@kew.org); Franck Rakotonasolo is also an associate of the Kew Madagascar Conservation Centre, Antananarivo and Parc Botanique et Zoologique de Tsimbazaza, Département Flore (email: f.rakotonasolo@kew.org) and Larry Sexton is a member of the AOS editorial board (email: orkiddoc@aol.com).

[11] Rocky outcropping islands such as these are common in grasslands.

[12] The Tapia forest is a sub-arid and sub-humid desertlike forest with an average rainfall of about 59 inches (150 cm). July to September are typically cool and dry while the remainder of the year is warmer and wet. Temperatures at higher elevations are typically 59–77 F (15–25 C).

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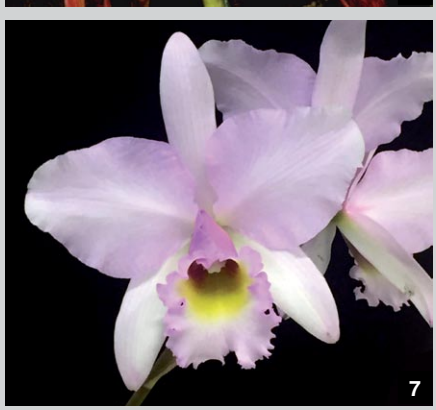
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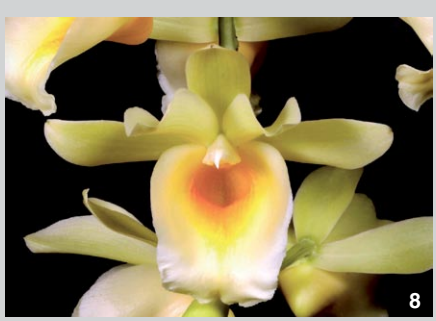
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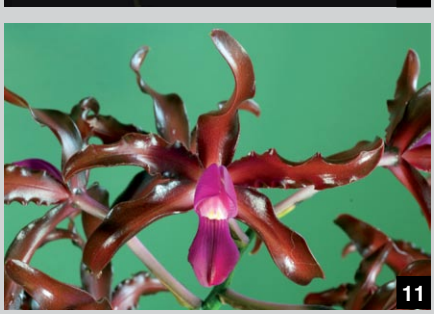
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[1] *Vanda* Barbara Walker 'Crownfox Spotted Cat' AM/AOS (Susan Best x Bruce Danforth) 84 pts. Exhibitor: R. F. Orchids, Inc.; Photographer: Tom Kuligowski. West Palm Beach Judging

[2] *Vanda* Barbara Walker 'Crownfox Peach Parfait' AM/AOS (Susan Best x Bruce Danforth) 85 pts. Exhibitor: R. F. Orchids, Inc.; Photographer: Tom Kuligowski. West Palm Beach Judging

[3] *Phalaenopsis hieroglyphica* 'Dr Z' HCC/AOS 76 pts. Exhibitor: Carolyn Fuentes; Photographer: Charlotte Randolph. Alamo Judging

[4] *Catasetum* Sylvia Soloff Beightol 'Memoria Dina Soloff' HCC/AOS (Dapper Dots x Doris's Choice) 75 pts. Exhibitor: Mark Margolis; Photographer: Tom Kuligowski. West Palm Beach Judging

[5] *Vanda* Barbara Walker AQ/AOS (Susan Best x Bruce Danforth). Exhibitor: R. F. Orchids, Inc.; Photographer: Tom Kuligowski. West Palm Beach Judging

[6] *Vanda* Barbara Walker 'Crownfox Leopard' AM/AOS (Susan Best x Bruce Danforth) 83 pts. Exhibitor: R. F. Orchids, Inc.; Photographer: Tom Kuligowski. West Palm Beach Judging

[7] *Rhyncatlaelia* Samba Point 'Tokyo' AM/AOS (*Rhyncholaeliocattleya* Turandot x *Laelia anceps*) 80 pts. Exhibitor: Fred Missbach; Photographer: Carson Barnes. Atlanta Judging

[8] *Clowesetum* Sandy Kasner 'Mark's Orangeade' AM/AOS (*Clowesia dodsoniana* x *Catasetum* Alexis Pardo) 84 pts. Exhibitor: Mark Margolis; Photographer: Tom Kuligowski. West Palm Beach Judging

[9] *Vanda* Barbara Walker 'Crownfox Samba' AM/AOS (Susan Best x Bruce Danforth) 87 pts. Exhibitor: R. F. Orchids, Inc.; Photographer: Tom Kuligowski. West Palm Beach Judging

[10] *Vanda* Barbara Walker 'Crownfox Pink Glow' AM/AOS (Susan Best x Bruce Danforth) 83 pts. Exhibitor: R. F. Orchids, Inc.; Photographer: Tom Kuligowski. West Palm Beach Judging

[11] *Laeliocatanthe* Splendid Drop 'Joan Dunlap' AM/AOS (*Laelianthe* Splendid Bow x *Cattlianthe* Chocolate Drop) 85 pts. Exhibitor: Thomas Dunlap; Photographer: Charlotte Randolph. Alamo Judging

[12] *Vanda* Barbara Walker 'Crownfox Raspberry' AM/AOS (Susan Best x Bruce Danforth) 86 pts. Exhibitor: R. F. Orchids, Inc.; Photographer: Tom Kuligowski. West Palm Beach Judging

[13] *Dendrobium* Lee Chang Yi Miriam 'Cutie Pie' HCC/AOS (*secundum* x *smilliae*) 79 pts. Exhibitor: R. F. Orchids, Inc.; Photographer: Tom Kuligowski. West Palm Beach Judging

[14] *Vanda* Robert's Delight 'Garnet Beauty' CCM/AOS (Kasem's Delight x Madame Rattana) 82 pts. Exhibitor: Wayne T. Green; Photographer: Tom Kuligowski. West Palm Beach Judging

[15] *Phalaenopsis pulcherrima* 'Cedarwood Fuchsia Embers' AM/AOS 80 pts. Exhibitor: Cecily Maciejeski; Photographer: Charlotte Randolph. Alamo Judging

[16] *Vanchoanthe* Memoria Holland Tan 'Farley T' AM/AOS (*Vandachostylis* Ocean Storm x *Papilionanda* Mimi Palmer) 81 pts. Exhibitor: Carolyn Fuentes; Photographer: Charlotte Randolph. Alamo Judging


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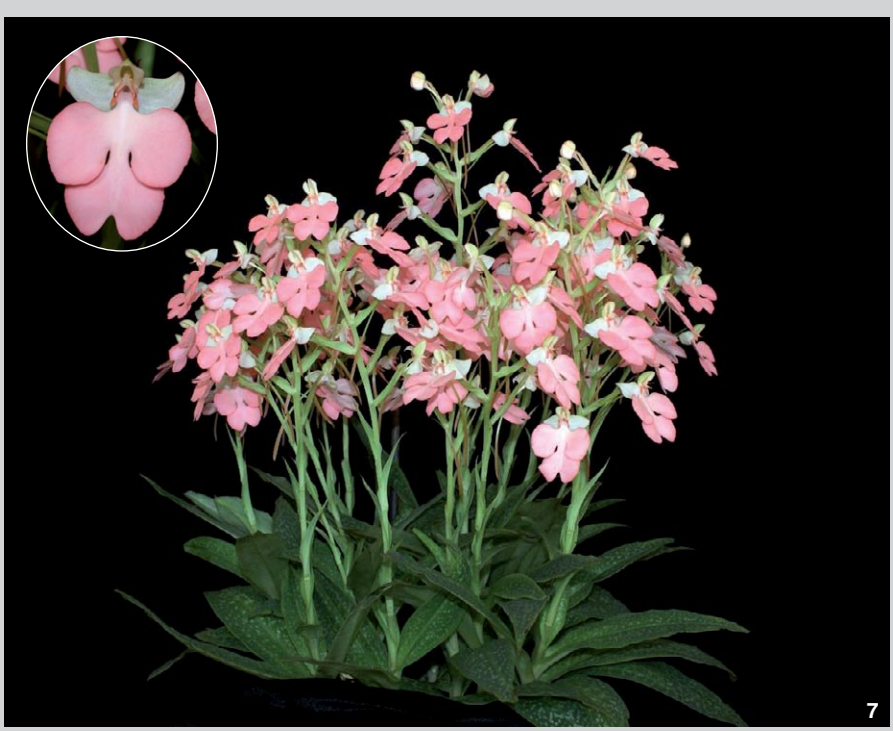
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[1] *Cattleya* Catherine Patterson 'Blissful Jo Ann' AM/AOS (Enid (1898) x Mrs. Frederick Knollys) 83 pts. Exhibitor: Ronnie Bliss; Photographer: Jason R. Mills. Atlanta Judging

[2] *Vanda mariae* 'Burnt Orange' AM/AOS 80 pts. Exhibitor: Stacey Bailey; Photographer: Jason R. Mills. Atlanta Judging

[3] *Phragmipedium* Sedenii 'Sycamore' HCC/AOS (*longifolium* x *schlimii*) 79 pts. Exhibitor: Dr. Ken & Georgia Lister; Photographer: Ken Lister. Atlanta Judging

[4] *Dendrobium* Doris Ann 'Goodstuff' AM/AOS (*biloculare* x *convolutum*) 81 pts. Exhibitor: Tom Pickford; Photographer: Ramon de los Santos. California Sierra Nevada Judging

[5] *Paphiopedilum* Toni Semple 'MBF II' AM/AOS (*haynaldianum* x *lowii*) 83 pts. Exhibitor: Marble Branch Farms; Photographer: Jason R. Mills. Atlanta Judging

[6] *Paphiopedilum* Prim-n-Proper 'Promiseland' AM/AOS (*glanduliferum* x *primulinum* var. *primulinum*) 82 pts. Exhibitor: Bonnie Armstrong; Photographer: Ken Lister. Atlanta Judging

[7] *Habenaria* Regnieri 'Millston' CCE/AOS (*carnea* x *rhodocheila*) 91 pts. Exhibitor: Joel R. Edwards; Photographer: Nile Dusdieker. Chicago Judging

[8] *Phragmipedium schlimii* var. *manzurii* 'Gabi' AM/AOS 84 pts. Exhibitor: Graham Ramsey; Photographer: Ken Lister. Atlanta Judging

[9] *Rhyncholaeliocattleya* Amy Wakasugi 'Looking Glass' AM/AOS (*Cattleya* Bonanza (Bracey) x Herons Ghyll) 84 pts. Exhibitor: Looking Glass Orchids; Photographer: Kenneth Lister. Atlanta Judging

[10] *Paphiopedilum* Spring Desire 'Slipper Zone Brazen' HCC/AOS (Dire Wolf x Spring Wolf) 76 pts. Exhibitor: Lehua Orchids; Photographer: Ramon de los Santos. California Sierra Nevada Judging

[11] *Cleisocentron gokusingii* 'Silas' CCM/AOS 89 pts. Exhibitor: Walter E. Crawford; Photographer: Nile Dusdieker. Chicago Judging

[12] *Cattleya* Zachary Hodes 'Alan Bachrach' AM/AOS (*harrisoniana* x *violacea*) 80 pts. Exhibitor: Keith Davis; Photographer: James Curtis. Carolinas Judging

[13] *Phalaenopsis* Shan-Chieh Beauty 'YPM1633 Iowa' AM/AOS (Cleopatra x Lady Blossom) 80 pts. Exhibitor: Robert Bannister; Photographer: Nile Dusdieker. Chicago Judging

[14] *Pecteilis radiata* 'Ginga' JC/AOS. Exhibitor: Tony Quirk; Photographer: Nile Dusdieker. Chicago Judging

[15] *Cattleya bicolor* 'Mendenhall Beta' HCC/AOS 77 pts. Exhibitor: William Rogerson; Photographer: Nile Dusdieker. Chicago Judging

[16] *Stanhopea oculata* 'Philip's Gold' AM/AOS 83 pts. Exhibitor: Newfield's The Indianapolis Museum of Art Greenhouse; Photographer: Richard Noel. Cincinnati Judging


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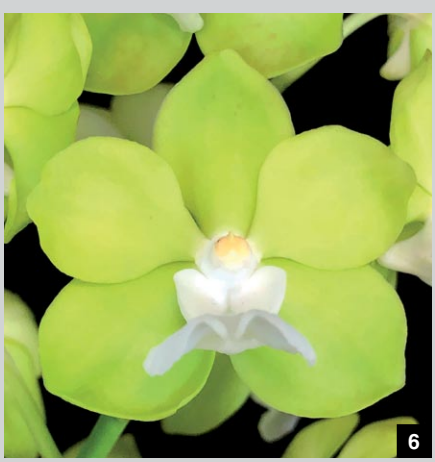
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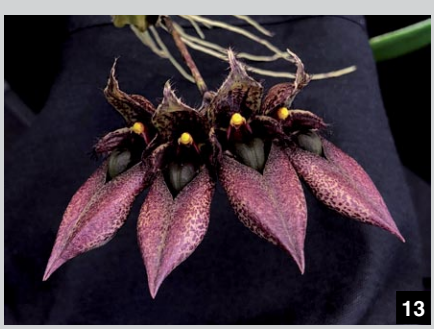
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[1] *Rhyncholaeliocattleya* Peekaboo 'Red Feather' AM/AOS (Susan Fender x *Cattleya dormaniana*) 81 pts. Exhibitor: Fred Missbach; Photographer: Carson Barnes. Atlanta Judging

[2] *Phalaenopsis* Maya's Violet 'My Violet' HCC/AOS (Mayamar x *violacea*) 79 pts. Exhibitor: New Vision Orchids; Photographer: Richard Noel. Cincinnati Judging

[3] *Rhyncholaeliocattleya* Volcano Plum 'Volcano Queen' AM/AOS (Waianae Embers x *Cattleya* Maui Plum) 81 pts. Exhibitor: Karen Davenport; Photographer: Carmen Johnston. Florida-Caribbean Judging

[4] *Cattleya* Merci Beaucoup 'OK' HCC/AOS (Seagulls Apricot x Horace) 76 pts. Exhibitor: Stephen and Jeanette Benjamin; Photographer: Richard Noel. Cincinnati Judging

[5] *Rhyncholaeliocattleya* Tampa Bay Jewel 'Whisper Winter Haven Orchid Nursery' AM/AOS (Tampa Bay Dawn x Momilani Jewel) 81 pts. Exhibitor: Laura and Wes Newton; Photographer: Wes Newton. Florida North-Central Judging

[6] *Vandachostylis* Christine Joan 'Garrett's Green Envy' AM/AOS (Mishima Lime x *Vanda vietnamica*) 89 pts. Exhibitor: Sharon and David Garrett; Photographer: Wes Newton. Florida North-Central Judging

[7] *Catasetum* Spotted Dragon 'Flights of Fancy' AM/AOS (*fimbriatum* x Orchidglade) 80 pts. Exhibitor: Mark Margolis; Photographer: Carmen Johnston. Florida-Caribbean Judging

[8] *Habenaria rhodocheila* 'Clara' HCC/AOS 79 pts. Exhibitor: Jordan Hawley; Photographer: Ann DePrez. Cincinnati Judging

[9] *Rhyncholaeliocattleya* Majestic Light 'Crown' AM/AOS (His Light x Hawaiian Treasure) 81 pts. Exhibitor: Paul Keller; Photographer: Wes Newton. Florida North-Central Judging

[10] *Cattleya* Miranda's Blue Berry 'Miranda Orchids' AM/AOS (DiPozzi Tiziano x Marcello Miranda) 83 pts. Exhibitor: Miranda Orchids; Photographer: Wes Newton. Florida North-Central Judging

[11] *Pecteilis susannae* 'Clara' HCC/AOS 77 pts. Exhibitor: Jordan Hawley; Photographer: Ann DePrez. Cincinnati Judging

[12] *Vanda devoogtii* 'Mary Motes' CBR/AOS. Exhibitor: Motes Orchids; Photographer: Carmen Johnston. Florida-Caribbean Judging

[13] *Bulbophyllum* Memoria Luis Rivero 'Whisper Black Heart' AM/AOS (*frostii* x *pingtungense*) 81 pts. Exhibitor: Laura and Wes Newton; Photographer: Wes Newton. Florida North-Central Judging

[14] *Perreiraara* Cutie Pie 'Garrett's I'm So Pretty' HCC/AOS (*Aerides lawrenceae* x *Vandachostylis* Ladda Gold) 77 pts. Exhibitor: Sharon and David Garrett; Photographer: Wes Newton. Florida North-Central Judging

[15] *Clowesetum* Sofia Margolis 'Mark's Little Pixie' HCC/AOS (*Clowesia* Rebecca Northen x *Catasetum cirrhaeoides*) 76 pts. Exhibitor: Mark Margolis; Photographer: Carmen Johnston. Florida-Caribbean Judging

[16] *Vanda* Alan Ashe Patterson 'MV Minion Horde' AM/AOS (*testacea* x *garayi*) 81 pts. Exhibitor: Stuart Henderson; Photographer: Wes Newton. Florida North-Central Judging


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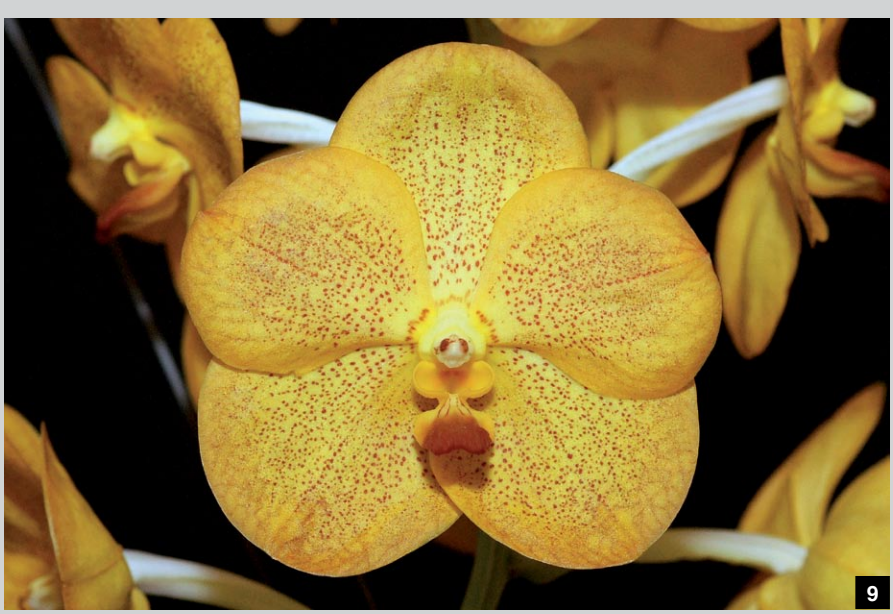
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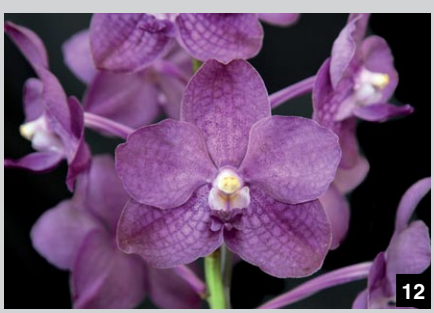

[1] *Vanchoanthe* Ben Mianmanus 'Garrett's Brown Sugar' AM/AOS (*Vandachostylis* Evergreen Magic x *Papilionanda* Mimi Palmer) 82 pts. Exhibitor: Sharon and David Garrett; Photographer: Wes Newton. Florida North-Central Judging

[2] *Phalaenopsis* Bredren's Imp 'Wright's Raccoon' HCC/AOS (LD's Bear King x *mannii*) 77 pts. Exhibitor: Harriet and Mike Wright; Photographer: Wes Newton. Florida North-Central Judging

[3] *Vandachostylis* Ploenpit Prize 'MV Wekiva Sunset' AM/AOS (*Vanda* Memoria Thianchai x *Rhynchostylis gigantea*) 84 pts. Exhibitor: Stuart Henderson; Photographer: Wes Newton. Florida North-Central Judging

[4] *Rhyncholaeliocattleya* Marion Steele 'Palmer Orchids' AM/AOS (Goldenzelle x *Cattleya forbesii*) 81 pts. Exhibitor: Marion Steele; Photographer: Beth Lamb. Florida North-Central Judging

[5] *Sealara* Khoo Kay Ann 'Nao-Ben' AM/AOS (*Paraphalaenopsis denevei* x *Papilionanda* Prolific) 80 pts. Exhibitor: Naoki Kawamura; Photographer: Wes Newton. Florida North-Central Judging

[6] *Stanhopea* Ronsard 'Dowudom' HCC/AOS (*wardii* x *oculata*) 78 pts. Exhibitor: Niyom and Sue Dowudom; Photographer: Beth Lamb. Florida North-Central Judging

[7] *Epicatarthron* Hilo Adventure 'Kim' HCC/AOS (*Cattleya* Motte Spot x *Epiarthron* Kevin Mark Ragbir) 77 pts. Exhibitor: Harriet and Mike Wright; Photographer: Wes Newton. Florida North-Central Judging

[8] *Vanda* Motes Rainbow 'Chad's Raspberry Glow' AM/AOS (Princess Blue x *curvifolia*) 84 pts. Exhibitor: Chad Whetstone; Photographer: Kay Clark. Florida North-Central Judging

[9] *Vanda* Somsri Thai Spot 'Ranlin' AM/AOS (Charles Goodfellow x Kulwadee Fragrance) 82 pts. Exhibitor: Linda Lawrence; Photographer: Beth Lamb. Florida North-Central Judging

[10] *Vandachostylis* Garrett's Blue on Blue 'Angel Baby' AM/AOS (Stephanie Blue Angel x *Vanda coerulea*) 80 pts. Exhibitor: Sharon and David Garrett; Photographer: Wes Newton. Florida North-Central Judging

[11] *Vanda* Banjong Violet 'Garrett's Raspberry Tart' HCC/AOS (Manuvadee x Yip Sum Wah) 79 pts. Exhibitor: Sharon and David Garrett; Photographer: Beth Lamb. Florida North-Central Judging

[12] *Vanda* Memoria Louis Hatos 'Purple *Passion'* AM/AOS (John De Biase x *tessellata*) 80 pts. Exhibitor: Chad Whetstone; Photographer: Kay Clark. Florida North-Central Judging

[13] *Phalaenopsis hieroglyphica* 'Bredren' AM/AOS 81 pts. Exhibitor: Bredren Orchids and Phillip Hamilton; Photographer: Beth Lamb. Florida North-Central Judging

[14] *Vanda* Jeanne et Marius Vidon 'Annie & Bella' HCC/AOS (*liouvillei* x *lamellata*) 76 pts. Exhibitor: Naoki Kawamura; Photographer: Kay Clark. Florida North-Central Judging

[15] *Vandachostylis* Michael Dean 'Dodi' *HCC*/AOS (Voja's Little Bird x *testacea*) 79 pts. Exhibitor: Naoki Kawamura; Photographer: Kay Clark. Florida North-Central Judging

[16] *Vanda* Heinz Graf 'Jamie' AM/AOS (Golden Peddler x Indio Guaicaipuro) 80 pts. Exhibitor: Naoki Kawamura; Photographer: Kay Clark. Florida North-Central Judging


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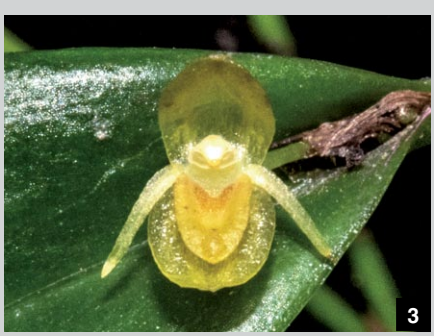
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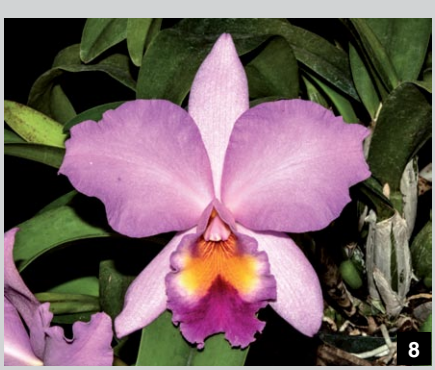
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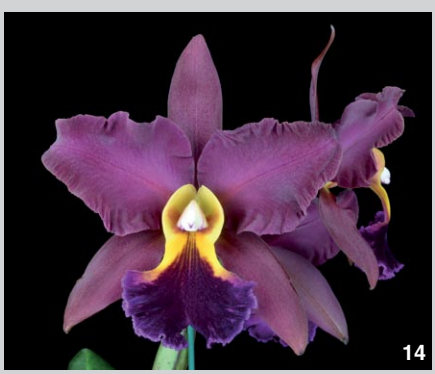
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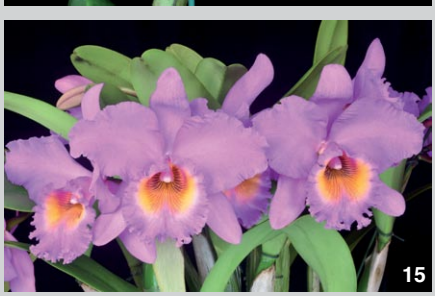
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[1] *Vaughnara* Golden Spice 'Red Pepper' HCC/AOS (*Brassocattleya* Richard Mueller x *Epidendrum stamfordianum*) 78 pts. Exhibitor: Lindsey Paris; Photographer: Wes Newton. Florida North-Central Judging

[2] *Cattleya* Fredis J. Refunjol 'Paris' HCC/AOS (*harpophylla* x *tigrina*) 77 pts. Exhibitor: Lindsey Paris; Photographer: Wes Newton. Florida North-Central Judging

[3] *Pleurothallis discoidea* 'Bryon Rinke' JC/AOS. Exhibitor: Bryon K. Rinke; Photographer: Bryon Rinke. Great Plains Judging

[4] *Cattleya velutina* 'Luke' HCC/AOS 79 pts. Exhibitor: Ben Oliveros and Orchid Eros; Photographer: Glen Barfield. Hawaii Judging

[5] *Miltonia moreliana* 'Samantha's Starry' CCM/AOS 88 pts. Exhibitor: Dennis Seffernick; Photographer: Katie Payeur. Great Lakes Judging

[6] *Paphiopedilum* Rolfei 'Honoli'is Quintessential Quagga' AM/AOS (*bellatulum* x *rothschildianum*) 80 pts. Exhibitor: Sandra Dixon; Photographer: Katie Payeur. Great Lakes Judging

[7] *Perreiraara* LeBeau Blue 'Steve Gray' AM/AOS (*Aerides lawrenceae* x *Vandachostylis* Sasicha) 82 pts. Exhibitor: Max Thompson and Bryon Rinke; Photographer: Bryon Rinke. Great Plains Judging

[8] *Cattleya* Walnut Valley Circle 'M & B' AM/AOS (Circle of Life x *mossiae*) 80 pts. Exhibitor: Max C. Thompson; Photographer: Bryon Rinke. Great Plains Judging

[9] *Habenaria janellehayneana* 'Bryon's Mini Rose' CBR/AOS. Exhibitor: Bryon K. Rinke; Photographer: Bryon K Rinke. Great Plains Judging

[10] *Habenaria* Raingreen's Pink Paw 'M & B' HCC/AOS (Tracey x *carnea*) 79 pts. Exhibitor: Max Thompson and Bryon Rinke; Photographer: Bryon Rinke. Great Plains Judging

[11] *Bulbophyllum grandiflorum* 'Polokei' CCM-AM/AOS 86-81 pts. Exhibitor: Sarah Pratt; Photographer: Bryon Rinke. Great Plains Judging

[12] *Cycnoches cooperi* 'Isabel Rosalia' CCM/AOS 88 pts. Exhibitor: Ben Oliveros and Orchid Eros; Photographer: Glen Barfield. Hawaii Judging

[13] *Cattleya* Pole-Star 'Gabriel' AM/AOS (*coccinea* x *briegeri*) 80 pts. Exhibitor: Ben Oliveros and Orchid Eros; Photographer: Glen Barfield. Hawaii Judging

[14] *Rhyncholaeliocattleya* Harriet Brickell 'St. Augustine' AM/AOS (Sydney Southwick x *Cattleya bicolor*) 83 pts. Exhibitor: Ben Oliveros and Orchid Eros; Photographer: Glen Barfield. Hawaii Judging

[15] *Rhyncholaeliocattleya* Pamela Ann Oliveros 'Mom's Best' AM/AOS (Salmon Sensation x Edith North) 80 pts. Exhibitor: Shogun Hawaii- Matthias Seelis; Photographer: Glen Barfield. Hawaii Judging

[16] *Cattleya* Pole-Star 'Sebastian' HCC/AOS (*coccinea* x *briegeri*) 79 pts. Exhibitor: Ben Oliveros and Orchid Eros; Photographer: Glen Barfield. Hawaii


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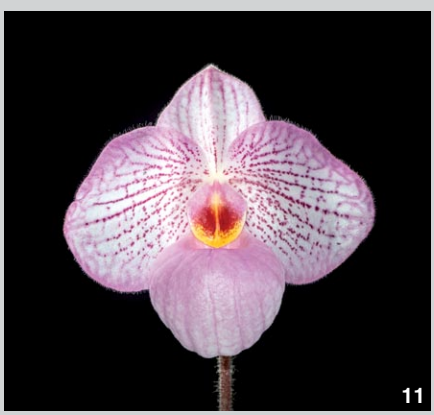
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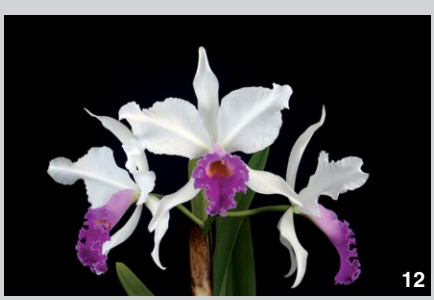
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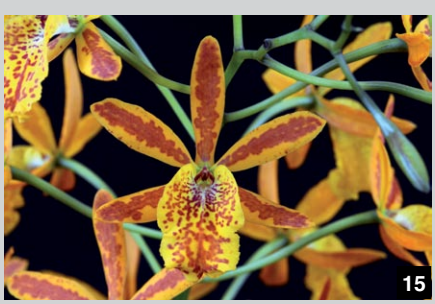
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[1] *Cattleya velutina* 'Kylo' CCM/AOS 85 pts. Exhibitor: Ben Oliveros and Orchid Eros; Photographer: Glen Barfield. Hawaii Judging

[2] *Cattleya labiata* var. *coerulea* 'Natural Wonder' AM/AOS 83 pts. Exhibitor: Tropical Orchid Farm; Photographer: Jeffrey Parker. Hawaii Judging

[3] *Cattleya bicolor* 'Sebastian Ferrell' AM/AOS 84 pts. Exhibitor: Ben Oliveros and Orchid Eros; Photographer: Glen Barfield. Hawaii Judging

[4] *Rhynchobrassoleya* Sedona's Surprise 'Louisiana' HCC/AOS (*Rhyncholaeliocattleya* Caesar's Head x *Brassavola nodosa*) 79 pts. Exhibitor: Al Taylor; Photographer: Malcolm McCorquodale. Houston Judging

[5] *Rhyncholaeliocattleya* Sydney Southwick 'Dark Devil' AM/AOS (General Grant x Eagle Island) 82 pts. Exhibitor: Shogun Hawaii- Matthias Seelis; Photographer: Glen Barfield. Hawaii Judging

[6] *Cattleya bicolor* 'Sense and Color' AM/AOS 81 pts. Exhibitor: Ben Oliveros and Orchid Eros; Photographer: Glen Barfield. Hawaii Judging

[7] *Cattleya bicolor* 'Terrapin Station' AM/AOS 83 pts. Exhibitor: Ben Oliveros and Orchid Eros; Photographer: Glen Barfield. Hawaii Judging

[8] *Paphiopedilum* Macabre Flutter 'Quiet Intent' HCC/AOS (Macabre Pops x Montera Moth) 78 pts. Exhibitor: The OrchidFix Nursery Jurahame Leyva; Photographer: Jurahame Leyva. Hawaii Judging

[9] *Cattleya* White Reception 'Breni La Rue' AM/AOS (Hawaiian Wedding Song x Douglas Johnston) 81 pts. Exhibitor: Brenda Prestegard; Photographer: Malcolm McCorquodale. Houston Judging

[10] *Miltonia moreliana* 'Spring Orchids' CCM/AOS 84 pts. Exhibitor: Denny and Renee Haase; Photographer: Malcolm McCorquodale. Houston Judging

[11] *Paphiopedilum* Magic Lantern 'Chibi Moon' HCC/AOS (*micranthum* x *delenatii*) 76 pts. Exhibitor: Vee T Du; Photographer: Malcolm McCorquodale. Houston Judging

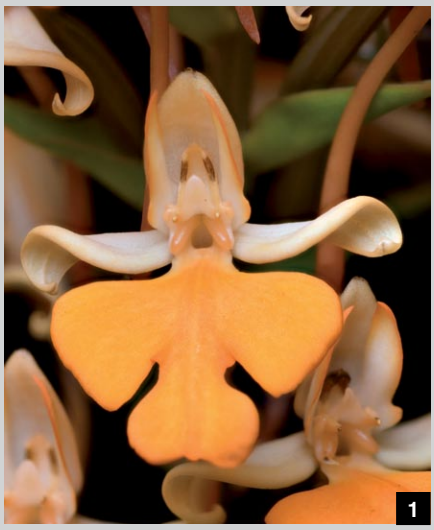
[12] *Cattleya* Memoria Scooter Adams 'Bobbie' AM/AOS (*warscewiczii* x Demarco) 85 pts. Exhibitor: Waldor Orchids, Inc.; Photographer: David Oldham. Mid-Atlantic Judging

[13] *Habenaria carnea* var. *nivosa* 'Windy Hill's White Angels' AM/AOS 80 pts. Exhibitor: Marilyn LeDoux; Photographer: Melissa Garner. Mid-America Judging

[14] *Dendrobium biloculare* 'M&M Orchids' HCC/AOS 78 pts. Exhibitor: Matt and Michelle Jaenke; Photographer: Melissa Garner. Mid-America Judging

[15] *Epicatanthe* Volcano Trick 'Angel Fire' AM/AOS (*Cattlianthe* Trick or Treat x *Epidendrum stamfordianum*) 82 pts. Exhibitor: Waldor Orchids, Inc.; Photographer: David Oldham. Mid-Atlantic Judging

[16] *Habenaria* Summer Tanager 'Doctor Judy' HCC/AOS (Conure x *roebbelenii*) 79 pts. Exhibitor: Leon Glicenstein; Photographer: Bryan Ramsay. National Capital Judging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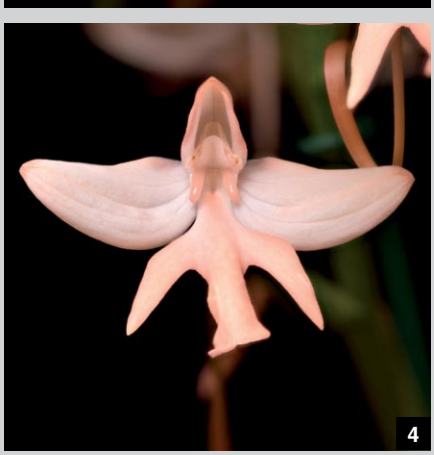
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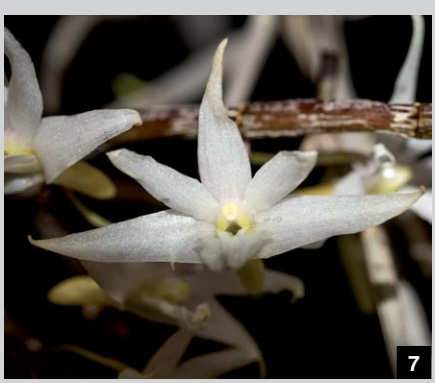
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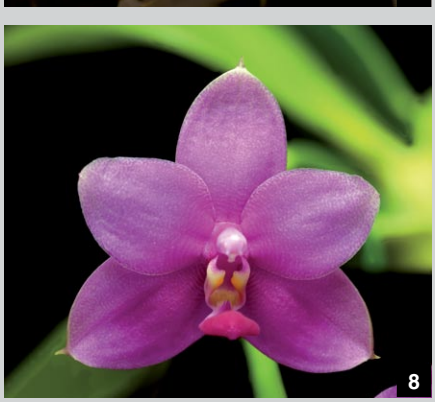
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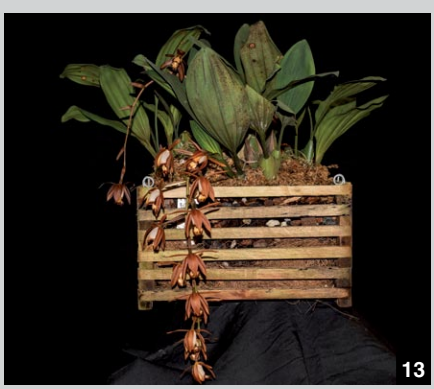
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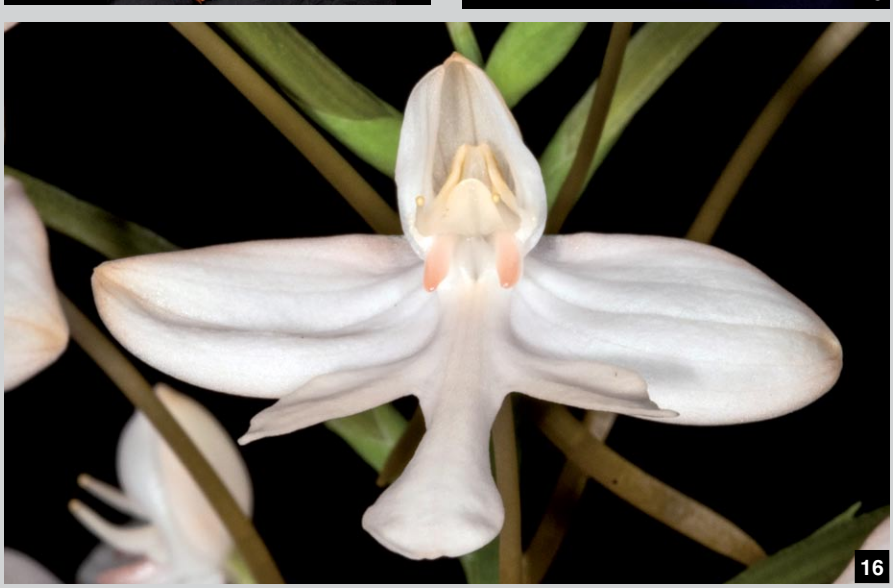
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[1] *Pectabenaria* Western Tanager 'Punkin" HCC/AOS (*Habenaria* Conure x *Pecteilis hawkesiana*) 79 pts. Exhibitor: Sarah Hurdel; Photographer: Bryan Ramsay. National Capital Judging

[2] *Habenaria* Mayfly 'Judy' HCC/AOS (Conure x *lindleyana*) 79 pts. Exhibitor: Leon Glicenstein; Photographer: Bryan Ramsay. National Capital Judging

[3] *Habenaria* Mayfly 'Doctor Judy' AM/AOS (Conure x *lindleyana*) 80 pts. Exhibitor: Leon Glicenstein; Photographer: Bryan Ramsay. National Capital Judging

[4] *Habenaria* Mayfly 'Professor Judy' HCC/AOS (Conure x *lindleyana*) 78 pts. Exhibitor: Leon Glicenstein; Photographer: Bryan Ramsay. National Capital Judging

[5] *Habenaria* Mayfly AQ/AOS (Conure 'Judy' x *lindleyana* 'Deceased'). Exhibitor and hybridizer: Leon Glicenstein; Photographer: Bryan Ramsay. National Capital Judging

[6] *Habenaria* Oriole 'B'more Hon!' AM/AOS (*roebbelenii* x *xanthocheila*) 80 pts. Exhibitor: Gary Smith and Sarah Hurdel; Photographer: Bryan Ramsay. National Capital Judging

[7] *Dendrobium klabatense* 'Irene' CHM/AOS 81 pts. Exhibitor: Al and Irene Messina; Photographer: Maurice Garvey. Northeast Judging

[8] *Phalaenopsis* Penang Belle 'STYLE' AM/AOS (Penang Ruby x *bellina*) 80 pts. Exhibitor: Little Brook Orchids; Photographer: Bryan Ramsay. National Capital Judging

[9] *Habenaria rhodocheila* subsp. *rhodocheila* 'Little Erich' CHM/AOS 84 pts. Exhibitor: Joseph J. Francis; Photographer: Bryan Ramsay. National Capital Judging

[10] *Habenaria medusa* 'Deirdre' AM/AOS 82 pts. Exhibitor: Dee and Bill Elbert; Photographer: Bryan Ramsay. National Capital Judging

[11] *Liparis cespitosa* 'Irene' CBR/AOS. Exhibitor: Al and Irene Messina; Photographer: Maurice Garvey. Northeast Judging

[12] *Robiquetia amesiana* 'Irene' CHM/AOS 82 pts. Exhibitor: Al and Irene Messina; Photographer: Maurice Garvey. Northeast Judging

[13] *Coelogyne odoardi* 'Ree Nee' CHM/AOS 83 pts. Exhibitor: Al and Irene Messina; Photographer: Maurice Garvey. Northeast Judging

[14] *Dendrobium darjeelingense* 'Memoria Lina' CCM/AOS 85 pts. Exhibitor: Gertraude Bliesath; Photographer: Maurice Garvey. Northeast Judging

[15] *Coelogyne sudora* 'Irene' CHM/AOS 80 pts. Exhibitor: Al and Irene Messina; Photographer: Maurice Garvey. Northeast Judging

[16] *Habenaria* Mayfly 'Orchidphile' AM/AOS (Conure x *lindleyana*) 82 pts. Exhibitor: Carri Raven-Riemann and the orchidPhile; Photographer: Maurice Garvey. Northeast Judging


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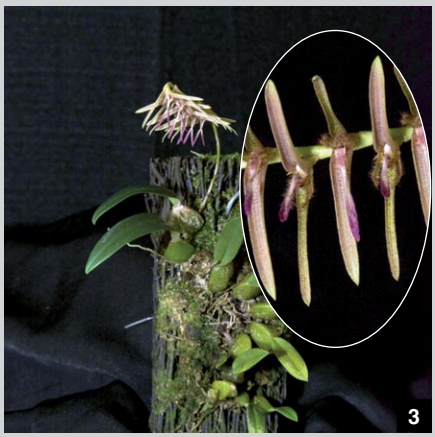
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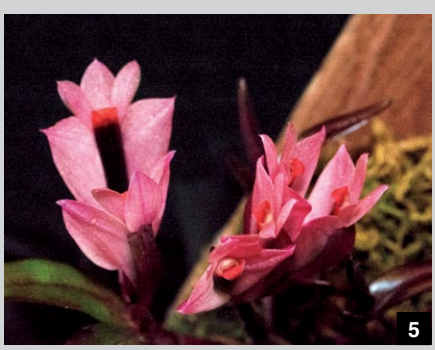
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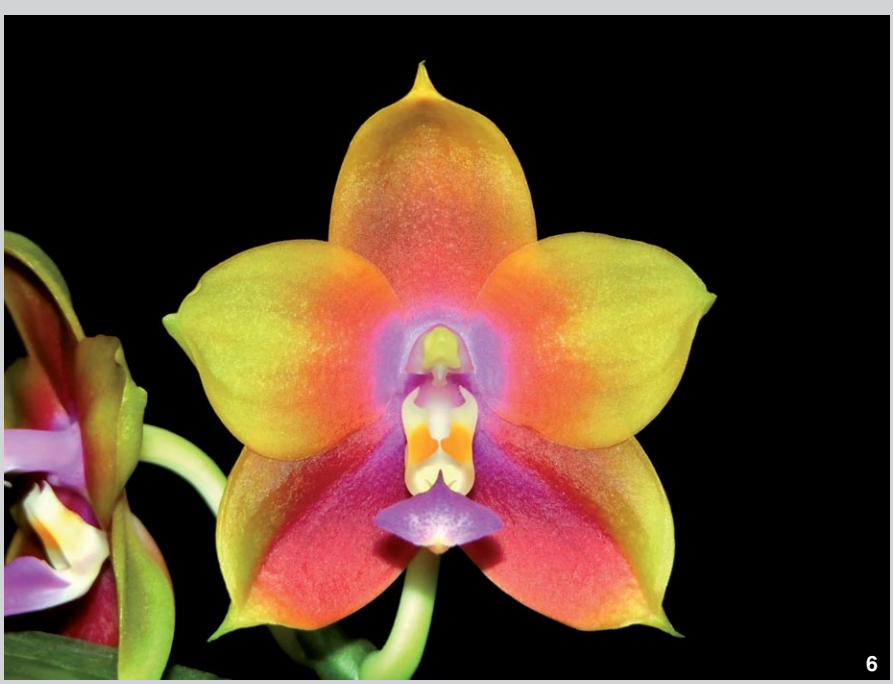
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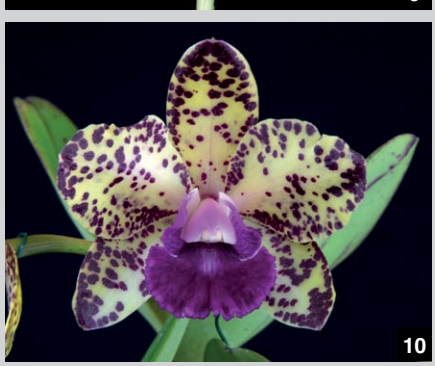
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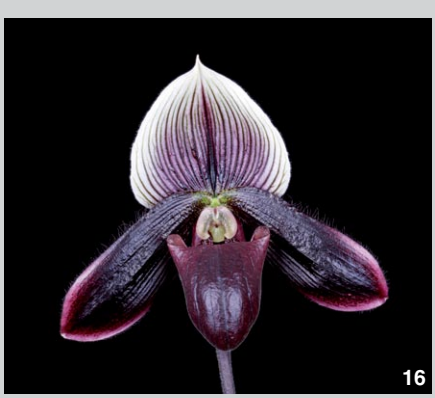
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[1] *Paphiopedilum* Saint Pinot 'Thank You Ed' AM/AOS (Saint Swithin x Pinocchio) 88 pts. Exhibitor: Carol Beule; Photographer: Arthur Pinkers. Pacific South Judging

[2] *Habenaria roebbelenii* 'Sanilac' AM/AOS 80 pts. Exhibitor: James Heilig; Photographer: Chaunie Langland. Pacific Central Judging

[3] *Bulbophyllum weberbauerianum* 'J & L' CHM/AOS 83 pts. Exhibitor: J & L Orchids; Photographer: Joseph Maciaszek. Northeast Judging

[4] *Cattleya* Tai Rose 'Linda's Aloha' HCC/AOS (Maui Plum x Landate) 79 pts. Exhibitor: Gines Orchids; Photographer: Tim Morton. Pacific Northwest Judging

[5] *Dendrobium vexillarius* var. *uncinatum* 'Raspberry Fool' CHM/AOS 85 pts. Exhibitor: Cordelia Head; Photographer: Joseph Maciaszek. Northeast Judging

[6] *Phalaenopsis* Shadow Dancer 'Phoenix Beauty' HCC/AOS (Phoenix Firebird x Dragon Tree Eagle) 77 pts. Exhibitor: Eric Goo/Phoenix Orchids; Photographer: Eric Goo. Pacific South Judging

[7] *Dendrobium nareshbahadurii* 'J & L' CHM/AOS 84 pts. Exhibitor: J & L Orchids; Photographer: Joseph Maciaszek. Northeast Judging

[8] *Cymbidium kanran* 'Fragrant' HCC/AOS 75 pts. Exhibitor: Ken and Amy Jacobsen; Photographer: Chaunie Langland. Pacific Central Judging

[9] *Cymbidium ensifolium* 'Rainbow' HCC/AOS 79 pts. Exhibitor: Japheth Ko; Photographer: Chaunie Langland. Pacific Central Judging

[10] *Cattlianthe* Terry's Spots 'Salmon Creek' HCC/AOS (*Cattleya* Katherine Clarkson x Memoria Evelyn Paquette) 78 pts. Exhibitor: Terry Aitken; Photographer: Tim Morton. Pacific Northwest Judging

[11] *Guaritonia* Why Not 'Feuerbach' AM/AOS (*Guarianthe aurantiaca* x *Broughtonia sanguinea*) 80 pts. Exhibitor: Renate Schmidt; Photographer: Arnold Gum. Pacific South Judging

[12] *Chiloschista viridiflava* 'Arnie' AM/AOS 83 pts. Exhibitor: Arnold Gum; Photographer: Arnold Gum. Pacific South Judging

[13] *Phalaenopsis* Liu's Bride Rouge 'KF #1' HCC/AOS (Pentel Gem x *equestris*) 77 pts. Exhibitor: Norman's Orchids; Photographer: Arthur Pinkers. Pacific South Judging

[14] *Cymbidium ensifolium* 'Shi Zhang Hong' AM/AOS 84 pts. Exhibitor: Baozhong Zhu; Photographer: Arthur Pinkers. Pacific South Judging

[15] *Phalaenopsis* Jiaho Blueberry 'Blue Flare' HCC/AOS (Samera x *equestris*) 79 pts. Exhibitor: Norman's Orchids; Photographer: Arthur Pinkers. Pacific South Judging

[16] *Paphiopedilum* Petula's Sensation 'Ebony Queen' HCC/AOS (Macabre Contrasts x Petula's Flame) 77 pts. Exhibitor: Fred Capriccio; Photographer: Arthur Pinkers. Pacific South Judging

COVID CONCERNS AND RESTRICTIONS CONTINUE TO SEVERELY IMPACT SHOWS. LISTED BELOW ARE THOSE CURRENTLY SCHEDULED. CANCELATIONS CAN AND DO OCCUR WITH LITTLE OR NO WARNING. SEE THE AOS WEBSITE FOR CURRENT INFORMATION OR CHECK WITH THE PERSON LISTED AS EVENT CONTACT.

JUNE

5–6—Central Florida Orchid Society Show and Sale, Oviedo Mall, 1700 Oviedo Mall Blvd., Oviedo, FL. Contact: Jerry Steele; 352–300–6023, orchidguy.steele@gmail.com

JULY

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

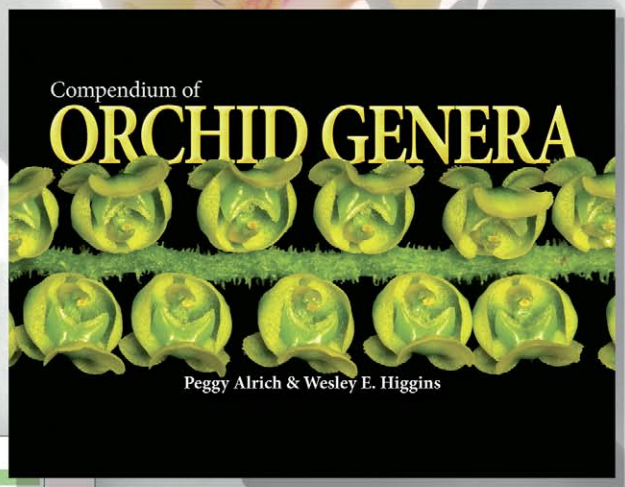
As of press time, the following judging centers are holding monthly judging events. Because of covid restrictions, this is subject to change without notice. Please contact the appropriate judging center chair before taking plants (https://www.aos.org/orchid-awards-judging/aos-judging-centers.aspx)

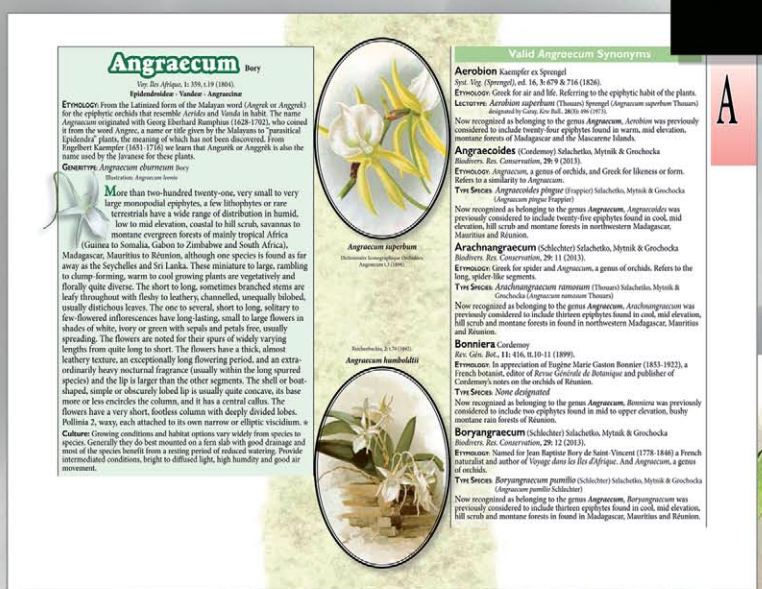
Alamo, Atlanta, California-Sierra Nevada, Carolinas, Chicago, Dallas, Florida Caribbean, Florida North-Central, Great Lakes, Great Plains, Hawaii (at least the Hilo site), Houston, Louisiana, Mid-America, Northeast (NJ location only), Pacific Central (Historic Filoli House), Puerto Rico, Rocky Mountain, West Palm Beach

ORCHID MARKETPLACE

Presenting

The Compendium of Orchid Genera by Peggy Alrich and Wesley Higgins





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

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AD INDEX

Submission of articles for *ORCHIDS* magazine

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

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The Japan Grand Prix International Orchid and Flower Show 2021

By Clare Hermans, Johan Hermans and Makiko Sato

ONE OF THE highlights of the orchid year is the Japan Grand Prix International Orchid and Flower Show or JGP. Generally held each February in the Tokyo Dome stadium, not surprisingly 2021 was different. Due to the pandemic, it was moved to the end of March and was smaller in scale. Instead of the large baseball stadium, it was held in the Prism Hall in the same complex and there were no individual plant displays. Restrictions meant that there were no overseas visitors or traders and no formal opening ceremony. Instead, Her Imperial Highness Princess Takamado, a great supporter of the show made a private visit. Visitor numbers were controlled to 50 percent capacity through pre-booked time slots, and averaged just over 2,000 a day. Nonetheless it is the first major orchid show in the world since controls were imposed and perhaps it is a sign that things are improving, at last.

Fortunately, there were still quality plants to admire and judge with over 500 entries. The visitor was greeted by a colourful gateway of phalaenopsis, lycaste and oncidium hybrids leading into a display of calanthes, a first for the show as they benefited from the month's delay. At the end was an avenue of the class winners culminating in a dais for the Grand Champion, a magnificent plant of *Dendrobium* Hawaiian Green 'Daisen'. The cross' parents were *Dendrobium schuetzei* and *Dendrobium* Jane Warne registered by Fuji Nursey in 2019, the cultivar 'Daisen' was owned by Mr. Haruyuki Kato, of Zama Orchids. Although the Mercedes car was absent this year, there was the same substantial check for ¥2,000,000 (c. $18,000).

The winner of the AOS Trophy for showing the greatest skill in cultivation of an Japanese orchid was also the Reserve Grand Champion, *Calanthe* Tokyo Bay-Dolphin 'Sawayaka' owned by Hiroshi Yamamoto. The cross' parents were *Calanthe* Ogura and *Calanthe* Fuji and it was registered by Mr. Yamamoto in 2018. He owns a nursery specialising in *Calanthe*, *Ponerorchis* and Japanese *Cymbidium*. Munekazu Ejiri, President of the Japan Orchid Growers Association said "I was very impressed with the Second Award which was also awarded the AOS Trophy. There are many purple calanthes but this one is a stunning purple, very bright which is like giving us hope for the future."

COURTESY OF THE JAPAN GRAND PRIX

COURTESY OF THE JAPAN GRAND PRIX

Dendrobium leporinum 'Hyperion' was winner of the Royal Horticultural Society Trophy for Supreme Excellence in Cultivation, owned by Mr. Yasunori Jinbo and had over 200 flowers on 53 inflorescences. The judging team for the overseas trophies was led by Harry Nagata with Masayoshi Takahashi, and Roy Ohba assisting.

Although the regulations were tiring and somewhat stressful, everyone was delighted to participate. It is hoped that there will be a 32nd JGP International Orchid and Flower Show in 2022 and for those planning a trip to Japan next spring it should be a date to put in their diary.

— Clare Hermans is the chairman of the RHS Orchid Committee (email: clare.jepson@btinternet.com). Johan Hermans is an honorary research associate of the Royal Botanical Gardens, Kew and vice-chairman of the Orchid Committee (email: orchids1@btinternet.com). Garden designer Makiko Sato has offices in Tokyo and London and is one of the organizers of the Tokyo Grand Prix International Orchid and Flower Show.

MAKIKO SATO

[1] 2021 JGP Grand Champion, *Dendrobium* Hawaiian Green 'Daisen'.
[2] 2021 winner of the AOS trophy for the most well-grown Japanese orchids, *Calanthe* Tokyo Bay-Dolphin 'Sawayaka'.
[3] 2021 winner of the RHS Trophy for Supreme Excellence in Cultivation, *Dendrobium leporinum* 'Hyperion.

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