the Tropical Garden

WINTER 2016

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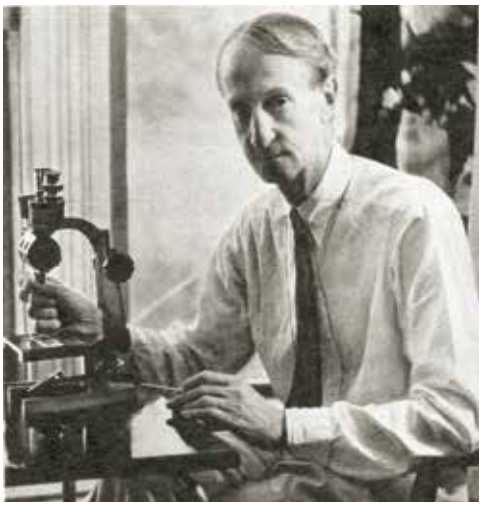
Photo by Rey Longchamp/FTBG

FEATURES



DEPARTMENTS

Freycinetia cumingiana, a spectacular plant in our Tropical Plant Conservatory, comes from a mountaintop rainforest in the south of Luzon, Philippines. A relative of the pandan, *Freycinetia* is a distant cousin of palms, grasses and bromeliads. In the Garden, *F. cumingiana* bursts into bloom in the shortest days of winter, just as it does in its native habitat. Its flowers are surrounded by showy orange bracts, making it a popular tropical garden and greenhouse plant.

We have photos of *F. cumingiana*, in black and white but still unmistakable, shot in 1940 by Dr. David Fairchild in the field. From the plant he photographed in the Philippines, Dr. Fairchild collected seeds to bring back and grow in the Garden. The plant in our Tropical Plant Conservatory was grown from a cutting of one of his original seedlings, as were many propagations we have made over the years. We have shared *F. cumingiana* with our members and horticulturists elsewhere in the United States.

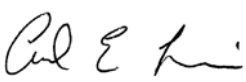
Freycinetia cumingiana
Photo by Kenneth Setzer/FTBG

We recently became aware that the *F. cumingiana* growing in the greenhouses at Longwood Gardens (Kennet Square, Pennsylvania) are also derived from Dr. Fairchild's original collection. As we look deeper, we realize that most, if not all, of the *F. cumingiana* plants in cultivation probably came from the same source. This is just one newly-discovered example of the impact Dr. Fairchild had on the horticultural world. It is a great lesson in how our work can shape tropical gardening into the future.

We are able to piece together the story of *F. cumingiana* because Dr. Fairchild was a meticulous recorder of information. Our archives include his photographs and negatives, all with detailed notes. For each plant he collected, Dr. Fairchild recorded extensive information on the origin, the habitat and anticipated horticultural requirements. Everything was written in triplicate, for himself, the U.S. Department of Agriculture and our Garden's records. As the plants began growing in Miami, he continued to record and share his observations.

As we uncover new information, we are inspired by Dr. Fairchild's worldwide exploration, the way he recorded information and the way he shared his discoveries with future generations. We continue to follow Dr. Fairchild's example, exploring the tropics for spectacular new garden plants and sharing our findings with the world. New introductions from the Caribbean and Asian expeditions of 2014 and 2015 are now making their way into our landscapes, and we have big plans for new expeditions during 2016. We hope our new plant introductions will find a place in gardens of the future. In the meantime, I hope you can visit our *F. cumingiana* while it puts on its annual show.

Best regards,



Carl E. Lewis, Ph.D.
Director

Nature does not hurry, yet everything is accomplished — Lao Tzu

Like this one, there are countless inspirational quotes attributed to the Zen-like powers of gardens. In fact, here at Fairchild, we post thought-provoking snippets on our Facebook and Twitter feeds (@fairchildgarden) as a subtle, yet constant reminder that the Garden's transformative powers beckon.

Similarly, there are scientific studies and scholarly papers published all the time about the healing benefits of nature and gardens. In fact, many hospitals have gardens for patients and families looking for a respite from that sterile, sensory-overloading environment. We're also seeing many findings from studies indicating that our über-connected lifestyle is having detrimental effects on our ability to quiet our minds.

And it's the quiet that seems to evade us most these days; and it's precisely what we most need. Quiet from the beeps, buzzes and alerts, from the breaking news and latest developments, from the multi-tasking and seemingly endless to do lists, from the traffic delays and time-crunching. Now, I'm not a "things-were-better-in-the-past" advocate. In fact, I'm a techie and a big proponent of advancements that not only create efficiencies but also improve our lives and our ability to connect with others. For example, I am eagerly awaiting the day when we can travel across the globe in an hour in sub-orbit. Or to the very near future when we can, instead of FaceTime with friends and family, Hologram with them.

But we must be vigilant that the tradeoff may be a loss of quiet; and I do believe that it's only through quiet and reflection that we can contemplate mindfully. Because it's when we're in that contemplative state of mind that we're most creative, most thoughtful and innovative—and when we can find solutions to those things that ail us.

At the New Year, it seems a good time to reconnect with nature and reflect on those resolutions. And where better to do so than at Fairchild.

Warmest regards,

Nannette M. Zapata, M.S./MBA
Chief Operating Officer

Georgia Tasker was the garden writer for *The Miami Herald* for more than 30 years, and now writes and blogs for Fairchild. She has received the Garden's highest honor, the Barbour Medal, and a lifetime achievement award from the Tropical Audubon Society. She is also an avid photographer, gardener and traveler. She graduated cum laude from Hanover College in Hanover, Indiana.

Kenneth Setzer joined Fairchild as a writer and editor with the marketing team in 2013. He contributes to print and digital media. Setzer enjoys writing about natural and human history and is an enthusiastic photographer, with a particular fascination with fungi. His educational background is in linguistics, with a B.A. from Queens College, City University of New York, and an M.A. from Florida International University.

Joyce Maschinski, Ph.D., is Fairchild's conservation ecologist. She leads the South Florida Conservation Team, which does both applied and theoretical research on rare plants of South Florida and the U.S. Caribbean. She received her B.S. and master's degrees at the University of Arizona and her doctorate from Northern Arizona University.

Cover

Phalaenopsis sp.
Come see this and many other beautiful orchids in our newest orchid exhibit: Orchid Odyssey in the Simons Rainforest.
Photo by Kenneth Setzer/FTBG

the TROPICAL GARDEN

The official publication of
Fairchild Tropical Botanic Garden

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SCHEDULE OF EVENTS

Festivals

14TH ANNUAL INTERNATIONAL ORCHID FESTIVAL
Friday, Saturday and Sunday,
March 11–13
9:30 a.m.–4:30 p.m.

SPRING GARDEN FESTIVAL
Saturday and Sunday,
April 9 and 10
9:30 a.m.–4:30 p.m.

Ticketed Events

GALA IN THE GARDEN
Saturday, February 6
6:30 p.m.

VALENTINE'S DAY CONCERT
Sunday, February 14
7:00 p.m.

MOTHER'S DAY BRUNCH
Sunday, May 8

FATHER'S DAY BBQ
Sunday, June 19

Plant Shows and Sales

SOUTH FLORIDA PALM SOCIETY'S SPRING SHOW AND SALE
Saturday and Sunday,
April 2 and 3
9:30 a.m.–4:30 p.m.

BROMELIAD SOCIETY OF SOUTH FLORIDA'S ANNUAL SHOW AND SALE
Saturday and Sunday,
April 16 and 17
9:30 a.m.–4:30 p.m.

TROPICAL FLOWERING TREE SOCIETY'S ANNUAL SALE
Saturday and Sunday,
May 7 and 8
9:30 a.m.–4:30 p.m.

TROPICAL FERN AND EXOTIC PLANT SOCIETY'S ANNUAL SHOW AND SALE
Saturday and Sunday,
May 21 and 22
9:30 a.m.–4:30 p.m.

Tours

DAILY TRAM TOURS OF THE GARDEN
On the hour

WEEKDAY WALKING TOURS
10:15 a.m.,11:15 a.m.,
12:15 p.m., 1:15 p.m.
and 2:15 p.m.

BUTTERFLIES: WINGED WONDERS AND THE PLANTS THEY LOVE
Saturdays and Sundays,
10:00.–11:30 a.m.

EARLY-BIRD WALKS
Saturdays and Sundays,
Through May 1
7:30.–9:30 a.m.
Tours added daily. Check the information desk upon arrival.

Family Fun

ORCHID ODYSSEY
Now through April 30
9:30 a.m.–4:30 p.m.

ART AT FAIRCHILD: PRESERVING EDEN BY CLYDE BUTCHER
Now through April 30
9:30 a.m.–4:30 p.m.

LEAF (LET'S EXPLORE AT FAIRCHILD)
February 13, 14, 27, 28
March 26, 27; April 23, 24
May 14, 15, 28, 29

FAIRCHILD ARTISTS IN BLOOM ART EXHIBITION
April 21–24

SUNDAY SOUNDS
1:00 p.m.
February 7, March 6,
April 3, May 1
Live music performed by students of University of Miami's Frost School of Music, on select Sundays in the Glasshouse Café.

Garden Tea

FIRST LADIES TEA
Sunday, February 21
3:00 p.m.

THE ORCHID TEA
During the Orchid Festival
Friday, Saturday and Sunday,
March 11–13
9:30 a.m.–4:30 p.m.

SPRING GARDEN TEA
During Spring Garden Festival
Saturday and Sunday,
April 9 and 10
9:30 a.m.–4:30 p.m.

MOTHER'S DAY TEA
Sunday, May 8
3:00 p.m.

For more information on tea events, pricing and reservations, please call Marnie Valent at 305.663.8059 or email mvalent@fairchildgarden.org

This schedule of events is subject to change. For up-to-the-minute information, please visit www.fairchildgarden.org/events. Tickets for events at www.fairchildgarden.org or by calling 305.667.1651.

16 REASONS TO GIVE TO FAIRCHILD IN 2016

Support **Fairchild's 2016 Annual Fund** Campaign.
We hope you'll take a moment and **make a gift to Fairchild**, because we need your help this year!

1. We are growing and reintroducing 1 million orchids in South Florida as part of our **Million Orchid Project.**
2. We are **engaging students from over 120 schools with NASA** to find edible plants for future missions to Mars.
3. We are reaching over 150,000 students each year through **The Fairchild Challenge.**
4. Together with Miami-Dade County Public Schools, we inaugurated **BioTECH, the first botany high school in the United States**, and will train 1,000 students during the next four years for careers in botany.
5. In the tradition of Dr. David Fairchild, our plant scientists and horticulturists **explore the world for plants useful to humans.**
6. We offer the most **robust cultural programming** of any institution in South Florida, and our Art and Sculpture Garden program is a model for connecting art and nature with hundreds of thousands of visitors each year.
7. Our **Wings of the Tropics** exhibit features the greatest diversity of exotic butterflies in the Southeast.
8. Our horticulturists and volunteers **grow and replace endangered plants** like cacti, ferns and orchids back into the environment.
9. Our **PlantMobile brings science and nature to local schools** and engages students in hands-on botany.
10. **DNA research at Fairchild** is ensuring our most beloved crops, like the mango, will flourish in a warmer climate.
11. We are one of **South Florida's oldest cultural institutions** and have played an important role in the community since 1938, offering events and festivals year-round to educate visitors on conserving the tropics while providing fun activities for the whole family.
12. Our conservation science and botanical education work keeps us on the **forefront of STEM initiatives.**
13. Our **Connect to Protect** program is dedicated to preserving the disappearing pine rockland habitat found only along Miami's rock ridge by distributing native plants to Miami-Dade County residents and enriching their landscapes.
14. We have been among **the most important botanical resources in the world** for nearly 80 years and continue to maintain our plant collections, the heart of all we do as a world-renowned botanic garden.
15. We are ensuring that the Garden remains the **world's most important resource for tropical horticulture.**
16. **We connect people with plants and a love of nature**, while being among the most beautiful gardens in the world.

DONATE TO THE ANNUAL FUND TODAY !

www.fairchildgarden.org/give

Follow as the dreams become reality @FairchildGarden

VISIT US

10901 Old Cutler Road, Coral Gables, FL 33156
T: 305.667.1651 F: 305.661.8953
7:30 a.m.–4:30 p.m. (except December 25)

Admission: Free for Fairchild members and children 5 and under. Non-members: $25 for adults, $18 for seniors 65 and up and $12 for children 6-17.

Eco-Discount: Walk, bike or ride public transportation to Fairchild. Non-members receive $5 off an adult admission and $2 off children's admission. Fairchild members receive a loyalty card to earn a gift admission after five visits.

Military Discount: We offer active military personnel and veterans free admission. Please present Military IDs.

FAIRCHILD BLOG

Follow the Fairchild Blog at
www.fairchildgarden.org/blog

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Inquiries: 305.667.1651, ext. 3351
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Become a member and enjoy Garden benefits all year long.
Inquiries: 305.667.1651, ext. 3301 or 3362
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Volunteer

Become a volunteer and help the Garden grow.
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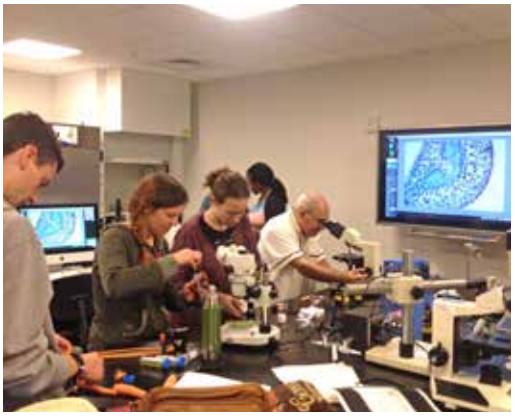
Work by Fairchild's High School Summer Interns Accepted for Publication

This past summer, 14 dedicated student interns from high schools participating in The Fairchild Challenge and BioTECH @Richmond Heights conducted research at Fairchild. They worked under the direction of Dr. Joanna Weremijewicz and Jason Downing as part of The Million Orchid Project. Fairchild scientists and graduate fellows instructed the students in all components of the scientific research process—from project inception to submitting an article for publication. The interns used this unique opportunity to work in the DNA lab of Fairchild's DiMare Science Village and submitted the results of their work for publication. We are pleased to announce that the work of our 2015 summer interns has been accepted for publication in the journal *Applications in Plant Sciences*. The article, entitled "Microsatellite Primers for Two Threatened Orchids in Florida; *Encyclia tampensis* and *Cyrtopodium punctatum* (Orchidaceae)," is the culmination of the interns' hard work.

New Plant Expedition to Southeast Asia

Fairchild's Jason Lopez and Dr. Chad Husby spent more than a month at the end of 2015 intensively exploring markets in Thailand and Singapore for new plants for Fairchild, as well as learning from horticultural experts in Indonesia and Malaysia. The November 26–January 1 trip, generously supported by Dr. Lin Lougheed, was scheduled to coincide with the Rama 9 plant show and sale in Bangkok, arguably the single most diverse offering of tropical plants in Southeast Asia. In addition to finding hundreds of new plants for the garden, Lopez and Husby had the opportunity to meet many of the most knowledgeable and active horticulturists in tropical Asia. They discovered horticultural treasures including rainforest palms with spectacular leaf colors, rare island plants with dramatic foliage from Mauritius and New Caledonia, as well as stunning new gingers and heliconias.



Graduate Workshop Explores Plant Anatomy In-Depth

In December, Fairchild co-hosted a Plant Anatomy and Histology Workshop for graduate students, in partnership with Florida International University. Dr. Andrew Vovides from the Francisco Javier Clavijero Botanic Garden (Instituto de Ecología y Sistemática) in Xalapa, Mexico, and Dr. Brett Jestrow, Fairchild's herbarium curator, led the intensive course. It covered all aspects of microscopes as applied to plants—from staining and preparation to photography. Course attendees were primarily FIU graduate students, joined by Tracy Commock, director of the Natural History Museum of Jamaica, and graduate student Mona Campus from the University of the West Indies.

Introduced tropical bee *Centris nitida* visiting *Byrsonima lucida* at Fairchild.

Fairchild's Bees and Extreme Cold Weather

Many of us remember the historic cold spell that struck South Florida in January of 2010. The mass die-off of local biota was unprecedented. In an upcoming publication of *Ecosphere*, Dr. Hong Liu and graduate students Jason Downing and Haydee Borrero examine the impacts of this extreme weather event on native and introduced oil bees at Fairchild. These bees are important because they are the main pollinators of the endangered Florida cowhorn orchid (*Cyrtopodium punctatum*) and native locust berry (*Byrsonima lucida*) in South Florida. The study included five years of pollinator-plant interaction intensity data and employed the help of students from Florida International University's Restoration Ecology course. They found that the cold spell had little impact on the abundance of the native bees, which are subtropical. But it did reduce the population of the introduced, tropical, bees.

The findings demonstrate that extreme cold spells are important climate change-related phenomena, which have strong impacts on tropical species distributions and abundances, especially at the threshold of their thermal tolerances. The data offered a rare opportunity to examine impacts of stochastic—randomly determined—events on species interactions, which will contribute to a more realistic assessment of the potential impacts of climate change.

DNA Fingerprinting of a Critically Endangered Palm from Hispaniola

During the course of the last year, Fairchild has furthered DNA fingerprinting techniques for the Caribbean palm genus *Coccothrinax*. This initiative has lead to a study of *Coccothrinax jimenezii*, a Critically Endangered palm restricted to only two populations—one in Haiti and the other in the Dominican Republic. In total, only 51 individuals of this palm exist. Key to this conservation genetics project has been the time and expertise of Garden volunteers Dr. Michael Hass and Andrew Reeve, who have produced much of the molecular data. The work by Dr. Brett Jestrow (Fairchild) and Dr. Javier Francisco-Ortega (Florida International University) has also been supported by the Mohamed Bin Zayed Species Conservation Fund. Fieldwork was conducted in collaboration with colleagues from the Botanic Garden of Cayes and the National Botanic Garden of the Dominican Republic.

In the fall 2015 issue of *The Tropical Garden* magazine, we announced our exciting new partnership with the National Aeronautics and Space Administration (NASA): the Growing Beyond Earth Challenge. The goal of the project is to provide South Florida middle and high school students the opportunity to conduct authentic horticultural research in the classroom.

GROWING BEYOND EARTH

Fairchild's Innovative Partnership with NASA

By Amy Padolf

NASA Research Scientist, Dr. Gioia Massa working on the Veggie System at Kennedy Space Center. Photo by Amy Padolf/FTBG

Together, Fairchild and NASA are administering plant experiments with 124 schools participating in **The Fairchild Challenge**, to determine which edible plants might be suitable for growth in microgravity aboard the International Space Station's plant growth facility.

This is the Challenge:

Florida will be the jumping-off point for the next generation of human exploration. Just as the ancient Polynesians traveled to distant islands, scientists are preparing for expeditions to the moon, near-Earth asteroids and Mars. As in ancient times, it is clear that plants will play a central role in our voyages. Plants provide food, oxygen and psychological benefits to astronauts in confined spaces. As part of NASA's Veg-01 project, scientists are testing food plants to see which will grow best under the conditions aboard the International Space Station.

For many years, life scientists at NASA's Kennedy Space Center (KSC) have been working on food production for bio-regenerative life support. Recently, plant scientists on the KSC team successfully grew plants in space using a space garden they created that has been on the International Space Station (ISS) since 2014. Called "Veggie," the garden is a small plant growth chamber designed to grow fresh vegetables, herbs and flowers as a means of providing astronauts and future Mars explorers with fresh plants for food and for their aesthetic ambiance.

In May of 2015, Fairchild began a partnership with KSC to help further NASA's plant-based research by calling upon the Garden's large network of highly-engaged, STEM-minded, students and teachers. Most were already participating in ongoing citizen science projects through our award-winning Fairchild Challenge program. Together with NASA scientists, we engineered and installed plant growth chambers similar to Veggie in classrooms throughout Miami-Dade County Public Schools—leveraging an army of nearly 50,000 middle and high school students and teachers in the nation's fourth-largest school district. The "Growing Beyond Earth Challenge" was designed to expand crop options and increase plant diversity by testing multiple plants that meet NASA's criteria for size and edibility.

Using equipment that mimics the environmental conditions aboard the International Space Station, students have been testing factors that may influence plant growth, flavor and nutrition. NASA will use students' data to determine which plants it should begin growing in space. The program began in September 2015, when more than 200 teachers and school administrators participated in a daylong, highly interactive, workshop that included presentations from the scientists from KSC and the

plant experts at Fairchild. During the workshop, teachers received specialized training on how best to grow plants in the classroom, collect important data and communicate results.

In order to maintain the integrity of the experiment, we provided each school, free of charge, with the necessary equipment and materials that mimic NASA's Veggie system. Each "mini botany lab" consists of a specially designed growth chamber, LED lighting, watering system, pots, soil, fertilizers and seeds. Scientists at Fairchild and NASA designed formal scientific research protocols that all of the schools have been following. Together, NASA and Fairchild selected plants for this project. Seed selection was based on specific growing conditions and outcomes, including the ability to thrive under LED lights, a large, edible biomass and vitamin content (with an important factor being that some vitamins cannot be preserved and transported great distances).

During this year's experiment, our control has been the cultivar currently being grown on the International Space Station: OutRedgeous romaine lettuce. We have utilized social media to maintain regular communication with the schools, problem-solve growth issues and communicate results with the world. Each class has used Twitter, tweeting at least once a week to share their progress or an interesting finding. Since the beginning of the project, more than 100 tweets have come in each week—with significant data, images, charts and graphic representation of the results of the experiment. You can follow the feed on Twitter @fairchdchallnge.

Students also have additional opportunities to contemplate our future journey and explore the impact of their research on space exploration. For instance, during Fairchild's 2016 Spring Garden Festival, students will present culinary masterpieces created using plants that NASA is currently considering for growth in space. As in the blockbuster movie "The Martian," students must consider the space required to grow the plants and their calorie count. Each serving must contain at least 100 calories and require no more than 250 square centimeters of growing space.

With the first research trials of the Growing Beyond Earth Challenge completed, we have already learned a tremendous amount about how to grow plants for future space journeys. Participants have sent more than 5,000 pieces of data to NASA researchers. The promise of truly impacting the research at NASA and our continued collaboration is significant and real. Ultimately, the program will empower South Florida's diverse student population with an opportunity to explore real-world research and consider careers in science fields.

We need your help! To support our education efforts and this out-of-this-world initiative, please visit www.fairchildgarden.org/give.

High school students harvesting lettuce grown as a part of the Growing Beyond Earth project. Photo by Education Staff/FTBG

Become a **Fairchild Volunteer** and let **a few hours** of your time **blossom** into a world of **new experiences**!

Fairchild volunteers serve the Garden, the South Florida community and the world through their hands-on, interactive participation in Fairchild's programs and activities, while meeting others who share their interest in plants, people and gardens. Current volunteer opportunities include hosting, assisting in the Wings of the Tropics exhibit and guiding visitors.

To learn more about becoming a Fairchild volunteer and how you can help the Garden grow, come to one of the upcoming Volunteer Information Days.

To attend a Volunteer Information Day or to learn more about becoming a Fairchild volunteer, please visit us at
www.fairchildgarden.org/volinfo
or call 305.667.1651 ext. 3360.

FTBG

Student Volunteers: SucSEEDing in planting for their futures

Text and photo by Niki Saylor

On weekends during the school year, and any day during the summer, teams of adults and high school students volunteer at the Wings of the Tropics exhibit in the Clinton Family Conservatory. Ted Adelman, the Saturday afternoon day captain, says that working with teen volunteers is gratifying because the students are interested in learning and glad to give back to the community. Adelman especially enjoys having five current John A. Ferguson High School students—Taiss Arzayus, Andrea Mora, Joel Cardoso, Flor Mireles and Valentina Satizabal—on his team. He says he sees them "… progress and shed their shyness as they learn to interact with visitors in the butterfly conservatory." He adds it is good for society to have the teens work alongside "geezers" like him, facilitating a positive interchange between generations.

BioTECH @Richmond Heights sophomore Cindy Bravo, a Let's Explore at Fairchild (LEAF) volunteer, enjoys giving children the opportunity to learn about the environment through educational games and crafting. Gardening is Palmetto High senior Kimberly Zinzell's favorite activity. "As part of LEAF, I teach kids how to plant herbs and vegetables at the Learning Garden. They are fascinated to learn how their food grows, and they are given seeds to take home to start their own gardens, too," says Zinzell.

BioTECH sophomores actively volunteer with the Micropropagation Lab, gaining laboratory experience as well as new knowledge about native orchids. Caro Valdes says she's learning lab techniques that many students don't acquire until college. "Every day I walk into Fairchild, it is hands-on learning," she adds. "You're working with plants and informing the community. It's an amazing experience." Along with lab skills, students develop interpersonal skills by engaging with Garden visitors and explaining The Million Orchid Project. Student Natalie Leon says, "It was hard to imagine a couple of years ago that I would not only be willing, but actually excited about, presenting information in front of a group of people. Volunteering has helped me get over my fear of public speaking, something I never thought possible."

As a part of her studies at BioTECH @Richmond Heights and volunteering at Fairchild, sophomore Darlene Darrican teaches visitors about the South Florida environment and the importance of habitat restoration.

Students often say being mentored by Fairchild staff and veteran volunteers has encouraged them to grow into environmentally aware citizens and helped them to develop life skills to prepare for a future profession. Emilio Arias, a Palmetto High senior and Wings of the Tropics volunteer, is considering a career in biology or environmental science thanks to all he has learned while giving more than 400 volunteer hours at Fairchild. Palmetto High's Zinzell is grateful for "the opportunity to learn how to communicate with children," which will help if she pursues her interest in pediatrics.

Fairchild high school volunteers generously gave over 3,300 hours of service to the Garden last year, serving as role models for younger visitors by demonstrating their commitment to the Garden's mission and by expressing their desire to give back to the community. Keep up the good work and thanks, high school volunteers!

Any interested high school students, age 16 or older, are invited to attend an upcoming Fairchild Volunteer Information Day in June 2016.

For more information or to register, please visit www.fairchildgarden.org/volinfo or call 305.667.1651, ext. 3360.

Hibiscus schizopetalus

Brugmansia suaveolens

Pavonia bahamanesis

Brunfelsia grandiflora

Goetza elegans

Winter Blooms

Text and photos by Marilyn Griffiths and Jason Lopez

In reviewing the many plants that flower in the winter here at the Garden, I saw relationships between more than a few of them. Two families, Malvaceae and Solanaceae, stood out, with several species represented from each.

Malvaceae, the mallow family, contains approximately 240 genera and 4,000 species, including cotton, chocolate and okra. Of the 94 species at the Garden, I've chosen three to focus on in this issue.

Hibiscus schizopetalus, fringed hibiscus, is native to tropical Africa. Our specimen near the Tram Plaza was brought into the Garden by Dr. John Popenoe in 1978. The brilliant red flower is hanging down beneath the foliage, with the pistil and stamens descending below the petals. It can also be found in Plot 33 with other members of this genus.

***Dombeya* x 'Seminole'** is a hybrid developed in the 1970s at the USDA Plant Introduction Station at Chapman Field in Miami-Dade. The genus *Dombeya* is native to Africa. Our specimen in Plot 35 is a descendant of the original plant received in 1980 from the U.S. Department of Agriculture. A graceful rounded shrub, it is covered with deep pink flowers in the winter.

Pavonia bahamensis, Bahama swamp-bush, is endemic to the rocky coastal thickets of the Bahamas. The unusual greenish-yellow flowers are a great favorite of hummingbirds. Find

these plants in Plots 26 and 35, as well as in Plot 166, our Bahamas Collection.

The nightshade family, Solanaceae, is another large family with familiar species. Tomato, potato, pepper, tobacco and petunia are all in this family. At Fairchild, we have 39 species in 11 genera.

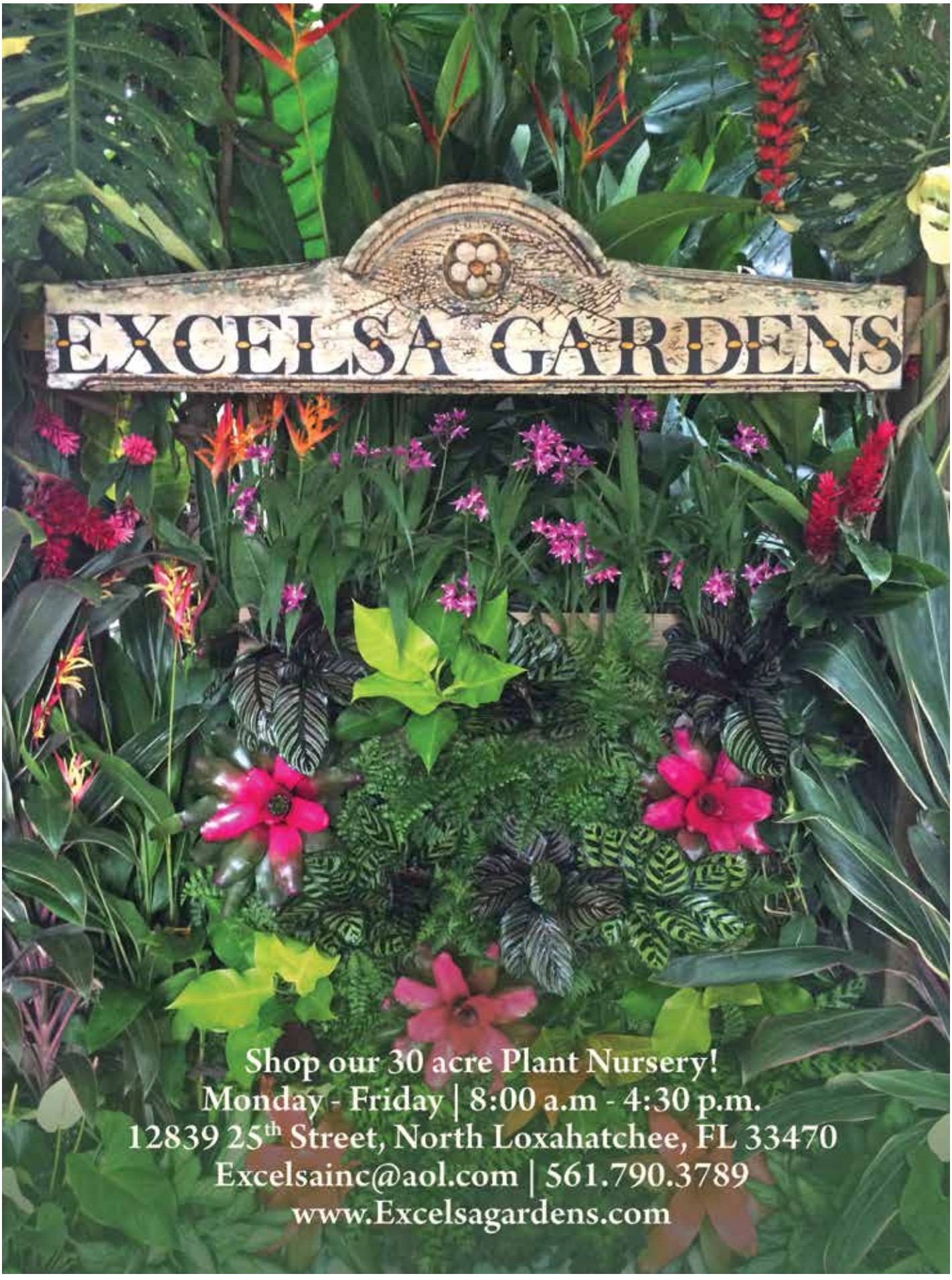
Ten species of *Brunfelsia* grow at Fairchild, mostly in the Arboretum. One of the most stunning is ***Brunfelsia grandiflora***, native to Peru. A large shrub, it generally begins flowering in December and continues until May. The blossoms open deep bluish-lavender and fade over time to almost white. It is a highlight along the tram road in Plot 5.

Brugmansia suaveolens, a native of Brazil, is an extraordinary flowering shrub. Large trumpet-shaped flowers drape in abundance from the branches. White while developing and opening to creamy pink, they produce a sweet fragrance in the night to attract pollinating moths. Our specimens can be found in Plots 49 and 50 in the Arboretum.

Goetzea elegans, mata buey, is a tree from Puerto Rico. Because of habitat destruction, the International Union for Conservation of Nature (IUCN) has determined it to be critically imperiled. Amidst its glossy oval leaves, delicate yellow flowers appear, followed by deep-yellow fruits. Look for this attractive tree in Plot 5 and the southern part of Plot 27 (the Solanaceae plot) as well as in Plot 158, one of the Caribbean plots in the Lowlands.

The Garden's Plot Map and What's Blooming List are available at the information desk at the Shehan Visitor Center and at the South Entrance welcome booth. A list of the Garden's complete plant collection is also available at the Visitor Center information desk. Be sure to pick up both when you visit.

Visit www.fairchildgarden.org for the current list of What's Blooming in the Garden.



The Art of Botanical Illustration

By Donna Torres

Perfecting the blend of art and science is one of the botanical illustrator's roles in creating a work. She or he will make sure that, from just a glance at the drawing or painting, many things about the plant become evident. The observer must quickly gather knowledge about the plant's growth pattern, its color and texture, its seeds and other important features.

You may ask, "Why bother with drawing or painting if we now have cameras and lenses capable of capturing the most-minute detail?" While these have their use, there are still some things best seen and illustrated by the human eye and hand. For instance, humans are capable of color matching with an acute sensibility. When documenting a plant in the field, the artist will record the colors of the plant on-site. A camera might record the color a little warmer or cooler, but the artist can capture the color exactly as he or she sees it. Even in the early days of plant exploration, artists were asked to record the colors of plants in the field. For example, during the scientific Malaspina expedition of 1789, a five-year exploration of the Pacific sponsored by the Spanish government, the naturalist Thaddäus Haenke crafted detailed color charts. Each color was numbered for future reference and served to guide the illustrators who might complete the drawings and paintings upon their return to Europe.

In addition to color accuracy, botanical artists spend much time with the plants, which allows for long observations. They return to observe plants during different times of the year to document their various stages. The color and size of leaves may vary with the seasons; the flowers and fruits will appear at different times. These drawings are often combined to show many aspects of the plant in one drawing or painting.

Nature photographers can learn from the study of botanical illustration, too. The hands-on approach to observing the details in plants can serve to make the photographer aware of delicate features and growth patterns. Studying plants in detail adds to the photographer's sensitivity about light and color. Illustrators are also concerned with a plant's habit—the ecology and landscape in which a particular plant thrives. Nature photographers attune themselves to the larger picture and often have a similar interest in ecological systems.

Artists have found the path to botanical illustration as a way to enhance their work. My oil paintings became richer when I could put in features appropriate to a particular plant species. Along the way, I found I enjoyed the detailed depiction of plants and my botanical illustration practice was born. Botanical art students have described to me how studying botanical art has opened their eyes to details about nature they wouldn't have noticed before. It is a practice that makes you more aware of the world around you and helps develop a closer relationship with the ecology of your personal landscape.

Interested in learning botanical illustration? Find current class schedules at www.fairchildgarden.org/education.

Psychotria viridis
Watercolor
Artwork by Donna Torres

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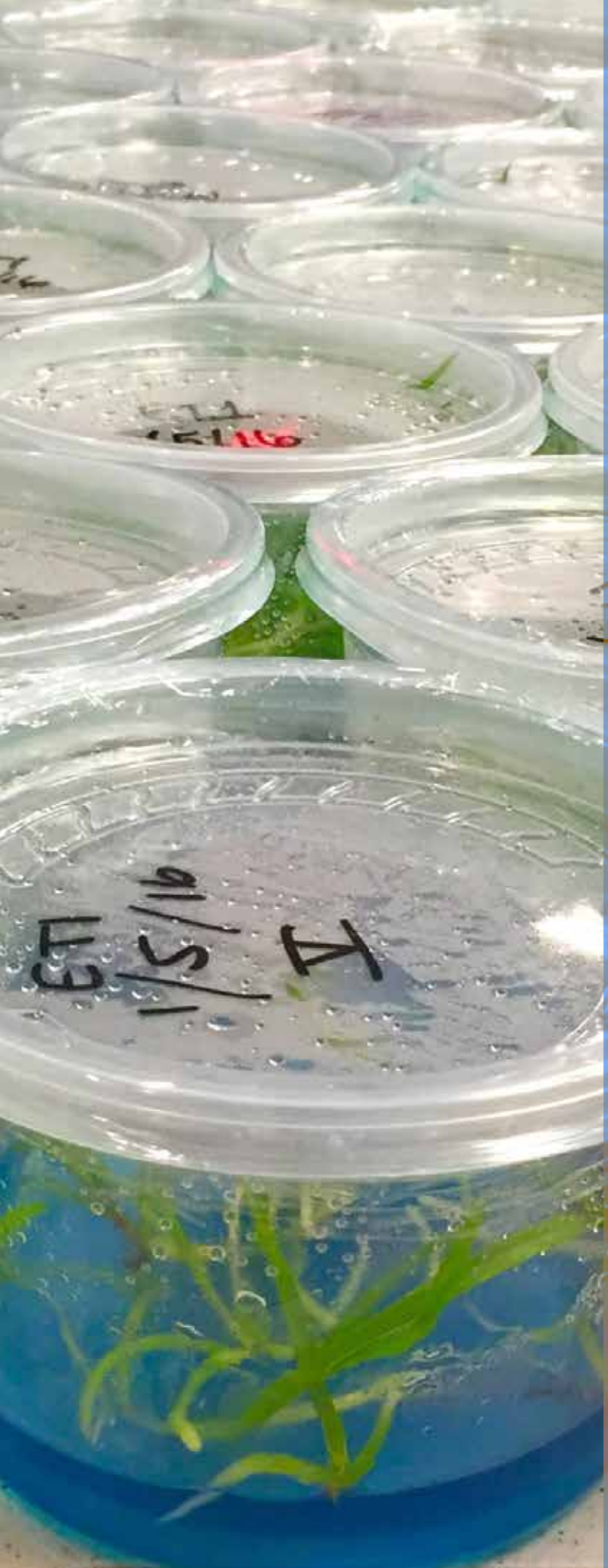

No longer one-in-a-million: The Science of The Million Orchid Project

By Carl Lewis, Ph.D.

The Million Orchid Project is our initiative to plant rare, native orchids in urban landscapes throughout South Florida. Our goal is to use the tree canopies of our region to create a layer of orchid conservation atop Miami-Dade County. At its core, the project is a massive science experiment that may lead to important discoveries on how native orchids grow and reproduce. Additionally, the science of The Million Orchid Project may help us design more general strategies for rescuing rare plants within a highly developed urban environment.

From its start nearly three years ago with a small group of volunteers and a single batch of orchid seeds, the project has grown to an army of volunteers—both in our labs at Fairchild and in local schools—nurturing hundreds of thousands of orchid plants in all stages of growth. We began planting orchids on trees in Coral Gables during the spring of 2014, and have since leveraged our network of partner schools to spread orchids throughout the region.

As we work with ever-increasing numbers of orchids and receive help from larger groups of volunteers and students, we can design a wide range of experiments to answer fundamental questions about orchid biology and species restoration. Today, The Million Orchid Project is large enough to support science on a massive scale.

LEFT
Tens of thousands of native Florida orchids grown by Fairchild ready for distribution to local schools.

...one in 10 million seeds naturally develop into orchid plants.

Orchid Natural History

Orchids are unusual plants with a special strategy for moving around. Their incredibly small seeds can float on the wind like tiny specks of dust. Under the right conditions, orchid seeds can travel many hundreds of miles, even crossing oceans. Each time an orchid blooms and produces a seedpod, there is an opportunity for that orchid to colonize a new, faraway habitat.

Typical orchid seedpods, including those of our most common native orchids, have more than 100,000 tiny seeds. One of our native species, *Cyrtopodium punctatum* (the cigar orchid), has unusually large, 3-to-5-inch seedpods that each contain as many as 3 million seeds. But, orchid seeds only germinate if they are exposed to specific conditions, which are very rare in the natural environment. Based on what we observe in the native orchids we have at Fairchild, we estimate that fewer than one in 10 million seeds naturally develop into orchid plants.

To germinate, orchid seeds must receive nutrients from their surroundings. In nature, orchids have evolved symbiotic relationships with fungi in the environment and those fungi provide the needed boost of energy. To grow successfully, most orchid seeds must land on a patch of tree bark with the proper species of microscopic fungus already in place—an exceedingly rare event.

In the laboratory, we are able to mass-produce orchids by cutting the fungi out of the equation and instead artificially providing energy to the orchid seeds. When everything works well, we can turn nearly 100% of the seeds into orchids that can be planted back out into the community. Much of our science is aimed at optimizing our production of seedlings.

Orchids in the Laboratory and Classroom

In the 1920s, scientists began finding ways to grow orchids without a symbiotic fungus. Over the years, techniques have been developed for successfully growing most kinds of orchids in gelatinous, carbohydrate-rich growth medium. With the right balance of chemicals, the growth medium triggers seed germination and nurtures the seedlings through their earliest stages of life. Orchids are cultured in closed flasks with sterile medium and handled in special clean environments in order to exclude any microbes that could contaminate the cultures.

As with any large-scale plant propagation initiative, The Million Orchid Project aims to generate plants as quickly and efficiently as possible while maximizing the health of the plants. For the eight native species we are growing in the lab, we are experimenting with various growth medium recipes and lighting strategies. When we change the chemical composition of the growth medium, or the intensity or duration of light, we can alter the speed at which the seedlings develop. Interestingly, we can also shift the relative amounts of root growth and leaf growth, affecting the appearance of the orchids and their ability to survive and grow in the outside world.

During the 2013-2014 school year, we set up an experiment in the TERRA Environmental Research Institute, one of our partner high schools. Students experimented with the duration of artificial lighting and observed the effects on growth and development of orchids in flasks. They found that one species of orchids (*Prosthechea boothiana*, the dollar orchid) grew at a higher rate under 18 hours of light, while a related species (*Encyclia tampensis*, the Florida butterfly orchid) grew best under 12 hours of light. *Cyrtopodium punctatum* (the cigar orchid) grew leaves rapidly under 18 hours of light, but had significantly greater root growth under 12 hours of light. We have used these results to establish a lighting schedule for the orchids in our lab at Fairchild.

We further explored the growth and development of *C. punctatum* last school year, enlisting 30 high schools to experiment with different types of growth medium. Students observed plants in three different media, tracking growth within the flasks and survival once the orchids were removed from the flasks. Results of these experiments helped us optimize the growth medium we use for that species.

This school year, we have a much larger group of participants—110 middle and high schools—experimenting with three types of growth medium on *E. tampensis* seedlings. Additionally, students at BioTECH @Richmond Heights, our new botany magnet high school, have started independent research on a wide range of growth media and other variables. We anticipate informative results from these projects during the months ahead.

Transition to the Outside World

The most challenging stage in orchid propagation is the transition from sterile flasks to the outside world. In flasks, orchids are bathed in constant humidity and nutrient-rich growth medium with complete protection from pests and diseases. That all goes away in the outside world.

The first shock to the plants is the immediate exposure to drying conditions, but within days they may also begin to suffer from the lower availability of nutrients and exposure to microbes. The care seedlings receive during those first days out of the flasks is critical to their success. Most of our orchids are kept in a heated greenhouse for weeks or months after they are removed from the flask, but we are now experimenting with different strategies.

Of the eight native orchid species we have in our lab, *C. punctatum* is by far the most challenging to grow outside the flask. Last school year, we asked the 30 high schools participating in The Million Orchid Project to help us compare different strategies for transitioning that species to the outside world. Overall, the schools observed a higher rate of survival in their classrooms than we see in our greenhouse. In the classrooms, students maintained orchids in trays with clear plastic domes under fluorescent lighting. Within those containers, students experimented with different types of soil, and tried inoculating some of the orchids with symbiotic fungi, but found that none of those treatments had a significant impact on survival or growth.

This year we are asking students in the 110 middle and high schools to do similar experiments with *E. tampensis* and *Bletia purpurea* (the pinepink orchid), and study how those species grow under LED lighting. As we did with *C. punctatum*, we may be able to optimize indoor growing conditions to the point that they are better than the conditions in our greenhouse.

Building Healthy Populations

As we mass-produce orchids, we run the risk of shifting the orchid gene pool in our area in unexpected ways. If we grow enormous numbers of orchids from a small number of seedpods, we could create populations of orchids that are unnaturally closely related to one another. That might establish populations that lack genetic diversity, making them more susceptible to pests, diseases and environmental change. To avoid that outcome, we are now studying the genetics of our native orchids to understand how to replicate the patterns of genetic diversity that exist in nature. Dr. Michael Hass, a forensic scientist who led the DNA team at the Miami-Dade Crime Lab, is now using techniques similar to those he used for crime scene DNA fingerprinting to help us understand how the orchids in our region are related to one another. Last summer, 14 high school interns in our Baddour DNA Lab tested the DNA fingerprinting techniques Hass developed. Their results will soon be published in *Applications in Plant Sciences*, and will eventually help us distribute orchids in a way that most closely represents natural patterns of genetic variation.

Tracking Orchids Into the Future

We modeled The Million Orchid Project after a similar initiative at the Singapore Botanic Garden, where native orchids were propagated and successfully established in city environments (see "Singapore's Orchid Conservation Program," page 37). That project provided the first scientific data to suggest that native orchids can be established in urban areas on a large scale, and that city environments can be comparable to natural forests for orchid restoration. Here on the opposite side of the globe, we hope to learn whether our native orchids can be deployed in our cities with similar results.

South Florida has a great diversity of urban environments, which vary in population density, tree canopy, building heights, proximity to the ocean and roadway density. The middle and high schools participating in The Million Orchid Project are distributed in all parts of South Florida and have the potential to track orchid growth across a wide range of environments. The teachers and students at those schools will be important partners as we study the impact of The Million Orchid Project. We are also working with the City of Coral Gables and the Geographic Information Systems (GIS) Center at Florida International University to develop a smartphone application to help community members keep track of where orchids are planted, and to monitor orchid survival and growth. We are excited to see how this technology might allow thousands of community members to participate in our scientific work.

The Million Orchid Project is one of the most ambitious science projects ever launched at Fairchild and has the potential to deliver an enormous amount of scientific information. As we share our results and publish scientific papers, we hope our data will help guide plant conservation projects in other urban areas throughout the world.

We need your help! To support our science efforts and The Million Orchid Project, please visit www.fairchildgarden.org/give.

Support for The Million Orchid Project comes from the American Orchid Society and the Furniss Foundation. Orchid experiments are coordinated through the Jane Hsiao Laboratories of the Paul & Swanee DiMare Science Village at Fairchild. Our partner K-12 schools are participating in The Million Orchid Project as part of The Fairchild Challenge, supported by the Batchelor Foundation.

Splendid Venetian Palazzo

Timeless Palladian elements and contemporary luxury reign throughout this Addison Mizner-inspired North Grove Estate, interpreted with 21st-century flair. “Serious” period architecture – enjoying comparison to Vizcaya – for the most discerning buyer.

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THE SMALL WORLD OF PLANT CONSERVATION

Sharing knowledge with Italian colleagues serves as a reminder that conservation efforts around the world are more alike than different.

Text and Photos by Joyce Maschinski, Ph.D.

PREVIOUS PAGE
The Ticino River at sunset, viewed from Pavia.

ABOVE
Luisa Rossi and Dr. Graziano Rossi in conversation over squash cultivars. The gray green variety at the center of the table is *Cucurbita maxima*, which is a regional specialty.

When Luisa Rossi first saw him poking around her squash bins last year, she shook her finger at him from her front porch and scolded him to leave her roadside vegetable market, which was closed for the season. This year, Dr. Graziano Rossi (no relation to Luisa) had a chance to remind her of that admonition while he introduced himself, presented his credentials, and asked her about her squash. Dr. Rossi had come to Luisa's market to collect economically important squash cultivars and to learn about the practices Luisa employs to preserve them. As professor of plant ecology at the University of Pavia in Pavia, Italy, Dr. Rossi and his students are broadly interested in preserving diversity of rare Italian native plants, the landraces of crops that have been traditionally grown in northern Italy, and crop wild relatives. Landraces are populations of cultivated plants, which have distinct identity and have been cultivated in a region for a long time by traditional growers. They often have unique characteristics that may include resistance to pests or adaptability to environmental stresses and climate change.

Specializing in squash, Luisa's strong hands are a testament to the fact that she has been farming since childhood. She proudly displays cultivars of several squash species with beautiful, diverse shapes and sizes, including *Cucurbita pepo*, *C. maxima, C. moschata, C. cylindrica* (aka *Luffa aegyptiaca*), *C. melopepo* and *Citrullus lanatus*. To prevent hybridization and maintain pure lines, Luisa grows the different squash varieties in fields separated by at least 1 kilometer. She hand-pollinates the first flowers and selects these fruits for the seeds that she will plant for the next year's crop. When asked what advice she would give to future generations, her eyes soften. She wants the young to get their heads out of their electronics and get their hands back in the soil.

Luisa's squash and story have joined those of other local traditional growers as part of Graziano Rossi's ethnobotanical research. The squash he purchased from Luisa became a focal display the following day at the University of Pavia Botanical Garden exhibition and market, which featured the best Italian landraces and local products. Of course, the scientific names of each were displayed so that visitors could learn some botany while they enjoyed the lovely displays. In Pavia, just as happens at so many Fairchild events, modern art, archival displays and good food rounded out the festivities.

The seeds from the squash will eventually have a different destiny. Graziano Rossi's interest in landraces and crop wild relatives is linked to the Convention on Biodiversity. Several of his students are working with the nonprofit Global Crop Diversity Trust and the Millennium Seed Bank of Britain's Royal Botanic Gardens, Kew on the initiative "Adapting Agriculture to Climate Change: Collecting, Protecting and Preparing Crop Wild Relatives." They actively store seed at the Millennium Seed Bank and at Pavia University's Plant Germplasm Bank. (Fairchild has a similar mission to conserve genetic diversity of tropical fruits in its Tropical Fruit Program. Because the seeds of many tropical fruits cannot be stored by orthodox methods, Fairchild pursues other ways of conserving landraces.)

RIGHT
Dr. Graziano Rossi and his graduate student, Nicola M.G. Ardenghi, selecting squash landraces from Luisa Rossi's vegetable bins.

ABOVE
Nevice Rossi with a huge squash at the Milan International Food Expo.

Studying Alpine Natives

Graziano Rossi's lab has also undertaken seed studies to examine native alpine plant evolution and susceptibility to climate change. Alpine habitats are characterized by a short growing season and extremes of temperature. Adding to the conservation challenge, because alpine summits are such beautiful sites, human impacts from trampling can also affect the fragile vegetation. In addition, seeds of alpine species do not store well. Rossi's students, however, have examined new techniques, which may potentially extend storage life of these seeds.

It was Rossi's interest in alpine flora that first led him to one of my early publications, "Demography and Population Viability of an Endangered Plant Species Before and After Protection From Trampling," which described recovery from trampling of an endangered rock outcrop plant. His long-term research, conducted in the Apennines and Himalayas, is integrated with the Global Observation Research Initiative in Alpine Environments (GLORIA). One of his former graduate students, who worked on alpine plants, is now a botanist with the U.S. Fish and Wildlife Service and studied with me at The Arboretum at Flagstaff in Arizona.

The overlaps in our interests don't end there. Rossi runs an active plant reintroduction program. In fall 2009, he sent his graduate student, Thomas Abeli, to St. Louis for the international symposium "Evaluating Plant Reintroductions as a Plant Conservation Strategy: Two Decades of Evidence," which I co-hosted with Dr. Kristin Haskins and the Center for Plant Conservation. Since that time, Rossi and Abeli have stayed in touch with me regarding plant reintroduction science. They asked me to speak about a related topic at the Congress of the Italian Botanical Society in Pavia in September 2015. On the squash-collecting day, I was fortunate to scout a potential reintroduction site for the submerged aquatic *Stratiotes aloides* (water soldier or water pineapple) with Rossi.

As is true in South Florida, many of the rare plants with which Rossi and Abeli work in northern Italy have very little good habitat remaining. It is often a challenge to find a new home for the species. Much as Fairchild does, the University of Pavia Botanical Garden provides an intermediate home, where propagation protocols can be discovered, seed biology can be illuminated and small experiments may occur. Often, experiments combine a reintroduction with a study of some biological attribute of a rare species.

I visited one such experimental reintroduction—for Virginia saltmarsh mallow, *Kosteletzkya pentacarpos* (or *K. virginica*)—conducted by Abeli and his colleague Dr. Lisa Brancaleoni from the University of Ferrara in northern Italy's Emilia-Romagna region. This species, once believed to be rare in Italy, has recently undergone taxonomic revision. Rossi and Abeli would love to have genetic tests confirm the taxonomy and origin of the species. Genetic tests could verify whether the species is widespread or rare, and whether it originated in North America or Italy. This would have consequences for future legal protection.

Similarities in Conservation Efforts

In the Bosco della Mesola, a forest preserve in the River Po Delta on the eastern coast of Italy (south of Venice), Abeli and Brancaleoni sought to determine which conditions would maximize the success of *K. pentacarpos* population establishment. They examined the growth, reproduction and physiology of plants that had been exposed to different salt and nutrient concentrations. The researchers and land managers created a tall enclosure to protect the experimental planting of *K. pentacarpos* from the threat of munching by mammals, including *Cervus elaphus* (Mesola red deer), a relative of our Rocky Mountain elk.

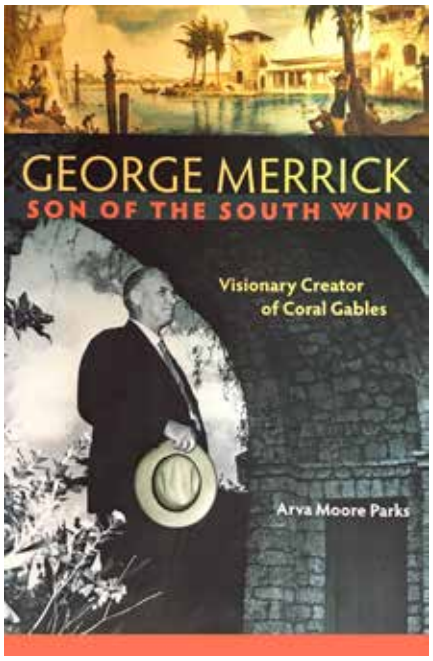
When I learned this, I discovered yet another parallel in our conservation experiences. Boscone della Mesola is home to a small, isolated population of Mesola red deer. Like Florida's endangered Key deer, these Mesola red deer have been essentially isolated in a forest surrounded by water from the River Po Delta and the Adriatic Sea—and have therefore developed unique characteristics. For instance, like the Key deer, they have a diminutive stature in comparison to their more widely distributed brethren. Forest ranger Mauro Menghini of the Corpo Forestale dello Stato told me that the population had grown to 200 animals in recent years. Incidentally, Key deer populations have also increased in recent years. He would like to find a location for an animal reintroduction, but, as with Key deer, it would not be wise to place them in a location where full-sized *Cervus elaphus* live.

My experience in Italy reminded me that, while species names may change, the circumstances and solutions for plant conservation are similar throughout the world. As conservation colleagues share experiences, we learn about the common threads of our past and present work. Through publications and personal contacts, Fairchild indirectly and directly contributes to efforts to preserve the world's biodiversity—and my time in Italy confirmed this.

ABOVE
Dr. Thomas Abeli and Dr. Lisa Brancaleoni collecting seeds from Virginia saltmarsh mallow.

RIGHT
Cervus elaphus (Mesola red deer) in Bosco della Mesola.

We need your help! To support our science and native plant conservation efforts, please visit www.fairchildgarden.org/give.



"GEORGE MERRICK, Son of the South Wind"

Arva Moore Parks

By Georgia Tasker

In her new book, "George Merrick, Son of the South Wind," Arva Moore Parks has given us a missing piece of our history through the portrait of an oversized personality in an era of oversized ambition.

It's not that we didn't know that George Merrick was the founder of Coral Gables, the City Beautiful—the man who donated land and pledged $5 million to start the University of Miami. It's not that we didn't know that the 1926 hurricane and the Great Depression stopped him in his tracks. We did. But what we did not know are the details, such as the lost decade of his youth spent grubbing out the pinelands to plant grapefruit trees. Nor did we know he hauled vegetables by mule-drawn wagon from his father Solomon's farm west of Miami to sell at the Royal Palm Hotel.

Parks has written a narrative beginning deep in family history and telegraphing forward the influence of that family on a man who dreamed big and fell hard. It is a saga so detailed, its images seem to come alive on the pages.

George Merrick was born in 1886. His father apprenticed as a minister at various churches for a few years before moving his growing family to a hardscrabble homestead, bought sight unseen in the pinelands of South Florida, in 1898. It was here that 12-year-old George spent the next 10 years laboring with black Bahamians to plant and nurture grapefruit groves without benefit of school or luxuries, all postponed "until the groves begin to bear."

After the grapefruit groves prospered, young Merrick went to Rollins College in Winter Park, then to New York to study law. Unfortunately, he was forced to return home when his father fell ill. He began purchasing land and became a real estate agent. Gradually, the long-held idea of developing a beautiful city—inspired by the planned garden villages of Cleveland's Shaker Heights and the Spanish architecture of St. Augustine and Cuba—grew more vivid.

Roads for Coral Gables were laid out in 1921; building began in 1922. The whirlwind of the next three years saw 1,000 homes built, designed by Merrick's cousin George Fink. Merrick's uncle Denman Fink designed boulevards, fountains, elaborate rock entrances and other amenities that would set apart the village.

Parks' story telling is as fast-paced as the drama: a railroad freight embargo, then a harbor clogged with ships unable to unload needed supplies and, finally, a hurricane. Merrick's last job was that of postmaster of Miami, but he was held in high esteem when he died in 1942 at age 54.

George Merrick's story is a cautionary tale, a parable of this exotic and peculiar bit of paradise. With it, Parks has solidified her place as one of South Florida's finest historians.

Arva Parks will be lecturing at Fairchild on Thursday evening, **February 11, 2016**. Information and tickets at www.fairchildgarden.org.
Find this book at the Shop at Fairchild or at store.fairchildonline.com
Regular price, $31.95. Member price, $28.75.

SINGAPORE'S GARDENS BY THE BAY

Gathering many of the world's most outstanding tropical plants in one place, it is a celebration of heritage and a demonstration of conservation of biological diversity.

TEXT AND PHOTOS BY GEORGIA TASKER

PREVIOUS PAGE
The South Garden is the first of three Gardens by the Bay. It opened in 2012. A view from the top of the Marina Bay Sands resort.

ABOVE
An enormous bromeliad flower spike emerges from the side of the Cloud Forest mountain.

It is, by any reckoning, a horticultural extravaganza that has drawn 19 million visitors in three years.

It has twin missions: to show how people and plants interact and to illuminate botanical richness by gathering together many of the world's most outstanding tropical plants.

It is Gardens by the Bay, Singapore's $1 billion gift to itself.

"Education is dispensed in little painless dollops," says Dr. Kiat Tan, CEO of Gardens by the Bay. "This is a gift to the people of Singapore, to educate the young to their roots and heritage."

To that end, four Heritage Gardens are meant to reflect and honor the harmonic blend of cultures in this city-state:

A CHINESE GARDEN features bamboos, brilliant red hibiscus, wonderfully shaped scholars' stones and a moon gate; plus two twisted Chinese fan palms (*Livistona decora*) that survived Hurricane Andrew in South Florida.

AN INDIAN GARDEN is designed in the shape of a kol—a traditional flower pattern created from rice. It features neem trees, Rangoon creeper, bael fruit and a smiling Buddha beneath a Bo tree.

THE MALAY GARDEN'S edible plants include breadfruit, carambola and rambutan. The shelter is shaped like a traditional high-roofed kampong.

IN THE BRITISH COLONIAL GARDEN, Prince William and the Duchess of Cambridge, Kate Middleton, planted a variegated species of a *Pachira* or money tree. Here, Tan has gathered the plants of trade and commerce that brought the Brits to the region: cloves, tea, coffee, nutmeg and rubber trees. Also on display: a type of Wardian case, a sealed glass case built by Dr. N.B. Ward in London that changed the way living plants could be shipped around the world.

The Heritage Gardens are only one part of Gardens by the Bay. Another area, Plants and the Planet, showcases biodiversity. Here, cycads and ferns set the scene in an evolution garden that also contains a *Gnetum gnemon* tree, which Tan explains is halfway between an angiosperm and a gymnosperm, bearing fruit-like strobili, or cones.

Highlighting plant pollination are figs, pollinated by wasps, and sausage and cannonball trees, pollinated by bats. Logs from the swamps of Java are in the process of becoming petrified. Four hundred palm species have been found for the World of Palms, including the highly endangered *Carpoxylon macrospermum* from Vanuatu and *Caryota zebrina*, the striped fishtail palm from Papua New Guinea. Yet another area illustrates what processes occur on the floor of a rainforest, with little mushroom stools for schoolchildren to sit on.

"This garden is for people who don't come to gardens," Tan says. "So I have to grab them and hook them." It does, in fact, represent a kind of bookend for the Singapore Botanic Garden. There, science and conservation reign, while at

ABOVE
Dr. Kiat Tan, left, Dr. Sandy Schultz and Dr. Adrian Loo, Garden by the Bay's director of horticulture pose in the Cloud Forest.

BELOW-RIGHT
Cloud Forest waterfalls drop 131 feet.

Gardens by the Bay, horticulture is on display. "You start with strong botany as a base, and then horticulture," Tan explains.

Perhaps horticulture is most on display beneath the Gardens by the Bay's two glass houses—the Flower Dome and the Cloud Forest—which shelter more than 100,000 plants.

The Flower Dome is meant to dazzle, with living plants as background for changing floral displays. The atmosphere is a cool, dry Mediterranean climate that reaches 25 degrees Celsius (77°F) during the day and 17 Celsius (62°F) at night. The humidity is suitable for roses, geraniums, orchids, baobabs, Italian cypress, Chilean wine palms, barrel cactus and Madagascar succulents. Humidity is controlled by running air through a desiccant, lithium chloride, which dehumidifies it in a spectacular but hidden piping system.

The Cloud Forest recreates a mountain environment. Ten waterfalls begin spilling out at 131 feet and descend from various levels. Humidity is kept at 80%.

The Spirit of the "City in a Garden"

Throughout, Tan is the moving spirit of Singapore's evolution into a city in a garden. Educated at Williams College in Massachusetts, Michigan State University and the University of Miami, he worked as assistant director of Marie Selby Botanical Gardens in Sarasota, Florida, as well as a botanical garden in Orlando. He studied orchids, he hybridized hibiscus. And in 1983, he answered the call of Singapore Botanic Gardens when it needed him most: When Tan learned that its herbarium was up for sale, he returned home to save it. He became a civil servant and, with a research team, developed a master plan for the historic garden to become successful over three phases. In 1988, he became the garden's director. He then moved over to become CEO of Singapore's National Parks Board, which oversaw the botanic garden, the creation of nature reserves and rooftop gardens, as well as the greening of the nation (the "Garden in a City") that was the goal of the late Lee Kuan Yew, Singapore's first prime minister. Tan opened the national orchid garden at Singapore Botanic Gardens, built a cool house, reconnected two areas once separated by a road and brought the fabled institution back to prominence. In 2015, the garden was designated a UNESCO World Heritage Site. When Singapore celebrated its 50th anniversary of independence, Tan was given the nation's Distinguished Service Award.

At one time Tan had foreseen retirement in 2006, but then he began to flesh out his ideas about the 40-year-old fill site at Marina Bay. Wouldn't it be better as a garden than as banks and hotels? After all, by then, he had found ways to implement Lee Kuan Yew's vision of a "Garden in a City", so why not a "City

in a Garden"? More importantly, why not demonstrate environmental sustainability and conservation of biological diversity in a way that also illustrates the history of the island nation?

Over several years, Tan traveled the world collecting plants—including crotons from South Florida and the twisted palms. Meanwhile, Britain's Grant Associates, Wilkinson Eyre Architects and teams of consultants and engineers put together the technical components of Tan's masterwork, winning an international competition for the job. The complexity of the enterprise was staggering: creating cool houses in a city that sits close to the equator without the enormous cost of traditional air conditioning; finding the right light for optimal plant growth; building domes without internal pillars; housing the support systems out of sight.

By 2012, the Gardens on the Bay's South Garden complex opened to the public. The domes for the Flower Dome and Cloud Forest were so remarkably constructed that they won the World Building of the Year award in 2012, the Landscape Institute's Fellows' Award for Climate Change Adaptation in 2013 and 14 other awards.

Literally central to the South Garden and the sustainability efforts are 18 "supertrees"—densely planted vertical gardens—15 of which are clustered in a grove. It is through these vertical gardens that energy is pumped into and out of the biomes. Standing 9 to 16 stories high, they artfully marry horticulture, science and technology. Some 163,000 epiphytes adorn the skin of the giants, along with bougainvillea, hoyas and pipevines.

Impressive during the day because of their scale, the trees are rigged for magical nightly light shows that color them by turns magenta, teal, red, orange and white. A two-story restaurant sits in the top of the tallest, and a skywalk between several of them reveals the scope of the place, and, oh yes, the skyline of Singapore.

One of the best views of Gardens by the Bay is from the roof of the 2,500-room Marina Bay Sands resort next door. It is the imposing statement of 54 floors of triple towers with a connecting rooftop infinity pool that the supertrees seek to balance.

Adrian Loo, director of horticulture for Gardens by the Bay, completed his doctoral work in palms under John Dransfield at Britain's Royal Botanic Gardens, Kew. Loo was a teacher when Tan met and hired him three years ago. And it is Loo who calls Gardens by the Bay "Dr. Tan's magnum opus."

On the drawing board for this spectacular ecological jewel: economic gardens displaying palms, sugar and fruit trees, as well as a hanging garden display of vines and climbing plants.

TOP-RIGHT
Called "super trees" these vertical gardens range in height from 9 to 16 stories and are clothed in plants. Every evening, two free sound and light shows render the trees magical.

BELOW
Color is one of the most important aspects of the Flower Dome.

Rain trees spread their huge airy canopies over ferns and orchids residing on their boughs as if they were hens protecting their chicks. In Pasir Ris Park in northeastern Singapore, these trees nurture native orchids as they once did before the development of this cosmopolitan city-state at the southern tip of the Malay peninsula. The park, in fact, is one of more than 50 places in Singapore where species of dendrobiums, cymbidiums, bulbophyllums, grammatophyllums and other orchids are growing in abundance.

Fairchild's **Million Orchid Project**: Inspiration Thousands of Miles Away

BY GEORGIA TASKER

Cymbidium finlaysonianum.
Photo by Georgia Tasker/FTBG

During our visit there, Senior Researcher Dr. Tim Wing Yam strides up to us with a cheerful, "Hi! I'm Tim," and within a short morning's walk shows us some results of his 20-years' labor: large clumps of *Cymbidium findlaysoniana*, with narrow, tough leaves, allowing pendant chains of small green and red flowers to dangle earthward; patches of *Phalaenopsis cornu-cervi* elevating little star-bursts of yellow and red flowers; enormous clumps of the epiphytic *Grammatophyllum speciosum*—the city's beloved Tiger Orchid—some growing on charcoal and humus right on the ground.

Grammatophyllum speciosum.
Photo by Dr. Tim Wing Yam

The success of this conservation effort inspired Fairchild's The Million Orchid Project, which began in 2012 and seeks to propagate and return to South Florida millions of native orchids. The Baddour DNA Lab at Fairchild is producing young native orchid plants with the help of thousands of Miami-Dade County students (see "The Science of The Million Orchid Project" page 21).

Fairchild's goal is to have the first generation of reestablished orchids blooming throughout South Florida within five years.

Singapore's orchid reintroduction began in 1995 as an orchid breeding program at the behest of Dr. Kiat Tan when he was director of Singapore Botanic Gardens. Singapore once had 220 species of native orchids, but as the city-state developed, the majority became "nationally extinct." So, as Tan figured, "why not do something about it?"

Some of the local orchids were growing in the botanic gardens' nursery, so Tan assigned Yam— then a young employee—to orchid breeding. After four years of propagating and building a supply of orchids, Yam made the first introduction into the city's trees. In 2005, five species of Singapore's native orchids had been propagated and successfully reintroduced. The project expanded rapidly, and 20 different species of native orchids have found their way back home.

One special reintroduction is *Robiquetia spathulata*. The species was recorded in Singapore only once, by Henry Ridley, the first scientific director of the Singapore Botanic Gardens from 1888 to 1911. The plant "was rediscovered on an off-shore island," Yam says. "There was only one left. We tried self-pollination but it didn't work. So we cloned it. Now, there are thousands all over Singapore."

The orchid conservation project has placed hundreds of specimens of orchid species in areas where the public can admire them as part of their heritage. There now are 60 different species of native orchids in the city.

Renanthera elongata, also extinct within Singapore, had to be purchased from another country. *Dendrobium aloifolium* is blooming in the trees around us, "but the flowers are so small you can barely see them," Yam says.

There has been no problem of theft, since the plants are attached to trees high enough to prevent snatching them while on the ground. Yet, the elevation cannot be too great, notes Yam "My boss always tells me, 'Don't plant too high. We want people to appreciate them.'"

We need your help! To support The Million Orchid Project, please visit www.fairchildgarden.org/give.

The Shop at Fairchild's Top Picks for the Gardener

By Erin Fitts. Photos by Rey Longchamp

Duck Lantern
Regular price, $120.00
Member price, $108.00

Garden Quote Cachepot
Regular price, $12.00
Member price, $10.80

Gardeners Therapy Hand Lotion
Regular price, $12.99
Member price, $11.69

Roots and Shoots Watering Can
Regular price, $34.95
Member price, $31.46

Advice from the Garden T-shirt
Regular price, $19.95
Member price, $17.96

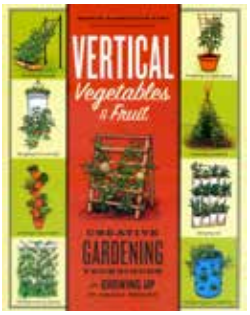
Green Butterfly with Mirror Box
Regular price, $48.00
Member price, $43.20

Cranberry Rainbow Vase
Regular price, $65.00
Member price, $58.50

Lotus Tealight Holder
Regular price, $14.95
Member price, $13.45

Grow a Living Wall
By Shawna Coronado
Regular price, $24.99
Member price, $22.49

Attracting Birds to South Florida Gardens
By James A. Kushlan and Kirsten Hines
Regular price, $29.95
Member price, $26.96



The Vertical Garden
By Patrick Blanc
Regular price, $65.00
Member price, $58.50

Herbs and Bird Pitcher
Regular price, $40.00
Member price, $36.00

Available in store and online at store.fairchildonline.com.

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PLANNED GIVING WITH FAIRCHILD

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About the legacy society

The Legacy Society is a dedicated group of Fairchild supporters who have made a lasting commitment to the Garden by making a planned or life-income gift with Fairchild or by naming Fairchild as a beneficiary in their estate plans.

Create your legacy

For more than 80 years, bequests and planned gifts have provided vital support to Fairchild's collections, exhibits and programs. Today, you can help continue this tradition by making a lasting commitment to the Garden. When you join The Legacy Society, you help ensure that the programs we pioneer today will continue long into the future. And, the expression of your individual values will provide hope, inspire others and have a real and lasting impact.

Ways to join fairchild's legacy society

Membership in The Legacy Society is open to those who wish to join the tradition of making a lasting gift. It is our way of recognizing a remarkable commitment to Fairchild. You can become a member of The Legacy Society by naming Fairchild in your will or estate plan or by making a life-income gift. As a member of The Legacy Society, we recognize your profound contribution and dedication to preserving the Garden.

Please contact Susannah Shubin at 305.667.1651, ext. 3375 or sshubin@fairchildgarden.org to learn how you can join **The Legacy Society**. Your commitment today supports the Garden long into the future.

The Coalition for Orchid Species

By Katria Whitfield

The Coalition for Orchid Species (COS), founded in 1990, is an orchid society devoted to naturally occurring orchid species in the wild. The Coalition meets the third Monday of every month at Fairchild at 7:30 p.m. Each meeting includes distinguished, internationally recognized speakers from all over the world, as well as hands-on presentations that assist members with growing and cultivating wildspecies orchids.

The Coalition logo is a ghost orchid, *Dendrophylax lindenii*, with its long, delicate petals and spur of nectar, which has become a symbol of the South Florida landscape. The ghost orchid is leafless but has photosynthetic roots that allow it to produce sugars in the presence of sunlight. Its roots engage in a symbiotic relationship with a fungus that helps it gather nutrients in exchange for extra sugars.

Without this fungus, the ghost orchid would be unable to thrive. Another wild native, *Cyrtopodium*, is popularly known as the cow-horn orchid because of its cigar-shaped, fleshy pseudobulbs. *Cyrtopodiums* can be spectacular, with panicles of many yellow to yellow-green flowers, often with maroonish spots and large bracts. The plants are mostly medium to large in size and are terrestrial, lithophytic (growing in or on rocks) or epiphytic.

You might see either of these orchids at Coalition events, which include member picnics and volunteer efforts at various orchid festivals. Members bring their rare and exotic plants for show-and-tell discussions, sharing their well-founded techniques for cultivating such outstanding plants with other members. They create magnificent displays at local shows and festivals, which have garnered prestigious awards over the years. At monthly raffles, silent auctions and annual auctions, the Coalition raises funds for uses including a scholarship for a worthy student seeking higher education in orchid-related studies. As species habitats are summarily compromised and destroyed around the globe, it becomes infinitely more important to preserve these precious naturally occurring jewels in nature's complex balance.

Coalition meetings are open to the public and new interest is always encouraged. Please come join us, or learn more by contacting William Capps at cappsb@att.net.

"Dear David: Have a heart and come up here to address our local Garden Club [in Ormond, Fl.] on the afternoon of January 18th. For this high honor, I will pay your expenses, keep you over night or longer, in comfort, and then donate one hundred and fifty solid dollars to the Fairchild Tropical Garden! ... Your obedient servant, Oakes Ames."

Dr. David Fairchild agreed to the talk in what today is Ormond Beach, but warned that some unforeseen event might force a change in plans.

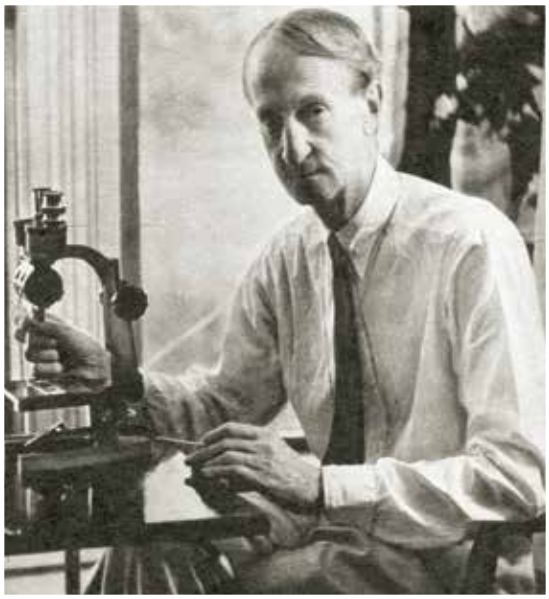
To that, Ames responded on January 12: "I shall pray that everything in your life will run smoothly and that you will not expose yourself, as I so often do, to that dreadful disease of 'cold feet.' … You will only have to show yourself, say a few charming phrases about love of plants, and the deed will be done. I am counting on you, Sir, Oakes Ames."

Oakes & Blanche AMES

By Georgia Tasker

Photos: Archives/FTBG

The foremost orchidologist of his time, Oakes Ames was exceedingly shy. Even a short lecture to a garden club was challenging to him. "He disliked large gatherings and fanfare and almost never attended scientific meetings," wrote ethnobotanist Richard Evans Schultes, who had been Ames' graduate student (and who would one day follow in Ames' footsteps and direct Harvard's Botanical Museum). Once, when a distinguished group of scientists met at Harvard, Ames spent the afternoon in a movie house to avoid them.



PREVIOUS PAGE
Ames in the door of his home.

RIGHT
Ames identified 1,100 species of orchids.

An Orchid Researcher from Childhood

Born to a wealthy Massachusetts family in 1874, young Oakes Ames grew up with orchids, as his father had extensive greenhouses in North Easton, Massachusetts. As a child, he famously set himself a task of identifying one new wildflower every day. His financier father, Oliver Ames, had served as Massachusetts governor and his grandfather, also named Oakes Ames, had been a builder of the Union Pacific Railroad (although he was touched by a scandal involving the sale of railroad stock, he later was exonerated).

After their marriage in 1900, Oakes and Blanche Ames (her maiden name was Ames, from an unrelated family, so she was Blanche Ames Ames) lived with his mother in North Easton. After a few years, they built a huge fireproof house of stone in the same area on 1,200 acres of land. It was called Borderland, and one wing was Oakes' library and laboratory. Blanche labored over her botanical illustrations for his work in a third-floor bedroom, according to their daughter Pauline. Blanche was a supporter of women's suffrage and birth control, and designed Borderland herself.

Aristocratic, accustomed to life with servants and enormous homes, Oakes Ames nevertheless had a winsome sense of humor lying just below the surface of his writings. In 1903, he visited Edwin Atkins at his Cuban sugar plantation, where four years before he and George Goodale from Harvard agreed with Atkins to establish the Harvard Botanic Station for Tropical Research. "My dear Blanchie," begins one letter from Cuba. "We sat long over the coffee and cigars this evening and then passed an hour in the sugar mill, that colossal institution which grinds grass and makes money."

It was on that trip that Ames successfully suggested to Boston-born Atkins (who had established Cuban sugar plantations in 1862) that the grounds around the Harvard Botanical Station in Cienfuegos be enhanced with palms and showy trees. That enhancement lead to the beginning of the botanic garden that remains in Cienfuegos today (although Harvard severed ties with it in 1961 after the 1959 Cuban revolution). Only three years later, the U.S. Congress recognized the need for a tropical botanic garden and chartered the Pacific Tropical Botanical Garden; from its start in Kaua'I, Hawaii, it expanded into a network of gardens that includes Miami's own Kampong, and in 1988 changed its name to

Looking a bit like Ichabod Crane, with a long, narrow face, prominent nose and deep-set eyes, the tall botanist, in portrait and photograph, often appeared stern. Ames held many roles at Harvard: He ran the Botanical Museum; oversaw the botanical collections—including the Arnold Arboretum and the Harvard Botanical Station in Cienfuegos, Cuba; and created the largest orchid herbarium in the country. His tasks ran on the tightly controlled schedule that made him extraordinarily disciplined. His daughter, Pauline Plimpton, remembers Ames teaching her tennis, ice-skating on the estate pond and that he always was at his desk when she arrived home. "Father could be very severe and reserved with us," she wrote in the introduction to "Oakes Ames: Jottings of a Harvard Botanist." "But as to athletics, he was an interested and endlessly patient coach," she added.

Throughout his career, Ames described more than 1,100 species and nine new genera of orchids. He became the world's expert on Philippine orchids and established the Ames Orchid Library and the Ames Orchid Herbarium. The herbarium contains 131,000 sheets of dried specimens; it began in his home and ultimately was housed at the Harvard Botanical Museum. Ames also set up a press at the university because he deplored scientific works on cheap paper. He was a founding member of the American Orchid Society (AOS). His wife Blanche, a Smith College graduate with a degree in art, designed the AOS gold medal, which she and Oakes were awarded in 1924. That same year, Oakes produced "Enumeration of the Orchids of the United States and Canada" for the AOS. With Blanche, he produced seven illustrated fascicles or volumes on the orchid family. For many years, the couple sent family and friends Christmas cards with orchid drawings by Blanche and a poem or snippet of literature chosen by Oakes.

RIGHT
The tall Ames entertains friends at "The Whim," his Florida home.

the National Tropical Botanical garden. Meanwhile, some 30 years after Ames' enhancements were made at Cienfuegos, landscape architect William Lyman Phillips studied plant lists from its gardens when designing Fairchild.

Focused on Angiosperm

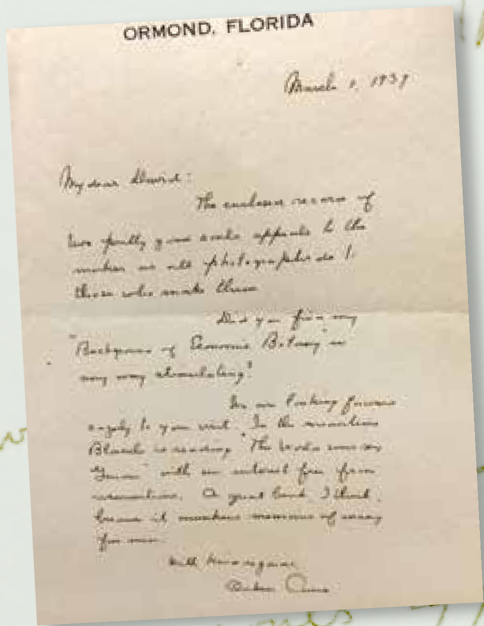
Throughout his career, orchids and all angiosperms fascinated Ames. To him, the evolution of the angiosperm seed had enabled development of "a land flora capable of sustaining mankind and his institutions," he wrote in "Economic Annuals and Human Cultures." He added: "To the Angiosperm seed, perhaps more than to any other structure, the economic evolution of the human race is due." And so, he created a 6,000-volume library and a course on economic botany, so famous among Harvard students that they rose and applauded after each of his lectures, which he called "chats" because he hated lecturing.

In 1938, a young man named Donovan Correll wrote to Ames, asking to work with him at Harvard to complete his doctorate, and including the fact that he didn't have the tuition. Ames secured a scholarship for him, matched by Duke University. The two men jointly published "Orchids of Guatemala." In 1950 Correll wrote "Native Orchids of North America, North of Mexico," illustrated by Blanche Ames and Gordon Dillon. He went on to work at Fairchild, and, with his wife Helen, wrote the seminal book "Flora of the Bahamas." He also reviewed "Oakes Ames, Jottings of a Harvard Botanist" when it was published in 1958. "When I volunteered to review these very personal notes from one who was so reserved, so sensitive, possessed of a great depth of feeling, such a noble spirit, I did not realize what an emotional undertaking it was to be," Correll wrote. "It was more so since Professor Ames had done more than anyone else to establish me in the field of botany."

The Garden's archives have files of extensive correspondence between Correll and his mentor, Ames. It begins around 1939. That year, Ames sent a $500 check to Dr. David Fairchild via Harvard zoologist and mutual friend Tom Barbour, to secure a life membership in the Fairchild Tropical Garden. By then, the Ames' had a home in Ormond, Florida, called "The Whim," and in December, Oakes wrote to Dr. Fairchild, "We fully expect to make a quick trip to Coconut Grove to be entertained by your smile and genial nature, and to experience the pleasure of Mrs. Fairchild." Ames sent Fairchild bound copies of *Botanical Museum Leaflets*, which he instituted so staffers could report on their work, noting that, "You will enjoy the many plates for which Blanche gave the best she had to satisfy an orchiologically demented mate."

The two plantsmen often wrote on orchid topics, and by 1944 Ames detailed the spread of an exotic orchid, *Zeuxine strateumatica*, which he ventured was "the most rapid spread of a plant without the purposeful aid of Mankind" from Indian River to Dade counties.

As a research scientist, Ames had a skeptical if jocular view of God—though he called orchids "God's chosen plant family." In a 1945 letter to David Fairchild, he wrote that God was not a compassionate deity, but, "as he came into being about two hundred thousand years ago, I suppose by the time he entered the Bible he was saturated with human traits and failings ... In my deteriorating mind, God is no older than human superstition."



AMES-isms in Letters to David Fairchild

"Blanche joins me in sending to you and Marian our best of good wishes. If later we find a few more lying round, I'll send them on."

"Boil it all down, and you have several types of mind concerned with semantic reactions: (1) The Garden Club type of mind devoid of any feeling for nomenclature. (2) The Plant Lover type of mind which abhors the world of static symbols. (3) The Botanical type of mind which finds deep satisfaction in plants as a means to nomenclatorial studies."

"You made a very deep impression on our garden lovers. For once in my wasted life, I enjoyed the noble art of passing the buck. But I really enjoyed more having David Fairchild within the reach of my voice."

"It was Henry Ford who said 'History is Bunk.' Oakes Ames says: 'Religious History is Bunk.' Both right!!"

"This is a very long letter… At least you will have learned why *Epidendrum tampense* undergoes marked color-changes in its lip; turning from pure white to yellow. Any letter is worth reading to the end which carries news and adds to human knowledge."

"Being very old in the art of butting my head against botanical stone-walls, I am writing to ask if you have found evidence for merging *Musa textilis* and *M. ensete*, or if you just let the wrong name drip from your pen?"

Often, the letters included gossipy bits about Harvard, such as this in 1946 concerning Elmer Drew Merrill, onetime director of Fairchild: "You will remember our discussions of Merrill's status … Well, Merrill has been deposed."

Blanche Ames painted the lovely portrait of David Fairchild that now hangs in the conference room of the Garden's Davis House. Oakes initiated the sitting in 1946, writing to Dr. Fairchild: "As you are a member of the distinguished order of Wise Guys, I know you will not need to be urged by me to let Blanche paint your portrait."

In 1947, "Drawings of Florida Orchids" by Blanche, with explanatory notes by Oakes, was published based on drawings she made for a paper she presented at the Garden Club of the Halifax Country in 1946. Included is the *Zeuxine strateumatica*, which is described as "occasional and spreading." (Some 43 years earlier, Oakes Ames wrote "A Contribution to the Knowledge of the Orchid Flora of Florida," based on collections by A.A. Eaton.)

To celebrate Ames' 50 years at Harvard, fellow botanists, students and colleagues gave him a dinner at the Faculty Club and presented him with "Orchids in Retrospect," a collection of some of his essays on one of his favorite subjects. He was the author of 400 botanical papers and botanical books. He sent one of 535 copies of "Orchids in Retrospect," printed in hand-set type, to Marian and David Fairchild, and Marian "became so fascinated with it that I couldn't get it away from her," reported David Fairchild. Ames even chided Fairchild for asking a question that the book had already answered. "That Ole Man Darwin was the alley-cat of Science with his eye on every backyard, no matter who owned it," Ames wrote. "He had an answer for your question about a single pollinium pollinating a million orchid seeds!" He directed Fairchild to the exact page and line to read about it.

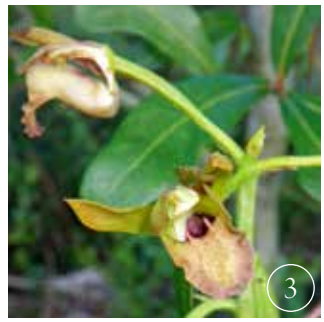
Oakes Ames died on April 28, 1950 in Florida. Blanche died on March 2, 1969 in North Easton, Massachusetts.

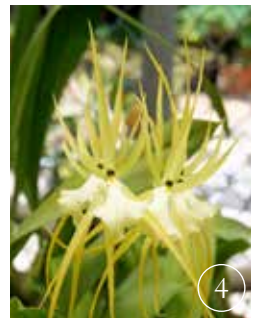
In 1972, Leslie Garay, a keeper of the Ames Orchid Herbarium, named *Amesiella*—a genus of orchid in the Vandae—for Ames. The name was announced that year in a *Botanical Museum Leaflet*.

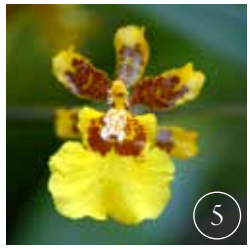
Orchid Brief

From "Drawings of Florida Orchids" come the etymologies of some of our orchids.

By Blanche Ames with explanatory notes by Oakes Ames.







1. *Zeuxine stratomatica*
2. *Liparis*
3. *Elophia alta*
4. *Brassia*
5. *Oncidium*
6. *Vanilla*
7. *Epidendron*

Bletia: Don Luis Blet, Spanish herbalist and apothecary of the 18th century

Brassia: William Brass, botanist of the 18th century who collected in West Africa and was a friend of Robert Brown (Scottish botanist who described the cell nucleus)

Calapogon: from Greek *kalos* for beautiful and *pogon* for beard, allusion to bearded lip

Campylocentrum: Greek *kampylos*, crooked, and *kentron*, spur, the shape of the spur

Cranichis: *kranos,* helmet, referring to the helmet-like, concave lip

Cyrtopodium: Greek *kyrtos*, for curved, and *podion*, diminuitive of *pous*, or foot, allusion to the prominently curved foot of the column

Epidendron: upon tree

Erythrodes: *erythros*, Greek for red, and *edios* for appearing

Eulophia: Greek *eulophos*, beautifully crested, referring to lip

Goodyera: to honor John Goodyer, (1592-1664), English botanist who translated into English *"De materia medica"* by Dioscorides

Habenaria: from Latin *habena* for thong or rein, allusion to spur or slender elongated lip of some species

Inoposis: Greek *ion*, for violet, and *opsis*, for resemblance

Liparis: from Greek *liparos* for fat or shining, referring to glossy leaves

Listera: dedicated to Martin Lister, English naturalist (1638-1711)

Maxillaris: from Latin *maxilla* for jaw, referring to resemblance of column and lip to jaws of an insect

Oncidium: a diminutive of the Greek *onkos* for swelling, warty excrescences of the lip

Pleurothallis: Greek *pleura* for rib and *thallos,* branch, re: short, persistent pedicels along the rachis

Polyrrhiza: from Greek *polys*, or many, and *rhiza*, root

Ponthieva: honors Henri de Ponthieu, collector in the Caribbean area who sent plants to Sir Joseph Banks in 1778

Spiranthes: from Greek *speria* for coil and *anthos* for flower, the spiral arrangement of flowers

Vanilla, from Spanish *vaniilla*, diminutive of vaina or pod

Zuexine, from Greek *zeukis*, for joining, in allusion to partial union of the lip and column

Embark on an ORCHID ODYSSEY

Fairchild's Rainforest Bedecked with Exotic Orchids

BY KENNETH SETZER

The Simons Rainforest Exhibit is one of my favorite attractions in the Garden, with its stream, waterfall, winding paths and plants not regularly seen outside the tropics or plant conservatories. Now it's an even more enchanting place to visit due in no small part to Fairchild's landscape designer Ricardo Aberle, who began installing large numbers of flowering orchids into trees and along the paths where visitors can best appreciate them. Aberle is also an accomplished watercolor artist and art instructor, so it should come as no surprise that the splashes of orchid color are thoughtfully placed for maximum impact.

The display has evolved into quite an attraction, and strolling the Rainforest path can be likened to embarking on an orchid odyssey of sorts, with *Cattleya, Phalaenopsis, Oncidium, Dendrobium,* and *Vanda* orchids and countless other varieties and hybrids in flower, with flower spikes often arching over the pathway. Seeking the orchids is half the fun though, as they are not all obvious; some are placed strategically on logs and rocks out in the water, so you must take the time to really look.

The orchids complement the colors and plant life of the Simons Rainforest, the only outdoor tropical rainforest in the continental U.S. The Rainforest is usually mostly in shade, so coming upon impossibly bright yellow or purple orchid flowers set against the many hues of green can be a visual surprise.

The exhibit is a partnership between Fairchild and the American Orchid Society, which moved its international headquarters to the Garden in 2012. It was originally founded in 1921 and currently has more than 10,000 members and 600 affiliated international orchid societies.

Orchid flowers are notoriously intricate and mesmerizing, and you are sure to find some really strange and wonderful shapes, colors and patterns among them, so bring a camera.

The Orchid Odyssey is on display until April 30.

Nurture your budding botanist

You've avoided it long enough: plant taxonomy. But I promise, learning a little of the rationale behind scientific plant names will make you a better gardener and citizen scientist.

And it's fairly painless.

BY KENNETH SETZER

I've come to realize how much knowing a little about classification of plants and other organisms has helped me—inadvertently—understand more about how everything is related. This is, of course, one of its purposes—to reveal how closely living things are related to each other on the tree of life. But there are practical benefits to familiarizing yourself with those often-intimidating and hard-to-pronounce terms within botanical nomenclature.

Taxonomy sounds intimidating—classifying and consequently naming all living things appropriately is a major task, and one to which taxonomists devote careers and lifetimes—but it is worth investigating. For centuries, naturalists have tried to describe and name every living thing they possibly could. At one cumbersome point before the currently used system, a scientific name could essentially be one very long descriptive sentence in Latin. Worse, there were often multiple systems used simultaneously, so you couldn't even be sure naturalists were talking about the same thing.

You've probably heard of the Linnaean system of classification, Linnaeus being the 18th-century botanist who pulled together the system of binomial ("two name") descriptions we use today, for example the two words in *Homo sapiens*. Our modern classification system derives from many sources, with influences back to Aristotle, but Linnaeus's publication of "Systema Naturae" in 1735 is considered the foundation of modern taxonomy, and his later "Species Plantarum" applied the system extensively to plants. His biography is in itself pretty fascinating reading: A world traveler, physician, naturalist and botanist extraordinaire, Linnaeus's contemporaries often considered him arrogant and opportunistic, but even his adversaries acknowledged he had the brains and ability to back up his self-aggrandizing personality.

Diving into the Binomial System

The binomial is composed of the genus name (always capitalized and italicized) followed by the epithet (never capitalized, always italicized). Knowing these will take you a long way. For example if you know a plant is in the *Quercus* genus, you know it's an oak. If you know it's *Quercus virginiana*, you have a live oak. Two or more species that fall within the same genus are called congeners. It helps to know this, as quite often—but certainly not always—congeners have similar horticultural requirements.

What's great is *Quercus virginiana* means the same thing to everyone, regardless of their language or location.

The levels of description go much higher than genus and species. These levels are called ranks, and form what are known as taxa (singular taxon). Genus and species are taxa. Genera are gathered into families—which as we will see, is a most useful taxon.

It helps to think of taxa as populations of similar organisms, and as you go down the list, the groups get smaller and smaller. For example there are thousands of plants in the Fabaceae family (families are always capitalized, no italics), previously called Leguminosae. Informally, this is called the legume, pea or bean family. As you go from this family level down to, for example, *Senna* (a genus within the family) there will be far fewer members—250 to 350 depending on your source. Go down one more level to species, say to *Senna polyphylla*, and there is only one member, the desert cassia.

I find the family level most useful in gardening; it gives me a general "feel" for what a plant will grow to look like and what conditions it may need. If you know a plant is in the citrus family, Rutaceae, you know a lot. You may not get an edible citrus fruit from the plant, but there will be similarities. During the recent citrus psyllid problem, knowing the orange jasmine or orange jessamine (*Murraya paniculata*) is a Rutaceae member alerts you that this ornamental is susceptible to the same insect as an orange tree.

Not only will knowing plant families impress your friends, but you also won't be fooled by common names based on superficial appearances. You'll be able to tell people "that traveler palm (*Ravenala madagascariensis*) isn't a palm at all. It's in the Strelitziaceae family. Palms are all in the Arecaceae family."

There are, of course, many variations, disagreements, revisions and unknowns in taxonomy. Life is just too diverse and unwilling to be neatly classified to conveniently fit into our artificial categories. Ask what constitutes membership within a rank, and you may get many answers. While cladistics, DNA research and genome mapping have answered many questions, they've also raised many new ones. Many books and journals are published on this topic, so admittedly this article only serves as a very simple start. But knowing some basics helps us better communicate—and better care for and know our plants. Find out much more at the International Association for Plant Taxonomy: www.iapt-taxon.org.

There's a great mnemonic many biology students are familiar with: "**K**ing **D**avid **C**ried **O**ut **F**or **G**ood **S**oup." There are a dozen variations, but remembering this will help you keep the main ranks in proper descending order:

Desert cassia, *Senna polyphylla*

Kingdom	Plantae
Division	Magnoliophyta
Class	Magnoliopsida
Order	Fabales
Family	Fabaceae
Genus	*Senna*
Species	*S. polyphylla*

A note on pro-nun-cia-tion

Here are a few guidelines for starters, though there really is no universal standard:

- The plural of genus is genera, with stress placed on the first syllable and the first vowel pronounced as in "bet."
- Plant family names always end in –aceae, pronounced as "ay-see-ee." The aroid family Araceae is therefore pronounced "uh-ráy-see-ee."
- All botanical orders end in –ales.
- A vowel is generally long if followed by a single consonant, as in *Salix*, "say-lix," or *Bidens*, "buy-dens." With exceptions, a vowel is short if followed by two consonants, as in *Hosta*, "ha-sta," like the vowel in "hot."

Vigilance and the Edible Garden

By Richard J. Campbell, Ph.D. and Noris Ledesma, Ph.D.

Here in South Florida, our backyards overflow with ornamentals and edibles—we grow myriad plants for all cultures and tastes. Our horticultural paradise surely knows no bounds, or, so we think.

Not that long ago, we all had citrus trees growing in our home gardens. We innocently ate sweet oranges, grapefruit and limes right off the tree and our sultry evenings were perfumed by the sweet scent of orange blossom. Citrus fruit was indeed one of our iconic backyard fruits, yet after a series of devastating plagues and government interventions, we are left citrus-less. As with the loss of the Jamaican tall coconut to lethal yellowing, we were left all the poorer.

The loss of the coconuts and citrus left a permanent scar on our South Florida lives. Never would we be able to return to our innocence. So should we worry about the plant plagues to come? While we work this around in our brains, laurel wilt is burning through South Florida destroying our avocado trees. We may be bemoaning the loss of another iconic South Florida crop in the not-too-distant future.

What about the mango? Could we endure its loss, could we come out the other side? What would we eat in the hot, humid summer? Is there a way to increase the odds of survival for the edible garden mango?

With horticultural crops, we must always be vigilant against the next pest or disease that takes aim at our beloved edible garden plants. Legislation, chemicals and management practices are what most of us think of as the defense of our crops. But, it is a wide genetic base and a diverse, varied horticultural environment that are most valuable to their survival. In terms of citrus and the HLB (Huanglongbing) bacteria (the causal agent of the current decline in home garden and commercial citrus, known as citrus greening disease), the answer to saving our edible gardens lies in widening our edible plants' narrow genetic base, which stretches back thousands of years into China. A narrow genetic approach is common in modern horticulture, but it is also dangerous.

With the mango, for instance, we have been selecting and re-selecting new varieties for decades, hundreds or even thousands of years. While we have achieved what we wanted in terms of large fruit, low fiber and sweet taste, it has come at the cost of genetic diversity. This narrowing of genetic diversity in our modern mango puts us at risk for some hereunto-unknown pathogen. Mark our words, the pathogen will come and keep coming. The mango and the edible garden will suffer if we take no action.

The Fairchild Farm is home to the genetic bank of Fairchild and is our insurance policy against biological disaster. Planted among our hundreds of mango cultivars are a growing number of wild mango species from Southeast Asia. These mangos come in all shapes and sizes, tree types and genetic makeups. Some look like mangos and some do not. Their fruit are a surprising range of colors, sizes, shapes and flavors, and within their genetic information there may lie the key to the survival of the mango.

In the coming years, our edible gardens will give shelter to these new visitors from Borneo, Sumatra and Peninsular Malaysia. Our canopies will be ablaze with crimson, purple and white from their blossoms and their boughs will be laden with sweet, colorful and exotic fruit. The next generation of Floridians will speak of not only 'Angie,' 'Mallika' and 'Cogshall,' but of the kuini, the kastooree and the laleejewo. We will change the face of the edible garden landscape and widen its diversity and defenses against disaster.

These wild mangos will form the backbone of our breeding program. We will make new interspecific hybrids—combinations of genes that have not occurred for thousands of years, or perhaps have never occurred. These new fruits will hold the genetic potential for the edible gardens to come. Future generations will build upon this work and these new interspecific hybrids in ways that we have not yet conceived. We will be limited only by our own imagination—heady days ahead for the edible garden and the world of the mango. FTBG

We need your help! To support our Tropical Fruit Program, please visit www.fairchildgarden.org/give

The Strange Life of the STRANGLER FIG

From canopy dweller to massive tree, with a reproductive cycle reliant on both male and female wasps

Text and photos by Kenneth Setzer

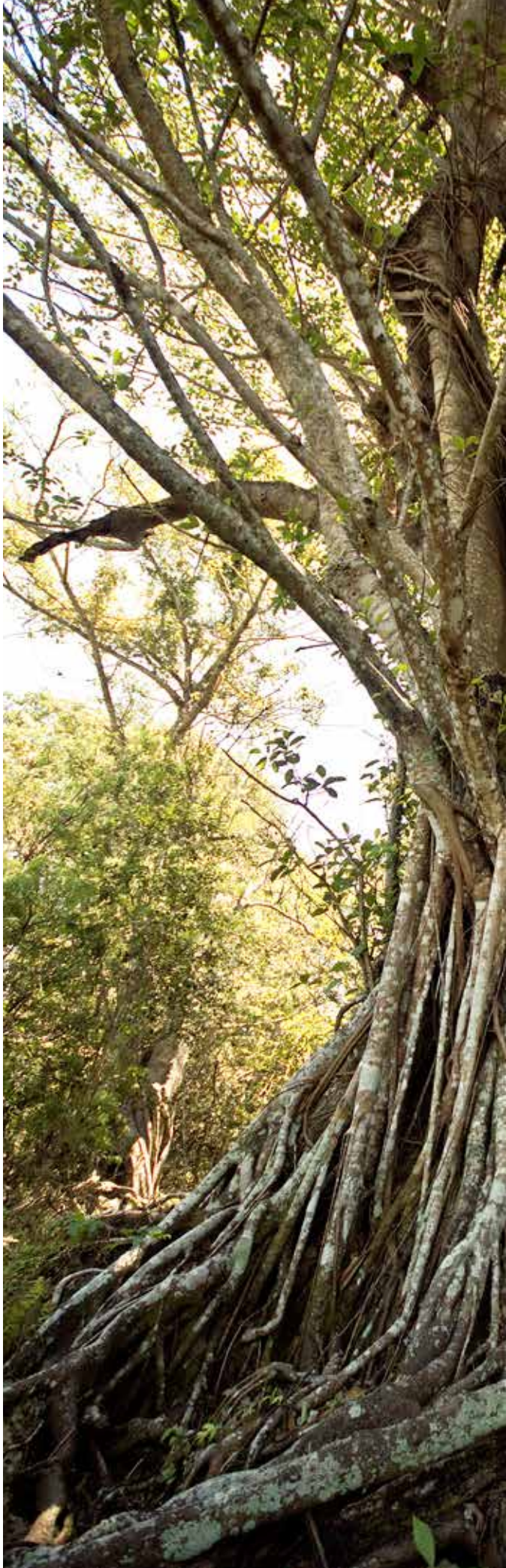
Somewhere, right now, a bird—maybe the ubiquitous mockingbird or bluejay, or a white-crowned pigeon—is pecking at a small fruit in lieu of its favored small vertebrates, deciding if it's one of the many it considers edible. It swallows the fruit nearly whole, all in a split second. It's a common occurrence, but also the beginning of a dramatic lifecycle happening all around us.

The fruit—really a false fruit called a syconium—is that of the Florida strangler fig, *Ficus aurea*. *Ficus* pollination involves a complex, perfectly timed and coordinated mutualism between the tree and a wasp (more on the wasp later). Our fig-eating bird must eventually deposit the remains of its meal, quite possibly on a tree limb. Now surrounded by a packet of sticky fertilizer, a *Ficus* seed that managed to survive avian digestion might germinate high up in the tree canopy. As the rain and sun signal the seed to grow, it sends out aerial roots to adhere to its supporting limb and embryonic leaves to begin photosynthesis; its life as an epiphyte has begun.

Strangler fig actually refers to many species of *Ficus*, which all may start out life this way—though many can germinate terrestrially and grow as freestanding trees. Those beginning as epiphytes use a tree for support, but do not directly draw nutrients like a parasite. As the aerial roots reach for the ground, the leaves take advantage of access to sunlight available from the *Ficus*'s advantageous perch on high—an adaptation for gaining a foothold in a crowded, light-deprived forest, while simultaneously avoiding floods and ground-dwelling herbivores. When those same roots reach soil, they begin to penetrate it. The strangler is now a hemiepiphyte (having spent part of its lifecycle as an epiphyte). With resources from the soil now available, the strangler fig really begins to grow.

Living up to its name, the strangler fig embraces its host in what becomes a latticework prison of wood; the original host tree now begins to suffer. The strangler is competing with it for precious sunlight, and with access to the ground, it's competing for groundwater and soil nutrients, too. The strangler fig's aerial roots fuse together and fill in to form areas of solid wood covering over the host, severely restricting its outward, secondary growth.

As in most aspects of the strangler's life, reproduction, too, is unusual. Its syconium is a hollow ball containing hundreds of clustered flowers on the inside. It is the part we recognize as a fig. Each *Ficus* species has a specific fig wasp mutualist it requires for pollination, with the wasp in turn needing the fig for its own reproductive cycle. A female wasp loaded with *Ficus* pollen enters the syconium through a tiny opening, the ostiole.



PREVIOUS PAGE
Ficus subcordata at Fairchild. Plot 28.

The *Ficus* syconium contains both male and female flowers, but at this stage, only the female flowers are mature and receptive. Inside, the wasp lays her eggs on female flowers, simultaneously spreading the pollen. The flowers containing eggs develop a gall, thus enclosing a young wasp within.

Meanwhile, the now-pollinated flowers are fertile and may produce seeds. Male wasps mature from eggs first, and are the first to emerge from their galls. They search for females within the syconium to mate with, which they do before the females even emerge from their respective gall.

By the time the female wasps have mated and are ready to emerge from their galls, the male fig flowers have matured. Now covered in pollen from the male flowers, the female wasps can emerge into the outside world to find a new syconium and begin the process again, in an amazing orchestration of perfectly timed events.

This synchrony is indeed amazing, but equally so is the asynchronous fruiting within a community of *Ficus* trees. If all trees of a given species produced syconia simultaneously, the fig wasp would have nowhere to lay her eggs after exiting her natal syconium. By staggering the production of syconia, the *Ficus* trees ensure this will not happen. This also means figs are available nearly year round for the creatures that depend on them, like non-pollinating wasps, fig-eating mammals and birds like the one that began our story.

There are between 750 and 850 *Ficus* species in the world. Such numbers mean they are nothing if not adaptable—they are known to live as epiphytes, hemiepiphytes, woody vines, shrubs and often as enormous trees throughout tropical and subtropical environments. The massive banyan tree—*Ficus benghalensis*—with its buttressed trunk and supporting roots, can grow to form a forest of its own creation; the Great Banyan Tree in Kolkata, India, covers about four acres. Closer to home is the largest banyan in the United States, in Lahaina, Maui, Hawaii—under whose shade I once had the pleasure of watching the construction of Polynesian canoes.

Fairchild alone has 33 different *Ficus* entries in our living catalog. And just a few miles south, in Bill Sadowski Park, is the National Champion strangler fig, a *Ficus aurea* that, at its last measurement in early 2014, reached 69 feet tall with a crown spread of 72 feet. Its original host, if the strangler began as an epiphyte, is long, long gone.

LEFT
The enormous *Ficus aurea* National Champion strangler fig, last measured at 69 feet tall with a 72-foot crown spread.

Oriental Fruit Fly
The Redland Invasion

By Kenneth Setzer

By now you must have seen or read something about the Oriental fruit fly—certainly if you live in Southeast Florida. With its persistent threat of invasion, this fruit fly has the potential to devastate Florida's—as well as the country's—horticulture.

We are constantly hearing of new invasions threatening our crops and ornamentals. You name it: giant African snails, iguanas, whiteflies, scale insects, etc. They like our home for the reasons we do—mostly mild weather, sun, lots of fresh fruit and vegetables. But I knew this latest Oriental fruit fly (OFF) invasion was grave, and being taken very seriously, when I saw one of the many portable electronic roadside signs flashing the warning: "Fruit Fly Quarantine Area; Do Not Move Fruit." The quarantine area encompasses about 85 square miles; fruit and vegetables can only be transported out of the area with permission of regulators.

The OFF (*Bactrocera dorsalis)* lays eggs in its host plants' fruit, and once they hatch the larvae consume portions of the fruit, rendering it unusable. A frightening realization comes while perusing the list of the OFF's potential host plants. It is quite polyphagous, meaning it isn't a picky eater! The Florida Department of Agriculture and Consumer Services lists 435 OFF host plants, from *Acca sellowiana* (Guavasteen) to *Ziziphus oenoplia*. It will eat almost all of our beloved fruit, including ackee, papaya and mango, as well as many ornamentals, like areca palm, sea grape, coconut palm, even certain orchids, and also plants from which we derive vegetables and nuts.

The OFF has attempted to invade Florida before. What makes this time different is the quantity of flies discovered. There are more than 55,000 insect traps placed statewide to monitor the insects that frequent our plants. When checking traps back in September 2015 in the Redland (an agricultural area of South Florida), researchers found 45 flies in a single trap.

Soon thereafter, the Florida Department of Agriculture established a quarantine zone, regulating the movement of any possible host material—infested fruit and vegetables—into or out of the quarantine. In order to buy, sell or even move plants, businesses needed to sign a compliance agreement to ensure they knew proper procedures to avoid spreading infested material. Homeowners, too, are prohibited from moving any fruit or vegetables off their property, and must follow strict disposal instructions, double bagging materials and placing them with household trash.

Other controls in the Redland area were immediately introduced to destroy the OFF infestation. One technique, called "male annihilation," involves using a pheromone to lure male fruit flies to a trap and kill them. Other treatments include foliar treatment with insecticide applied directly to leaves, stripping and destruction of preferred host fruit around sites where flies have been found and drenching of soil around infected host trees with a pesticide to destroy any subterranean pupae.

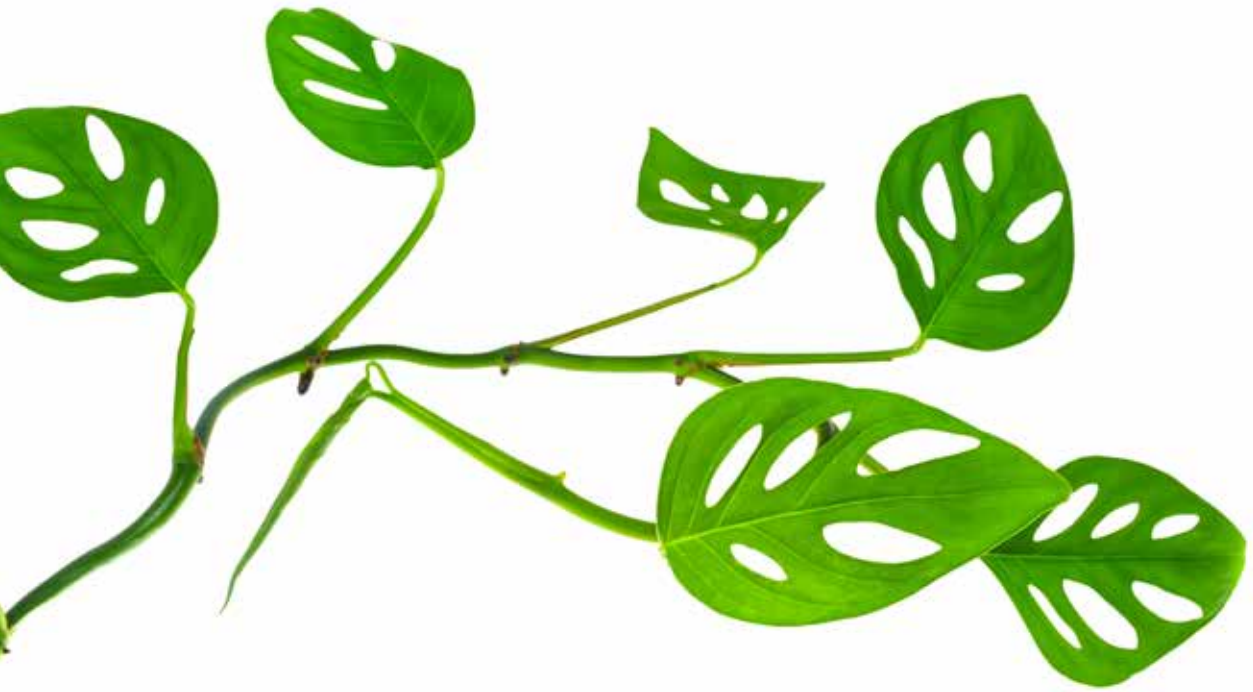
The Good News

These extreme actions are coupled with cooperation among the Florida Department of Agriculture and Consumer Services, University of Florida Institute of Food and Agricultural Sciences Extension, the U.S. Department of Agriculture, local government and local growers. It seems to be working. Jeff Wasielewski, a commercial tropical fruit crops extension agent at the University of Florida/IFAS Miami-Dade County Extension and formerly of Fairchild, says the quarantine will be lifted when no flies are found for the duration of three of its lifecycles. The length of lifecycle varies, with warmer temperatures resulting in a shorter life of around 30 days, while cooler temps lead to a life of about 45 days.

As of this writing, zero flies have been found during the past 71 days, and, fingers crossed, the quarantine will soon be lifted. February 20, 2016, is the current tentative end for the quarantine. Of course, since the OFF has invaded before, it may always do so again. We are constantly at risk, but there are many diligent professionals keeping an eye on things.

Find more information about OFF at www.freshfromflorida.com.

Photos by Gary Steck, FDACS/Division of Plant Industry



Aroids OF FAIRCHILD

Text and photos by Marilyn Griffiths

Plants in the aroid family, Araceae, are part of the large group of "monocots" (plants with a single cotyledon, i.e. the embryonic leaf) that includes grasses, palms and orchids.

The distinctive inflorescence is the most obvious defining characteristic: a spadix (a type of spike inflorescence) holds small flowers and is supported by a spathe that covers and protects the spadix as it develops. This flowering structure varies widely in size and color through the 3,750 different species in the family. Habits also vary widely, from epiphytic to aquatic.

At Fairchild, we have 417 living accessions of aroids, encompassing 620 individual plants, of which 64 were wild-collected. The collections span the entire lifetime of the Garden.

On the historic *Cheng Ho* Expedition to the Philippines and Indonesia in 1939, Dr. David Fairchild received material of *Amorphophallus paeoniifolius* from the economic garden of the Agricultural School in Laguna, Luzon, Philippines. The material was planted in the Garden soon after it was received. Following a period of dormancy in the winter, this terrestrial species develops large multi-lobed leaves in the spring. The tuber will divide and form colonies of multiple plants. The more mature plants of the group will flower before sending up mottled stems topped with lacy leaves. Fairchild described its odor as "strong," while most would describe it as "awful." Pollinated by flies and beetles, it has an

1. *Anthurium veitchii*
2. *Philodendron warscewiczii*
3. *Homalomena* species

4. *Philodendron* species
5. *Rhaphidophora sulcata*
6. *Philodendron* species roots

odor reminiscent of rotting flesh. Look in Plot 32a near the *Victoria* Pool during April and May to see flowers and leaves emerge from dormancy.

Amorphophallus titanum has the world's largest unbranched inflorescence. Like *A. paeoniifolius*, it has a distinctive odor which emanates in waves from the plant. The spathe has the appearance of burgundy velvet and surrounds the spadix, which can reach 10 feet tall. In 1998, our specimen, affectionately called "Mr. Stinky," began to produce an inflorescence—the first *A. titanum* to do so in the United States in 60 years. We received this plant from Wilbert Hetterscheid, world-renowned *Amorphophallus* specialist and collector. *A. titanum* has been found only on the island of Sumatra.

Anthurium andraeanum, native from Colombia to Ecuador, is widely cultivated and hybridized for its colorful heart-shaped spathes, which open flat and have brilliant pink-to-red waxy surfaces and a yellow spadix emerging from them. The genus contains more than 800 species, from *A. abelaezii* to *A. zuloagae* (which were incidently both described by Thomas Croat).

Philodendron and *Monstera* can be seen climbing on trees and palms in our rainforest, with roots dangling from great heights; they are evocative of Tarzan swinging through the Hollywood jungles.

"Aroids"

Georgia Tasker

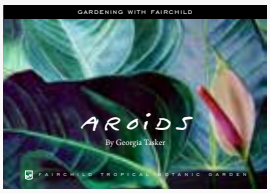
By Kenneth Setzer

Have you ever wondered, "What exactly *is* an aroid?" I have the answer for you, in the new book "Aroids," by the Garden's own Georgia Tasker. It's the ideal handbook to introduce you to this large tropical and sub-tropical group of plants, which range from the commonest houseplant to some of the rarest and weirdest the plant kingdom offers.

Aroids all belong to the Araceae plant family, but can vary wildly in appearance and habit. This book highlights telltale characteristics to help you identify an aroid, with chapters on genera within the family, including *Philodendron*, *Anthurium*, *Colocasia*, *Monstera*, *Amorphophallus* and many more.

This book includes just the right mixture of information on growing and caring for aroids, as well as snippets on their biology, origins and reproduction—including details on growing aroids from seed, and where in your garden they will thrive to showcase their classic tropical look.

With its numerous large photos, "Aroids" is the best way to really get a feel for identifying different aroids while gaining the confidence to grow them.



Gardening with Fairchild Series: Aroids

By Georgia Tasker, can be purchased in the Shop at Fairchild or online at store.fairchildonline.com
Regular price, $19.95
Member price, $17.97

inflorescenses

Several aroid species are edible, notably *Colocasia esculenta*, taro root. It is estimated that this species has been cultivated for 10,000 years. The tuber of *Amorphophallus paeoniifolius*, or elephant foot yam, is cultivated for markets from Africa through Asia. *Cyrtosperma*, *Alocasia*, *Xanthosoma* and *Monstera* are other genera containing edible species.

Our collections have been enhanced over the years by donations and collecting trips. Among the significant donors are Dr. Monroe Birdsey, professor of botany at the University of Miami; Timothy Plowman, noted ethnobotanist; and Thomas Croat, Missouri Botanic Garden's aroid specialist and world-renowned plant collector. Fairchild staff members have brought plants in from collecting trips to India, Malaysia, the Caribbean, Central and South America and Hawaii.

As previously mentioned, aroids can be climbers, epiphytes or aquatics. The bird's nest-type *Anthurium* collects leaf litter in its center, which breaks down into fertilizing compost. Bees, beetles, flies and even hummingbirds have been seen to pollinate aroids. Many of our Florida native aroids are aquatics. For the South Florida landscaper and home gardener, aroids provide a diverse palette. For the botanist and ecologist, they are an unending source of research interest.

7. *Anthurium* x 'Caribe'
8. *Amorphophallus paeoniifolius*
9. *Dieffenbachia oerstedii*

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Living "East of the Andes and West of Nowhere"

Nancy Bell Fairchild Bates, from her childhood through her early married life in Colombia

By Janet Mosely

"Best I ever took of Nancy." Dr. David Fairchild took this photo while visiting in 1941. Nancy is seen on the porch of her ranch outside Villavicencio, Colombia. July 26, 1941. Photo by Archives/FTBG

"Nancy Bell Fairchild grew up with a liking for the limitless range of adventure that waits for the purposeful explorer, for she is a daughter of David Fairchild, the world prospector for plants. And she grew up with a taste for the fascinations that await the explorer in science, for her grandfather was Alexander Graham Bell."—From the flyleaf of "East of the Andes and West of Nowhere."

Nancy Bell was Marian and Dr. David Fairchild's second daughter and youngest child. She was born in 1912 in Washington, D.C., a time when David and Marian were living at "In The Woods," as the family's open-to-the-outdoors, Asian-influenced Washington-area house was called. As you might imagine, her childhood was full of interesting travels and experiences. She, along with her older siblings Graham and Barbara, often accompanied their tireless parents on trips. They spent family summers in Baddeck, Nova Scotia, at the Bell Family house known as "Benin Breagh" and winters at The Kampong in Miami. Meals were adventures in exotic and then-unknown foods. During the years when David Fairchild explored the world on the first Utowana Expedition (1924-1928), Nancy Bell attended boarding schools in New York and Geneva.

Throughout Nancy Bell's childhood, Graham Fairchild's best friend was a fellow entomology enthusiast named Marston Bates. He was the son of Fort Lauderdale horticulturist Glenn Bates—the boys met at The Kampong when Glenn Bates came to visit and brought his son. The two boys shared a love of lepidoptery and hunted butterflies together, sometimes suffering the girls to come along. Nancy Bell and Barbara considered Marston a second brother. Both boys would grow up to become well-respected Harvard-trained entomologists. Marston is also well known for his writings on ecology.

In Nancy Bell's memoir, "East of the Andes and West of Nowhere: A Naturalist's Wife in Colombia," she remembers growing up with Marston, who was considered a member of the family. "Then came a gap of several years during which Marston was off in Cuba, Honduras and Guatemala. We heard that he had gone to Albania to work for the Rockefeller Foundation on mosquitos and malaria. I personally gave the matter little thought, being busy going to school, accompanying Daddy and Mother to the West Indies or going to China by myself." She studied singing at the Juilliard School of Music for several years. One semester, she travelled the Hebrides

Nancy Bell holding a bowl of Ceylon gooseberry (*Dovyalis hebecarpa*). March 2, 1919.
Photo by Archives/FTBG

islands off the northwestern coast of Scotland on a bicycle to collect Highland folksongs. As she recalls, she was reaching the age when people were wondering if she'd ever marry when Marston Bates came home for a visit in the winter of 1938.

Three months later, in February 1939, Marston Bates and Nancy Bell Fairchild were married at The Kampong. Theirs was the first wedding to be held under The Wedding Tree, a ficus grown from seed collected by Marian and David on their 1926 trip to Java. The newlyweds left for Albania shortly after and spent six months there, until the outbreak of World War II necessitated their leaving. They spent several tense months in Cairo, Egypt, until they could get a boat out in May of 1940.

While sailing home, Nancy Bell and Marston planned their next move. Growing up regaled by her father's tales of Java and Panama's Barro Colorado, Nancy Bell needed little persuasion from Marston to agree they should move somewhere in the tropics, preferably in Latin America. The Rockefeller Foundation was agreeable and sent Marston to Colombia to study yellow fever. "Now a whole vista of delightful possibilities opened up: Adventure, Romance, Expeditions into the bush," Nancy Bell wrote. "Expeditions, yes …" her husband told her "... but the expedition that has adventures is a badly planned one."

Nancy Bell was expecting her first child when they arrived in Bogotá, Colombia, in 1940. Marston got back to work studying mosquitos while she undertook learning Spanish.

Remembering her family's maxim, "the first thing to see in a new place is its market," she began teaching herself the local customs.

Marian Bates was born on December 25, 1940, in Bogotá. On January 31, 1941, the family moved to Villavicencio—an isolated area in central Colombia at the edge of the Llanos tropical grassland, where the Rockefeller Foundation had a laboratory.

The Bates family lived there until the early 1950s. Nancy Bell and Marston had two more daughters, Sally and Barbara, and bought a ranch called La Argentina outside of town. Nancy Bell spent the decade they were in Colombia assisting Marston in his research on mosquitos, monkeys and the transmission of yellow fever. They raised cattle, turkeys and chickens and had a small zoo of monkeys, mice, guinea pigs, rabbits, coatis (a raccoon-like animal) and the odd capybara (the largest living rodent) or two. They travelled extensively throughout Colombia—by car, plane and on horseback, often carrying yellow fever vaccine to isolated villages. It was during this time that Nancy Bell wrote "East of the Andes and West of Nowhere," sharing her life in an unfamiliar land with wit and humor; it was published in 1947.

In 1941, Dr. David Fairchild toured Guatemala, Costa Rica and Colombia. He stayed with Nancy Bell and Marston at their ranch outside Villavicencio. Nancy Bell collected palm seeds with him. August 2, 1941.
Photo by Archives/FTBG

Friendly Creatures of the Night

Children learned all about owls, bats and bugs during Friendly Creatures of the Night in October. Garden staff led twilight walks to discover nocturnal creatures and carnivorous plants, and a special outdoor screening of Disney's "Frankenweenie" got everyone excited for Halloween.

Howl-O-Ween

Man and man's best friend enjoyed exploring the Garden in costume during Howl-O-Ween, the annual event where Fairchild opens its doors to dogs and their families. Visitors got creative with costumes, and dogs came decked out in bumblebee, jack-o-lantern and superhero attire.

*Boo*tanical Halloween Decorations

We celebrated Halloween with a not-so-scary bootanical exhibit of decorations made from sustainable and repurposed plant material. Kids gasped at ghoulish ghosts fishing in the rainforest stream, bitty bats hanging from the DiMare Science Village ceiling and wicked witches holding brooms made from fallen branches.

Our thanks to longtime Fairchild volunteer Bev Murphy—who is the creative genius behind this uniquely Fairchild experience.

Fall Festival Featuring the 75th Annual Ramble

Fairchild's beloved garden tradition, the Fall Garden Festival featuring The Ramble, celebrated its 75th anniversary this November. Traditions like the antique sale, old and rare books sale, plant sales and Nell's Tea Garden were combined with new activities like conservation education stations and The Million Orchid Project demonstrations, symbolizing a melding of past and future.

And the EMMY® goes to...

The *Chihuly at Fairchild* exhibition appeared in WPBT's "Art Loft" in December 2014. Nannette Zapata, Fairchild's chief operating officer, was featured in the 20-minute segment, which was awarded an EMMY® by the Suncoast Chapter of the National Academy of Television Arts & Sciences in December 2015. The EMMY®-award winning segment can be seen at www.fairchildgarden.org/emmy

Gala in the Garden 2016 Preview

The 23rd Annual Gala in the Garden at Fairchild will take place on Saturday, February 6, 2016 at 6:30 p.m.

This year's Gala, themed "Starry, Starry Night," will begin with a cocktail reception and silent auction featuring luxury getaways and world-class experiences. Dinner and dancing will follow in the Lakeside Marquee, which will be decorated in midnight blue with tiny lights adorning the ceiling like stars. A gourmet dinner and exciting band will set the perfect tone for both your palate and your dancing shoes. It will all culminate in an unforgettable evening of tropical beauty.

Individual tickets start at $750, and tables for 10 can be reserved for $7,500. To purchase tickets, please contact Susannah Shubin at sshubin@fairchildgarden.org or call 305.667.1651, ext. 3375. For more information, please visit www.fairchildgarden.org/Gala.

Sunday Sounds

Visitors enjoyed live music performed by students of the University of Miami Frost School of Music during Sunday Sounds at the Glasshouse Café. Each month, groups of young musicians played a diverse repertoire of styles and delighted audiences of all ages.

See "Schedule of Events," page 7, for the complete schedule.

Holiday Concert at Fairchild

In December, esteemed conductor James Judd led the Fairchild Ensemble Players through a lovely repertoire of winter-themed music at the Holiday Concert. The band performed a mix of new and classical favorites to usher in the winter season.

wish list

Fairchild has a wish list of items that will enhance our programs, but we need Wish Makers. We hope you see an item that you can help fulfill.

FOR OUR HORTICULTURE OPERATION

- 2 Tablet Notebooks, $1,500
- 12 Golf Cart Batteries, $1,200
- Walk-Behind Aerator, $1,500
- Hardware for Accession Tag Embossing Machine, $2,000
- Plant Transport Van, $20,000

FOR CONSERVATION, RESEARCH AND THE ONLINE HERBARIUM

- Extra-Tall Tripod, $150
- Macro Zoom Lens for Sony SLR Camera, $800
- Laptop Computer, $2,000
- New Display Giclee Prints on Canvas for Public Events, $2,000
- Plant Canopy Imager, $6,000
- Seed Germination Chamber, $8,500
- Mid-Size Pickup Truck, $26,400
- GPS Unit (GeoXT 6000), $8,000

FOR THE RESEARCH LIBRARY

- World Checklists for: Araliaceae, Conifers and Fagales, $300

FOR THE FAIRCHILD FARM

- Golf Cart, $7,000

FOR MEMBER AND DONOR SERVICES

- Laptop Computer/LCD Projector, $2,000
- Digital SLR Camera, $1,000

FOR OUR STUDENTS

- Solar Conversion Kits for Education Golf Carts, $4,000
- iPads for Explorer Field Studies Program, $2,500
- Dark Field Microscope, $600
- Cannon Double-Sided Feed Scanner, $3,000

FOR OUR VISITORS

- Golf Cart, $7,000

FOR THE LIFELONG LEARNING PROGRAM

- Laptop and LCD, $1,200

To fully fund a wish, donate a portion of the cost or donate the actual item, please contact Leslie Bowe at 305.667.1651, ext. 3338, lbowe@fairchildgarden.org or please visit www.fairchildgarden.org/Donate

18th Annual Spring Plant EXTRAVAGANZA

DON'T MISS THIS EXCITING SALE ONLY OFFERED TWICE A YEAR TO THE PUBLIC!

PRESENTED BY:

Searle Brothers Nursery, Inc. &

The Rainforest Collection®

SOUTHWEST RANCHES, FLORIDA - WESTERN BROWARD COUNTY

MARCH 2016

March **4th, 5th**, 8:00AM - 5:00PM - March **6th**, 9:00AM - 4:00PM

FOLLOWING WEEKEND:

March **11th, 12th**, 8:00AM - 5:00PM - March **13th**, 9:00AM - 4:00PM

FEATURING A DYNAMIC TROPICAL PLANT SELECTION:

Including over 500 species of **Rare & Exotic Palms** - Crotons - Aroids - Bromeliads - Cordylines - Cycads - Heliconias - Gingers - Orchids - Flowering Trees, Shrubs & Vines - Tropical Fruit Trees & Plants - Unusual Species and Botanical Oddities! Plus: Butterfly Plants - Deluxe & Field-Grown Specimens - Hedge Material - Ground Covers and a diverse selection of Ornamental Landscape Plants!

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Email: palms@rainforestcollection.com
Website: www.rainforestcollection.com

Go online to the **IPS Palmtalk** forum and search for 'Extravaganza' topics for more information.

Coupon
Redeem for a free plant!
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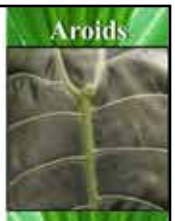
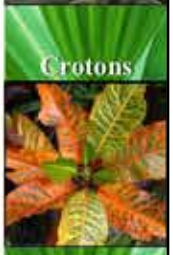
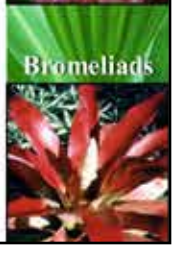
(while supplies last)







COME AND EXPERIENCE OUR

ORCHID ODYSSEY

NOW THROUGH APRIL 30, 2016

Be sure to bring your family and friends to Fairchild this season to enjoy a truly tropical display of rare orchids, and the widest varieties of colors you'll find anywhere. The Simons Rainforest features a colorwheel of beautiful orchids from around the world.

SO BE SURE TO VISIT US SOON.
YOU WILL NOT WANT TO MISS THE ORCHID ODYSSEY AT FAIRCHILD.

To learn more about **Orchid Odyssey at Fairchild**, to support **The Million Orchid Project** or to buy **tickets to Fairchild,** visit us at **www.fairchildgarden.org.**

FAIRCHILD IS OPEN DAILY, 7:30 A.M. - 4:30 P.M.

While you're at the Garden, be sure to Facebook, Tweet and Instagram to your friends with the hashtag **#OrchidOdyssey**

Follow the beauty **@FairchildGarden**

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