

the TROPICAL GARDEN

FALL 2016



PUBLISHED BY FAIRCHILD TROPICAL BOTANIC GARDEN

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FEATURES



ONE PLANT'S LITTER,
ANOTHER ONE'S NUTRIENTS **27**



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50 OKEECHOBEE GOURD:
A PUMPKIN LIKE NO OTHER





 @CarlLewis

I have always appreciated our Garden's rich history and innovative spirit. While we continue to celebrate the legacy of Col. Robert Montgomery and Dr. David Fairchild, we are also creating programs with a futuristic take on botany.

This fall, we have been especially aware of our past, revisiting the world of Dr. Fairchild through an extraordinary trip to Southeast Asia. Last month, I spent 12 days on a wooden schooner with an adventurous group of longtime Fairchild supporters, members and volunteers. We retraced a route traveled by Dr. Fairchild on his 1940 botanical expedition, weaving our way among remote Indonesian islands that have changed very little during the last 76 years.

The winter issue of *The Tropical Garden* will include stories from our trip, along with photos of the plants, places and people we encountered.

While we were on our historic expedition, seeing the world through Dr. Fairchild's eyes, our students were here in Miami contemplating plants from the perspective of an astronaut on a mission to Mars. Thousands of middle and high school students are participating in our NASA-funded Growing Beyond Earth project, sifting through the world's edible plants to find varieties suited to growing on spacecraft.

Several of our programs are pushing the boundaries of botany in similar ways. The Million Orchid Project, unique in its scale, is leveraging the enthusiasm of our community to reestablish rare orchids in city neighborhoods. We are also reimagining the design of tree plantings across Miami-Dade, through a scientific partnership with The Nature Conservancy and more than 100 elementary schools. Within the Garden, we are introducing, planting and studying new plants at a faster rate than ever, innovating and reshaping tropical horticulture for generations to come.

As a Fairchild member, you are helping us preserve 83 acres of paradise carved out by our founders 80 years ago. Your membership, combined with the enthusiasm and generosity of our forward-thinking supporters, is also allowing us to chart the future of botany for our community, our planet and beyond.

Best regards,

A handwritten signature in black ink that reads "Carl E Lewis". The signature is written in a cursive, flowing style.

Carl Lewis, Ph.D.
Director



[@ZapataNannette](#)



Ceiba speciosa

South Floridians jokingly say that we only have one season: perpetual summer! And while our calendars indicate that we're technically in "autumn," here in South Florida, we don't experience dramatic changes in foliage like the rest of the country. However, that doesn't mean we're green with envy.

There's a consistency in the tropics that's very reassuring; a reliability and steadiness that resembles a Swiss timepiece. There's comfort in that, I believe. It's also what makes Miami such a desirable place to live and vacation: blue skies, warm waters, year-round outdoor living, lush foliage and, of course, Fairchild.

Fairchild is like that Swiss watch. We clock the passage of time not just by the nearly endless spectrum of green foliage woven like a beautiful tapestry within our historical landscape, but also through spectacular blooms. For example, each year between October and November, you can expect to see the beautiful silk floss tree (*Ceiba speciosa*) in full splendor. The vibrant pink blooms punctuate the start of fall with such flourish as to inspire even the greatest poets.

I was talking with Georgia Tasker, our garden writer, a few days ago, and she reminded me that, while they are subtle and nuanced, a few of what I'll call more "traditional" fall changes also take place in South Florida. Keep an eye out for these delicate and underrated passages of time that she shared: "Carolina willows shed their leaves; goldenrod lines the roadsides; swamp lilies bloom in the prairies; fruit appears on smilax, baccharis, myrsine, wax myrtle, morinda and snowberry; tree snails mate in the fall, bury their eggs in the ground and then ascend their favorite trees to seal themselves in to survive the dry season. Sweet bay magnolias hold up seed pods, maple leaves will turn red and the ruby throated hummingbirds are back now and will migrate back north in the spring."

Tasker also noted that the turkey vultures—our winter residents—returned on October 9. I can attest to this personally, having seen a kettle of turkey vultures mightily at work on a dearly departed animal while I was stopped in traffic. I skipped breakfast that morning.

The arrival of autumn also means that we'll soon be out of hurricane season (June 1 – November 30), for which most of us will be especially glad this year. In early October, we prepared for Hurricane Matthew, and thankfully for South Florida, Matthew stayed far enough offshore to produce mostly leaf litter and garden debris.

As I drove to the Garden following the storm, I was pleased that many homeowners heeded warnings, shuttered their homes and proactively prepared their gardens by pruning trees and moving potted plants indoors. Once I arrived at Fairchild, I walked the grounds and surveyed the plant collections and buildings for damage. You can imagine my relief in finding very little damage and my joy in seeing the silkfloss trees' familiar silky, bubble-gum pink blooms hanging from high above.

So get ready for shorter, cooler days. Our quiet fall has arrived right on time, its subtle beauty burning brighter than autumn's ambers. And enjoy our Fall Issue; we've specially curated it to enrich the season's bounty.

Warmest regards,

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

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Chad Husby, Ph.D., is Fairchild's botanical horticulturist. His work focuses on international plant exploration to enhance the Garden's collections and to find worthy new plants to share with the public. In addition, he collaborates with the science and education programs at the Garden. He received his undergraduate degree from Alma College, a Master of Applied Statistics from Ohio State University, a master's in horticulture from Virginia Tech and a Ph.D. in biology from Florida International University.

Jennifer Possley, M.S.,

is a field biologist and a member of Fairchild's South Florida Conservation Team. She maps, monitors and researches the rare flora of Miami-Dade County and has a special interest in ferns. She also helps to steer the Garden's Connect to Protect Network.

Prior to joining Fairchild's staff in 2001, she received a B.A. in biology from Kalamazoo College and a M.S. in agronomy from the University of Florida.



Scott Zona, Ph.D., is Florida International University's conservatory & greenhouse curator. He holds a Ph.D. in botany from Rancho Santa Ana Botanic Garden and Claremont Graduate University, California. He has over 150 publications, both scientific and popular, on palms, bryophytes and other tropical plants. Zona co-wrote the second, revised edition of *The Encyclopedia of Cultivated Palms*, published in 2012 by Timber Press. He is co-editor of the International Palm Society's quarterly journal, *PALMS*.



Javier Francisco-Ortega, Ph.D.,

is a faculty member at Florida International University (Department of Biological Sciences) with a research appointment at the Garden. He joined FIU and Fairchild in 1999 and has a broad interest in plant taxonomy, conservation genetics, molecular phylogenetics and botanical history. During the last few years, he has performed research on the history of plant exploration.



the TROPICAL GARDEN

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ON THE COVER
Tacca integrifolia
Photo by Susan Ford-Collins



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January 20, 21 and 22
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MOMMY AND ME TEA
\$27 members, \$37 non-members and \$17 children 12 and under.
Sunday, January 29
3:00 p.m. Information and reservations, at 305.663.8059; e-mail mvalent@fairchildgarden.org

February
SUNDAY SOUNDS
Sunday, February 5
1:00 p.m. Glasshouse Café

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Thursday, February 9
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VALENTINE'S DAY CONCERT
Sunday, December 3

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TOURS EN ESPAÑOL
Sábados y Domingos,
1:30, 2:30 y 3:30 p.m.

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10:15 a.m., 11:15 a.m.,
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and 2:15 p.m.

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10:15 – 11:00 a.m.

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Tours added daily.
Check the information desk upon arrival.

Support the Annual Fund 2017



Dear Friends,

My name is David Fairchild, and well over one hundred years ago, I began to search the world for plants that I believed would improve our country. Throughout my lifetime of exploration, I relied on the support of benefactors every step of the way.

I traveled throughout Europe, Asia, North and South America for plants that would help farmers to grow crops capable of surviving harsh Midwest winters. We found tough varieties of alfalfa, corn, wheat, barley. Eventually, I was able to introduce the tropical plants we've come to take for granted, like mangos and avocados.

The Garden has expanded my efforts and continues exploration, education, conservation and research in botany and horticulture—to the benefit of the local and global communities. I now ask you to join the list of our supporters, those people who have expressed an appreciation for how important it is to continue our mission of exploring, explaining and conserving the world of tropical plants.

This is why I ask you to contribute to the Fairchild Annual Fund; we need to maintain and increase our efforts for this and future generations. Visit the Garden and see for yourself what we can accomplish.

I ask you to please consider giving \$50, \$100 or \$500.

To read more about why we need your help, or to give, please go to www.fairchildgarden.org/annualfund

Sincerely,

David Fairchild

David G. Fairchild, Plant Explorer

PS: Please give today. Our work is urgent and needs your support.

Pencil, images and journal page from the D. Fairchild collection of the FTBG Archives.



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Daily 9:30 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.

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GET IN ON THE CONSERVATION



William Cinea, from Jardin Botanique des Cayes, on the Tortue expedition.

A RECENT EXPEDITION TO NORTHERN HAITI

In May, a joint conservation expedition representing botanical gardens of three different countries explored the Island of Tortue in northern Haiti. The expedition included Haiti's Jardin Botanique des Cayes (William Cinea), the Dominican Republic's Jardín Botánico Nacional de la República Dominicana (Brígido Peguero) and Fairchild (Dr. Brett Jestrow). The primary goal was to locate *Tortuella* (a member of the Rubiaceae family), a monotypic (single-member) genus neither seen nor collected since 1925, one of the lost genera of the Caribbean.

On this trip, we were able to locate the lost species, though it wasn't quite where we expected it would be. Also during this field trip, team members found the palm *Pseudophoenix sargentii* (buccaneer palm), a first report for the island.

The project was co-organized by Dr. Javier Francisco-Ortega, head of the FIU/Fairchild Plant Molecular Systematics Laboratory and a Florida International University faculty member. The expedition was supported by Mohamed Bin Zayed Species Conservation Fund.



NEW COLLABORATIVE CONSERVATION INITIATIVE FOR HAITIAN PALMS

A grant from the Prince Bernhard Nature Fund (based in the Netherlands) is supporting a conservation action plan for the most threatened palm from Haiti, *Attalea crassispatha*. Haiti's Jardin Botanique des Cayes, Fairchild and Florida International University are developing the plan. The project is led by William Cinea, director of the Jardin Botanique des Cayes, in partnership with Fairchild Herbarium Curator Brett Jestrow and Dr. Javier Francisco-Ortega, a Florida International University/Fairchild faculty member. They hope to conduct field studies to determine current threats to *A. crassispatha*, collect seeds to establish stocks for sustainability exploitation and use molecular markers to determine current levels of genetic diversity. They also plan to develop an extensive outreach and educational program with local communities and farmers, and to expand ex situ conservation activities at the Jardin Botanique des Cayes.

The project builds on previous conservation initiatives targeting threatened palms from Hispaniola; those involve botanists from the National Botanic Garden of the Dominican Republic.



Jennifer Possley and James Lange

GRANTS SUPPORT WORK OF SOUTH FLORIDA CONSERVATION TEAM

Fairchild's South Florida Conservation team recently received several grants to carry out its work with the rare native plants of South Florida and the Caribbean. Funding from Miami-Dade County Parks, Recreation and Open Spaces will support rare plant mapping, monitoring and research in Miami-Dade preserves for the next five years. Funding from the Florida Department of Agriculture & Consumer Services is supporting work with South Florida's rarest species, and is providing partial funding to the Connect to Protect Network. The Conservation Team also received grants for projects focused on seed collection from the Center for Plant Conservation; recovery of federally endangered Puerto Rican endemic plants from the U.S. Fish & Wildlife Service; and post-fire vegetation monitoring in Everglades National Park from the National Park Service.



L-R: Dr. Lisbet González, Dr. Ramona Oviedo, a local field guide, Nichole Tiernan and Jonathan Flickinger, at Pico Mella in Cuba's Sierra Maestra mountain range.

Photo by Nichole Tiernan

FIU-FAIRCHILD STUDENTS PERFORM RESEARCH FIELD WORK IN CUBA

Last August, Florida International University-Fairchild graduate students Jonathan Flickinger and Nichole Tiernan traveled to Cuba to collect plants for their doctoral research on the systematics of Caribbean Myrtaceae and *Plumeria*, respectively. During a two-week-long field trip, they collected in the mountains and along the coast of eastern Cuba, along with hosts Dr. Ramona Oviedo and Dr. Lisbet González, botanists at the Instituto de Ecología y Sistemática in Havana. The students also visited the Jardín Botánico Nacional and the Jardín Botánico de Las Tunas to study their living and herbarium collections. This work was supported by the Garden as well as the Tinker Foundation (through the Kimberly Green Latin American and Caribbean Center of FIU), in addition to the International Center for Tropical Botany of FIU—which supported Tiernan and Phipps Conservatory and Botanical Gardens—which supported Flickinger.



Shading our Schools for a Cooler Tomorrow

By Alex Levine, Fairchild Graduate Fellow

Photos by Education Staff/FTBG

Many of South Florida's elementary school students are becoming citizen scientists, thanks to a new collaboration between The Fairchild Challenge and The Nature Conservancy. What can elementary students contribute? Lots, the conservation organization believes, especially documentation of South Florida's urban heat island.

According to NASA's Goddard Institute for Space Studies, 2015 was officially the hottest global year on record. With 15 of the past 16 hottest years occurring since 2001, the current millennium is exhibiting what might be the sharpest increase in global temperatures our planet has ever seen. Indeed, 2016 is now predicted to surpass 2015's sweltering temperatures and become the new "hottest year ever," the third consecutive year to hold this title. Florida is, in many ways, a bellwether for climate change. Many of the qualities our state is known for—hundreds of miles of coastal beaches, subtropical weather, continuing urban growth—magnify the climatic shifts that are occurring

throughout the world. As greenery disappears and is replaced by impermeable concrete cityscapes, we create an expanding heat island that is notably warmer than surrounding rural areas. So when The Nature Conservancy approached the Fairchild Challenge team to help devise a way to mitigate these ever-rising temperatures, we knew we had to come up with something special.

The Nature Conservancy is one of the world's leading conservation agencies, working in more than 30 countries and all 50 U.S. states to effect change in both public policy and landscape conservation. One of the keys to its success has been to partner with local institutions and non-profits to spark action at the community level. The Fairchild Challenge reaches thousands of South Florida's K-12 students through its award-winning, multidisciplinary, science-based competition. That made Fairchild the perfect partner to help study and combat rising urban temperatures. We created the "Shade our Schools" challenge to do just that.

"Shade our Schools" encourages elementary school students to explore their school grounds and assess the benefits shade trees provide. After classes map out where all the shade trees are at their schools, they will pick one or more trees to study during the school year.



Fairchild and The Nature Conservancy created an instructional video to show teachers and students how to measure their tree's DBH (diameter at breast height) and canopy circumference (<https://youtu.be/9ELFxdQbUrA>). We also provided schools with a shade tree identification guide so students know exactly which tree species they are studying. On at least 10 separate days, classes will measure air temperatures at both ground level and chest height at three intervals—near the trunk, mid-canopy and in the sun. Their findings will be recorded on a custom data sheet, to be compiled and analyzed at the end of the year. The significance of having children ages 5 to 11 years old collecting usable scientific data cannot be overstated. Fairchild is empowering some of South Florida's youngest residents to assuage the effects of one of the most profound climatic shifts humanity has ever encountered.

However, trees are more than simple providers of cooling shade. They also form the base of complex ecosystems, providing food and shelter for numerous other plants and animals. Because these ecosystem services so often go unnoticed, the Fairchild Challenge team decided to also have each participating student create a field journal, recording observations made while their class is outside collecting data. We provided schools with a list of topics students can focus upon, such as leaves, bark, insects or birds, encouraging students to look at trees in a novel way. Each entry will be a combination of written notes and labeled illustrations, mirroring how working biologists and ecologists create their field journals.

We recently distributed more than 100 "Shade our Schools" kits containing tape measures, string, data sheets and portable thermometer/hygrometers, which measure temperature and humidity, to elementary schools. This ensures that every participating class has all the tools needed to complete this study. South Florida's elementary school teachers are energized and excited to start their classes on this journey and the Fairchild Challenge team cannot wait to see what these students discover. With the help of hundreds of fledgling scientists, the future looks bright ... and hopefully a little cooler. 

PREVIOUS PAGE

Young students learn why trees are important to the environment

LEFT

Using tools provided through the Fairchild Challenge, students measure trees in their school yard.

Photos by Education Staff/FTBC

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

Volunteer



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, guiding students on field trips, and gardening on a horticulture team.

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

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Fairchild Tropical Garden



Arlene Ferris: 30 years of Inspiring Volunteers

By Niki Saylor and Georgia Tasker

Nearly 300 Garden volunteers, staff and friends gathered on August 4 to wish Volunteer Director Arlene Ferris farewell, and to celebrate her life's work and 31 years of service and dedication to the Garden. "The Magical Mystery Tour" was the theme of her party, inspired by the twists and turns of her life, her experience as a tram tour guide, and of course, one of her favorite musical groups, the Beatles.



PREVIOUS PAGE

At Fairchild's longest running festival, The Ramble, Arlene especially enjoyed the tradition of the exhibit of Dr. William Murphy's Dutch Waterpoorter and its intricately carved figures and melodic sounds.

ABOVE (L-R)

The 2016 Friends of Fairchild Board recently presented Arlene with a commemorative brick, placed outside the Garden's Jean M. Sheehan Visitor Center, in honor of her steadfast service to the volunteers. **(L -R)** Harriet Frillarte, Caryl Chassman, Yonna Levine, Suzanne Steinberg, George Gates, Bobbe Dooley, Arlene Ferris, Carl Bauer, Stephanie Thorman, Sondra Galperin (not pictured: Judith Futerfas)

At her Farewell party on August 4, Arlene was recognized by Garden Director, Dr. Carl Lewis, for her years of dedicated service to the Garden and championing the Fairchild's mission within the South Florida community.

Few people have translated the Garden's mission to others with the same conviction, the same earnestness and passion. Arlene headed the volunteer department for three decades. She was a fierce advocate for volunteers, whom she rallied year after year, sharing her love of the Garden and inspiring them to give tens of thousands of hours of service annually.

"When you meet Arlene, you immediately sense her warmth, enthusiasm and vitality," said Carl Bauer, who chairs the volunteers' Friends of Fairchild group. "For 30 years, she met, interviewed and placed thousands of happy volunteers with equally happy Fairchild Garden staff."

Before she joined the Garden, Ferris toured the world after college and then worked in a variety of non-profit and hospitality jobs. When she moved to Florida, she explored, as she likes to say, "the real Florida" and its diverse habitats through the state parks. In 1986, while studying to become a paralegal, she decided to face her fear of public speaking and became a Fairchild tram tour guide.

It was Dr. John Popenoe, then Fairchild's director, who saw Ferris' passion for plants and her ability to lead and asked her to head up a volunteer department the next year. She spent her ensuing time with the Garden meeting, greeting, assigning, coordinating, listening and giving. She created such a model department that she turned the hows and whys of her work into a book chapter for the American

Public Gardens Association and petitioned, along with other volunteer directors, for the development of an APGA Volunteer Engagement Committee.

In her personal and professional life, Ferris has championed the conservation of the natural environment, truly internalizing Fairchild's mission. The Garden became a second home to her, where she knew each volunteer's name and understood the value of the personal touch. She took care of her ever-increasing corps of volunteers both at the Garden and by writing notes, making calls and visiting the sick. Colleagues, too, know the empathy she possesses; she has been a sounding board for any crisis, idea, sadness or happiness.

As the face of Fairchild's Volunteer Program, Ferris has touched countless lives both inside and outside the Garden's gates, driven by a deep belief about the powerful role of botanic gardens in communities. At her farewell party, her message to volunteers and staff captured the essential Arlene Ferris. "Each of us got to Fairchild by a different road, but what's so amazing is we formed a community and it is really a magical thing—a magical mystery tour," she said. "What kept us here and built our community are the things we have in common: a deep appreciation for the beauty of the natural world and the knowledge that we have to be proactive in protecting it." 

of the *Wings of the Tropics*



Thousands of spectacular butterflies await

Exotic butterflies like the heliconids, morphos and owl butterflies from Central America and South America will be performing their aerial displays of wonder all around you as you stroll through the meandering paths.



Open Daily

9:30 a.m. - 4:30 p.m.

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Giving holiday dinner a tropical twist!

Holidays in South Florida are not “over the river and through the woods,” but as with everything in this Magic City, it has a wonderful sunny zing that makes the day all our own. We invited **Michelle Bernstein**, a Miami native, to serve as a guest chef for this issue to create a lively celebratory main offering for your holiday meal.

Mojo marinated turkey with chorizo stuffing

Prepare the mojo marinade

2 cups olive oil
12 garlic cloves, chopped fine
Juice of 6 sour oranges
1 teaspoon ground cumin
1 cup cilantro, chopped
Salt and pepper

In a saucepan on medium, heat 2 cups of olive oil. Add the garlic and keep moving the pan until the garlic turns golden brown. Remove from the heat and add salt, pepper, orange and lime juice, cumin and cilantro. Set aside until it cools to room temperature.

Marinate the turkey

1 (12–14 pound) turkey (all natural and heritage bird if possible)
1/2 pound butter

Carefully remove the livers from inside the turkey cavity (they will usually be wrapped in butcher paper or plastic).

With your fingers, separate the skin from the turkey, being very delicate. Place butter under the skin, especially around the breast meat. Place in a plastic bag and cover with mojo marinade. Place in the refrigerator for about 24–48 hours in advance.

Prepare the stuffing

3 Spanish or Mexican chorizos, casings removed, diced in 1/8-inch pieces (if Mexican, crumble instead of dice)
1 tablespoon butter
1 Spanish onion, diced in 1/4-inch pieces
3 garlic cloves, crushed
Turkey livers from the turkey, chopped
1 tablespoon fresh thyme, chopped
2 tablespoons fresh Italian parsley, chopped
1/4 cup brandy or dry white wine
2 cups heavy cream
4 cups day-old challah bread, diced small, toasted in an oven at 200 degrees on a sheet pan for 10 minutes or until crisp

Over medium heat, render chorizo in a large sauté pan, add butter and onions, and cook until soft. Add garlic, livers, herbs and brandy or wine. Cook until reduced by half. Add cream and reduce by half again. Toss bread into mixture and allow it to cool. Stuff the mixture into the turkey just before roasting.

Cook the turkey

Remove the turkey from the bag. Remove any marinade left on the turkey. Fill the turkey with stuffing. Roast in a 325-degree oven for 3.5–4 hours or until cooked through and golden. Baste 4–5 times during cooking.

Raise the temperature to 425 degrees and place the turkey in the oven for 15 minutes or until the turkey turns a darker golden brown. Remove and allow to rest at least 10–15 minutes before slicing.

Prepare the gravy

3 tablespoons all-purpose flour
4 cups very reduced chicken stock

Remove the turkey from the roasting pan. Pour off all but 3 tablespoons of the drippings from the pan. Place the pan on the stove on medium heat. Using a whisk, mix 3 tablespoons of flour into the drippings and whisk until thickened and smooth. Cook the flour until golden brown, then add 4 cups of very reduced chicken stock and continue whisking until smooth. Season with salt and pepper.



Chef Michelle Bernstein

A Miami native, Michelle Bernstein, says her cooking secret is “about amazing ingredients, layered flavors and simplicity.” A James Beard Award winner (Best Chef South, 2008) Bernstein and her husband/business partner David Martinez, own/operate MBC Michelle Bernstein Catering Company, as well as Crumb on Parchment. She hosts “Check Please! South Florida,” a weekly show on Public Television Station WPBT2, as well as “SoFla Taste,” seen Saturdays on WPLG Local 10, and is the author of “Cuisine a Latina.”



ENCHANTED BY FERNS ON LA ISLA DEL ENCANTO

BY JENNIFER POSSLEY

PHOTOS BY JAMES LANGE AND JENNIFER POSSLEY

One of the many perks of being a botanist in subtropical South Florida is that we reside in the sweet spot between temperate and tropical zones, and much of our flora has biogeographical roots in the West Indies. If you learn to identify the native species in Miami, then you are also learning to identify many West Indian species, or at least their close relatives. This is one reason why we look forward to using our experience with Miami's ferns to promote fern conservation throughout our region.

And so it came to pass that in early 2016, Fairchild Field Biologist Jimmy Lange and I found ourselves in western Puerto Rico for 11 days, at the invitation of U.S. Fish & Wildlife Service (USFWS) biologists. This was the South Florida Conservation Team's second visit to the area in recent years, and we were once again dedicating half of our trip to Puerto Rico's endemic, federally endangered ferns (the rest of our time was spent on the endemic flora of the Sierra Bermeja region, which was profiled in Dr. Joyce Maschinski's summer 2015 article in *The Tropical Garden*).



1. *Danaea elliptica*
2. *Pleopeltis polypodioides*
3. View of mountains near Yauco
4. *Odontosoria aculeata*

Our pteridological (fern-related) goals on this excursion were many, but first and foremost was to locate federally endangered fern species and collect material for propagation. The fern species we sought included *Tectaria estremerana*, *Polystichum calderonense*, *Cyathea dryopteroides*, *Adiantum vivesii*, *Thelypteris yaucoensis* and *Elaphoglossum serpens*.

By the end of this second trip, we had succeeded in collecting spores from four of these six species. From our bounty of spores, Fairchild's horticulturist, Mike

Freedman, set about developing spore propagation protocols. We reported Mike's results to USFWS, which will use them to inform its endangered species recovery plans. Some of the ferns Freedman has grown will be displayed at Fairchild; others will be kept in our nursery until they are ready to ship to our Puerto Rican colleagues. In the meantime, when these ferns reach maturity, we will collect their spores to send to long-term storage at the U.S. Department of Agriculture, further safeguarding their germplasm.



A new goal introduced for this recent trip was to collect tissue and herbarium specimens for taxonomic research. Fern taxonomy can be complicated, stemming from the fact that ferns are notorious for hybridization as well as extreme variability in form. Many of our target species have outstanding taxonomic questions whose resolution will be extremely important for their recovery. One might be a hybrid, while another might be a geographic variant of a more common species. USFWS needs to know these details so that they can best protect each species.

To untangle these taxonomic knots, we sought out two experts in fern genetics: Dr. Emily Sessa from the University of Florida, and Susan Fawcett from the University of Vermont. Lange and I may have had the fun part of the job, collecting the material, but Sessa and Fawcett's work has the potential to change Puerto Rican fern taxonomy. In order to obtain enough material for Sessa and Fawcett, we collected pieces of fern fronds from the target species and also from close relatives (Sessa says this helps her to build a phylogeny, which shows how species are related to one another). This



- 5. *Adiantum pyramidale*
- 6. *Thelypteris hildae*
- 7. *Neurodium lanceolatum*
- 8. *Polystichum calderonense*
- 9. *Diplazium* sp.
- 10. *Dicranopteris pectinata*
- 11. *Asplenium erosum*

meant that Lange and I needed to learn to recognize a good deal more than just our six target species, which we eventually did with the help of George Proctor's book "The Ferns of Puerto Rico and the Virgin Islands," as well as help from Puerto Rican botanists, and by studying specimens in the University of Puerto Rico herbarium. By the end of our trip, we had collected 50 tissue samples for Sessa and Fawcett, learned many new (to us) species, and (most humbly) realized how much more we still had to learn.

EDITOR'S NOTE

All collections were covered by a permit from the Puerto Rico Department of Natural and Environmental Resources; and all activities were coordinated with U.S. Fish and Wildlife Services Caribbean Ecological Services Field Office (CESFO) and the Puerto Rico Department of Natural and Environmental Resources (PRDNER). Thank you to our partners in these efforts to conserve endangered endemic ferns of western Puerto Rico, including Omar Monsegur, Xiomara Labiosa, Iván Llerandi Román, JP Segarra, Jen Valentín and José Cruz Burgos (USFWS, CESFO); Emily Sessa (University of Florida, Department of Biology); Susan Fawcett (University of Vermont, Department of Plant Biology); Jeanine Velez, Carlos Santos Flores, Benjamin Van Ee and Eugenio Santiago (University of Puerto Rico); and Jose Sustache (PRDNER).

Working with the ferns of western Puerto Rico is especially rewarding for us, in part because we love visiting our familiar Miami ferns in a truly tropical Caribbean setting. Additionally, this work has put us in touch with collaborators from a wide range of backgrounds, all of whom share a passion for rare fern conservation. We are thrilled that we have received funding to return to western Puerto Rico in winter 2017 to continue this work. I hope that some of our photos included here convey the beauty and diversity of these plants, as well as the commitment of those of us who are working to save them. 



THE BROTHERS OF LA SALLE AND CARIBBEAN BOTANY

By Javier Francisco-Ortega, Ph.D.; José R. Garrigó; Luc Brouillet,
Ph.D.; Geoffrey Hall; Nicolas André; William Cinea; Eugenio
Santiago-Valentín, Ph.D.; Scott Zona, Ph.D.; and Brett Jestrow, Ph.D.

ABOVE (L-R)
Jacques Rousseau and Brother Marie-Victorin in one the hammocks of Florida,
January 1933. Jacques Rousseau (1905–1970) became Director of Montreal
Botanic Garden when Brother Marie-Victorin died in 1944.
Courtesy of the Université de Montréal, Division de la gestion de document et des archives.



ABOVE (L-R)
 From left to right: Brother Néstor María, Dr. Thomas Barbour, Dr. David Fairchild, and Brother León at the main courtyard entrance of the La Salle school at El Vedado, Havana. February 23, 1935.
 Courtesy of the Fairchild Botanic Garden Archives.

Main courtyard entrance of the La Salle school at El Vedado, Havana, May, 2015.
 Courtesy of Brother Agustín Enciso Archives and Library.

The Brothers of La Salle is a Catholic teaching order that focuses on education from elementary to university levels and reaches more than one million students worldwide. Traditionally, this order has promoted natural history studies, and they currently run museums and research journals in this field.

Three La Salle brothers were among the most important figures engaged in botanical research in the Caribbean Islands. Our current historical research activities center on the botanical contributions made by these three outstanding naturalists. Our studies have been mostly based on documents and photos housed in the archives of Fairchild Tropical Botanic Garden and of the University of Montreal in Québec, Canada.

Two of these brothers, Brother León (Joseph Sylvestre Sauget, 1871–1955) and Brother Alain (Henri Alain Liogier, 1916–2009), were born in France but worked in the La Salle

school located in the neighborhood known as El Vedado in Havana, Cuba. They dominated the botanical studies of this island in the first half of the 20th century. The La Salle Brothers were driven out of Cuba in 1961 shortly after the revolution that overthrew Fulgencio Batista. One of us (J. Garrigó) studied in one of La Salle schools in Havana and met these two great naturalists. Brothers León and Alain produced the first comprehensive Flora of Cuba (five volumes and one supplement published between 1947 and 1969).

After Brother Alain left Cuba, he worked for the National Botanic Garden of the Dominican Republic and for the Botanic Garden of the University of Puerto Rico. Indeed the fifth volume of his Flora de Cuba was published in Puerto Rico. Brother Alain became one of the most important and knowledgeable plant taxonomists in the botanical history of the West Indies. He published the latest floras for the islands of Hispaniola (9 volumes, between 1981



Seal of the La Salle Brothers

and 2000) and Puerto Rico (five volumes, between 1985 and 1997 and a synopsis in 1982–2000).

The third La Salle Brother, Brother Marie-Victorin (Conrad Kirouac, 1885–1944), was from Canada. He was the founder of the Montreal Botanic Garden and had an extraordinary friendship with Brother León. Brother Marie-Victorin visited Cuba seven times and wrote three books coauthored with Brother León about his botanical expeditions to this island. Two other brothers from France need to be mentioned as they also made contributions to the study of the Cuban flora: Brother Clemente (Augustin Clement Teteau Monet, 1878–1951), and Brother Hioram Juan (Jean Frange Lagorge, 1875–1936). Brother Clemente amassed an extraordinary collection of Cuban butterflies and also had a great interest in land-snails. He also specialized in ferns. Brother Hioram Juan mostly studied mosses and lichens. Brother León and Brother Hioram Juan were part of the initial group of La Salle Brothers who came to Cuba in 1905. They moved from France, as many of La Salle schools were closed down in that country in 1904 as a result of secularization laws.

David Fairchild had strong ties with Cuba, particularly through the Botanic Garden of La Soledad (located near Cienfuegos and owned by Harvard University). This garden had Fairchild's long-time friend Prof. Thomas Barbour (1884–1946) as its custodian. As a result of this friendship, Fairchild travelled to Cuba at least three times. In one of these trips (in February 1939), he came across the brothers Marie-Victorin and León at La Soledad. Barbour and the famous American tropical botanist Prof. Elmer Drew Merrill (1876–1956) were also in this garden with Fairchild. Merrill was then the Administrator of the Botanical Collections of Harvard University and the Director of the Arnold Arboretum. One of the photos found in the Garden archives was taken in February 1935 and shows Brother León with David Fairchild, Thomas Barbour, and Brother Néstor María. The latter was the principal of the El Vedado school.

In Fairchild's pocket diary recording for his 1939 trip to Cuba, we discovered an entry in which he wrote the postal address of Brother Marie-Victorin in Montreal. The Garden's archives have a total of 13 letters sent by Brother León to Fairchild dating from April

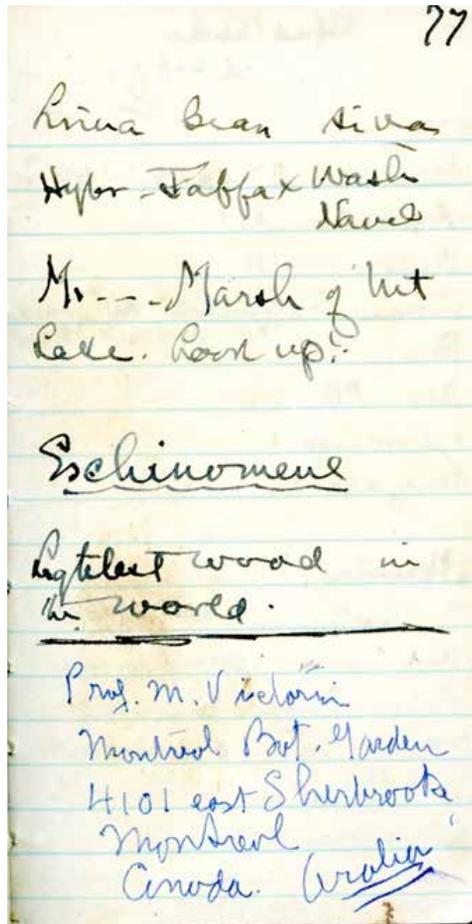


ABOVE
Stamp of Brother Marie-Victorin issue by the Canada Post in 1981.

RIGHT (L-R)
Dr. Thomas Barbour, Brother León, Dr. Elmer D. Merrill and Brother Marie-Victorin standing near a baobab tree (*Adansonia digitata*) at La Soledad Botanic Garden, Cienfuegos, Cuba, February 19, 1939.

Courtesy of the Archives and Library of Fairchild Tropical Botanic Garden.





Page from the pocket diary of Dr. David Fairchild for his 1939 trip to Cuba; it shows the address of Brother Marie-Victorin.

Courtesy of the Archives and Library of Fairchild Tropical Botanic Garden.

Portrait of Brother Alain as published by J.A. Conde (Historia de la Botánica en Cuba. 1958)



(December 1937–January 1938), when he travelled to both Haiti and the Dominican Republic. In Florida and these islands, he took hundreds of photos that were never published. In addition, the archives have a condolence letter sent by Fairchild to Jules Brunel (1905–1986), Acting Director of the Botany Institute of the University of Montreal after the sudden death of Brother Marie-Victorin in a tragic car accident in Canada.

Starting in 2015, the authors of this article began developing several research projects focusing on the archives of Marie-Victorin located at the University of Montreal. Led by one of us (Santiago-Valentín), we investigated the trip that Brother Marie-Victorin made to Puerto Rico, and the results of this research have recently been published in the Revista del Jardín Botánico Nacional, Cuba. With the support of the University of Montreal, the Kimberly Green Latin American and Caribbean Center from Florida International University (FIU), and the College of Arts and Sciences of FIU, two of us (Francisco-Ortega and André) have made our first research trips to Montreal to study part of this material. Our research also involves undergraduate students from FIU. 

1935 to February 1951, but it seems that David Fairchild did not exchange any correspondence with Brothers Alain and Marie-Victorin.

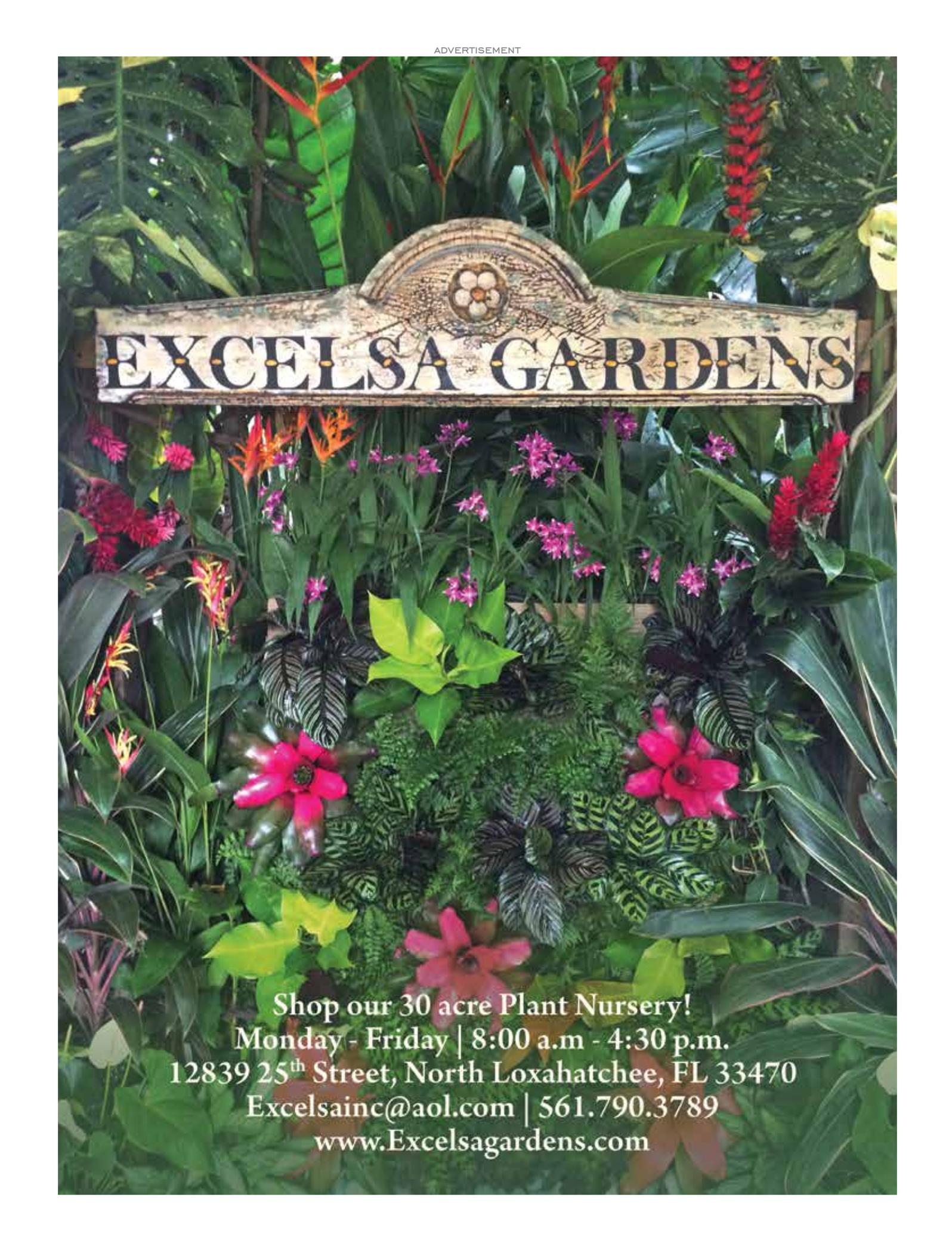
The herbarium of the La Salle Brothers is currently located at the Instituto de Ecología y Sistemática in Havana. This research center houses the historical herbaria of the country.

Brother Marie-Victorin also made trips to the Dominican Republic (in January 1938), Haiti (in December 1937–January 1938, and Spring 1942), Florida (at least two trips in January 1933 and in 1937), Jamaica and Trinidad (both in April 1941), and Puerto Rico (in May 1942). We have found an unpublished travelogue from Marie-Victorin's first visit to Hispaniola

ACKNOWLEDGMENTS

Thank you to Janet Mosely, Nancy Korber and Marianne Swan for their support and help with the documents in Fairchild's archives and library. We are also grateful to Liesl Picard for conducting preliminary research at the archives of the University of Montreal. Monique Voyer and Diane Baillargeon (Division de la gestion de documents et des archives, Université de Montréal) provided technical assistance during our archival research. José M. Dorado and Brother Agustín Enciso (one of the La Salle Brothers who had to leave Cuba in 1961) provided invaluable help with references and details pertinent to the history of La Salle Brothers in Cuba.





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LITTER- TRAPPING PLANTS: NATURE'S COMPOST MAKERS

The nutrient-poor soils of tropical rainforests have pushed plants to evolve new ways to get the carbon, nitrogen, potassium and other nutrients that they need. Many tap into the rainforest's constant drizzle of falling leaves, flowers, fruits and more to create their own private compost piles.

Text and photos by Scott Zona, Ph.D.



A great irony of tropical rainforests—and the cause of failure for many grand plantation schemes—is that the underlying soils are notoriously poor in nutrients. Heavily leached by relentless rain and almost devoid of organic matter beneath the surface, the soils under most rainforests should not be able to support much plant growth. Yet, they support the most biologically rich forests on the planet. How is that possible? The answer lies in the forest itself, not the soils. The nutrients—carbon, nitrogen, phosphorus, potassium, etc.—are held by the living organisms of the forest,

not by the soil. When a leaf falls, its nutrients are quickly released by decomposing organisms (bacteria and fungi) and immediately taken up again by the roots of plants. Those not quickly absorbed by organisms are washed away by the daily rains.

In the mid-20th century, ecologists illuminated the nutrient cycle, demonstrating the endless cycling and recycling of nutrients

within this closed system. The only way nutrients leave the system is through leaching and erosion, oxidation (fire), or as timber on the back of a flatbed truck. In undisturbed forest, nutrients cycle through the system in a sustainable and predictable way. Some nutrients are shunted into subcycles, such as when an insect eats a leaf and a bird eats the insect. Ultimately, though, all nutrients are returned to the forest floor in a constant drizzle of litterfall, which includes not just fallen leaves, but also flowers, fruits, twigs and branches, animal droppings, effluvia and even fallen epiphytes (plants that grow harmlessly on other plants).

In tropical forests, some plants have evolved a way to shortcut the nutrient cycle by tapping into the litterfall, intercepting litter

before it hits the ground. Plants that can capture litterfall gain access to its nutrients, which confers upon them a competitive advantage. These plants are called litter-trappers. They are plants that make their own compost, thereby giving themselves access to a private supply of nutrients and a leg ... or, rather, a leaf, up on the competition. A casual stroll through the Garden reveals a number of litter-trapping plants, some familiar and others quite surprising.

Probably the most familiar litter-trappers are the staghorn ferns (*Platycterium* spp., Polypodiaceae) and the tank bromeliads (Bromeliaceae). Staghorn ferns are epiphytes that produce two distinct kinds of leaves. The shield, or sterile, leaves are rounded and erect, cupped against the trunk of their host tree, while the fertile leaves are lobed and pendulous, performing photosynthesis and reproduction. The shield leaves trap litter behind them, where it decomposes, and the fern sends its roots into that composted litter to extract its nutrients. Tank bromeliads, those that form water-filled rosettes of leaves, may be epiphytic or terrestrial. The tank impounds a rich broth of decaying leaf litter, as well as aquatic and semi-aquatic organisms such as frogs, snails and mosquito larvae (and their waste products). The ability of bromeliad leaves to absorb nutrients directly from their private cesspools has been well-studied.

The bird's nest fern (*Asplenium nidus*, Aspleniaceae) and bird's nest anthuriums (*Anthurium* spp., Araceae) are another group of familiar litter-trappers. The bird's nests are epiphytic plants and form a funnel-shaped rosette of leaves that captures and retains litter. *Anthurium salvinii* and *A. schlechtendalii* can be seen in the Garden's Richard H. Simons Rainforest, their crowns of leaves capturing litter from the oak trees overhead. A fine specimen of *Asplenium nidus* is growing between the Corbin Education Center and the tram path. Look into the crowns of these plants and you'll see their private compost piles, slowly releasing nutrients to the root zone below. It is likely that some nutrients might be taken up directly by the leaves, as they are in bromeliads.



PREVIOUS PAGE
The upward-growing roots on this Cow's Horn Orchid (*Cyrtopodium punctatum*) trap litter, while other roots secure the orchid to the palm.

ABOVE
This *Anthurium jenmanii* has a private compost pile in the center of its crown.

Many palms are known to be litter-trappers, and several in-depth studies of litter-trapping have focused on litter-trapping palms. Some palms trap and retain litter in their leaf crowns; a few even hold water, like bromeliads. *Salacca magnifica*, *Sommieria leucophylla*, *Calyptrogyne ghiesbreghtiana* and *Johannesteijsmannia altifrons* (all in the Tropical Plant Conservatory) are all consummate litter-trappers, although the roof of the Conservatory prevents them from naturally catching litter in their crowns.

Other palms use another litter-trapping strategy, funneling litterfall toward the center of their crowns, where the litter drops to the ground below, forming a compost pile

directly around the base of the trunk. An example of this kind of litter-trapping palm can be found among the many forest species of *Licuala*. I have seen *Licuala* species in Malaysian rainforests with the telltale mound of leaf litter heaped around their short trunks, augmenting the leaf litter that carpets the forest floor.

Just outside the Conservatory, you

can see some young plants of *Clavija domingensis* and *Theophrasta jussieui* (both Primulaceae) grown from seeds collected by the Garden's staff in the Dominican Republic. The genus *Clavija* comprises some 55 species from the American tropics, and all of them are litter-trappers. *Theophrasta* has just two species from Hispaniola, and both are litter-trappers. These are small trees with a palm-like growth habit, trapping litter in the crowns of their strap-shaped leaves. Walk over to Plot 39 to see *Erythrochiton brasiliensis* (Rutaceae), a Neotropical understory shrub that traps litter in its crown. A short distance away, in Plot 45, a young sapling of *Gustavia monocaulis* (Lecythydaceae) is doing the same thing.

An entirely different mode of litter-trapping is found in several genera of epiphytic orchids, including some species of *Catasetum*, *Cymbidium*, *Grammatophyllum* and *Cyrtopodium*. These orchids produce two kinds of roots: thick roots that hold the orchid to the tree on which it grows, and thin, upward-growing roots that trap litter. *Cyrtopodium punctatum*, an orchid native to Florida growing on several palms in the Montgomery Palmetum, readily exhibits these litter-trapping roots. The thin, wiry roots trap stray leaves and other debris and are also, presumably, able to absorb nutrients as they leech out of the trapped litter.

In the wild, the private compost piles accumulated by litter-trapping plants are home to an amazing array of organisms. Ants, collembolans and mites are some of the most common occupants of litter masses, but biologists have recorded hundreds of different kinds of animals living in litter-trappers. One ecologist estimated that the biomass of invertebrate species living in a forest canopy in Asia is doubled if one also counts the biomass of species living in bird's nest ferns. Inventories of insects living in litter-trappers routinely turn up new, undescribed species, and probably many more insect species await discovery by intrepid biologists willing to dig into the private compost piles of litter-trapping plants.

Litter-trapping plants are quintessentially tropical. They didn't evolve in the temperate zone, where soils are richer and the decay process is slower. Hundreds of litter-trapping species from more than 30 families of plants are found in tropical regions of Asia, Africa and the Americas. Australia appears to be poor in litter-trappers, but this may be an artifact of under-reporting. One of the big remaining questions is: Which plants are litter-trappers? In the past, field botanists cleared away the litter before taking photographs and making specimens (no one wants to press a mound of decaying leaves infested with ants!), so litter-trapping has been under-reported in the literature. As awareness of litter-trapping plants grows—through living plant displays at Fairchild, among other means—so will our understanding of this fascinating tropical phenomenon. 



ABOVE
A young *Theophrasta jussieui* just outside the Conservatory.

WHAT'S BLOOMING



The house the tropics built

Über-tropical plants loved our early fall heat and humidity, which is why I headed to the Tropical Plant Conservatory and Rare Plant House recently to discover what's blooming.

By Georgia Tasker

Photos by Susan Ford-Collins, Kenneth Setzer/FTBG and Arielle Simon



Here are some of the plants I found:

1. *Scutellaria costaricana*, a skullcap that has tubular orange-red flowers withheld in a bundle at the end of a pedicle (a stem that attaches to the inflorescence). The individual flowers have yellow “lips” and little orange caps or helmets held above the corolla. From Costa Rica and Panama, this small shrub is in the mint family. Look for it on the upper level.

2. *Episcia cupreata*, a charming member of the gesneriad family, serves as a groundcover in one area of the upper level conservatory. Its bicolor silver and green leaves are hairy and its flowers a bold red with yellow throat. I have a pink-flowering *Episcia* that has now filled three pots and trails to the ground from its shade house bench.

3. *Calathea warscewiczii* not only has lovely patterned leaves, but it also produces white flowers from what looks like a Dairy Queen vanilla cone. As the flower matures, the bracts of the cone become light yellow with pink lips.

4. *Impatiens mirabilis* meanders across a window sill between the upper and lower levels. Hailing from Thailand, it resembles a tiny yellow balloon, with a lower lip that sticks out in a pouty way. It grows from a caudex—a swollen woody base.

5. *Plumeria obtusa* ‘Singapore Dwarf Pink’ in plot 133 is a charmer with only the slightest hint of pink in our midday sun. The small tree is evergreen. 



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.

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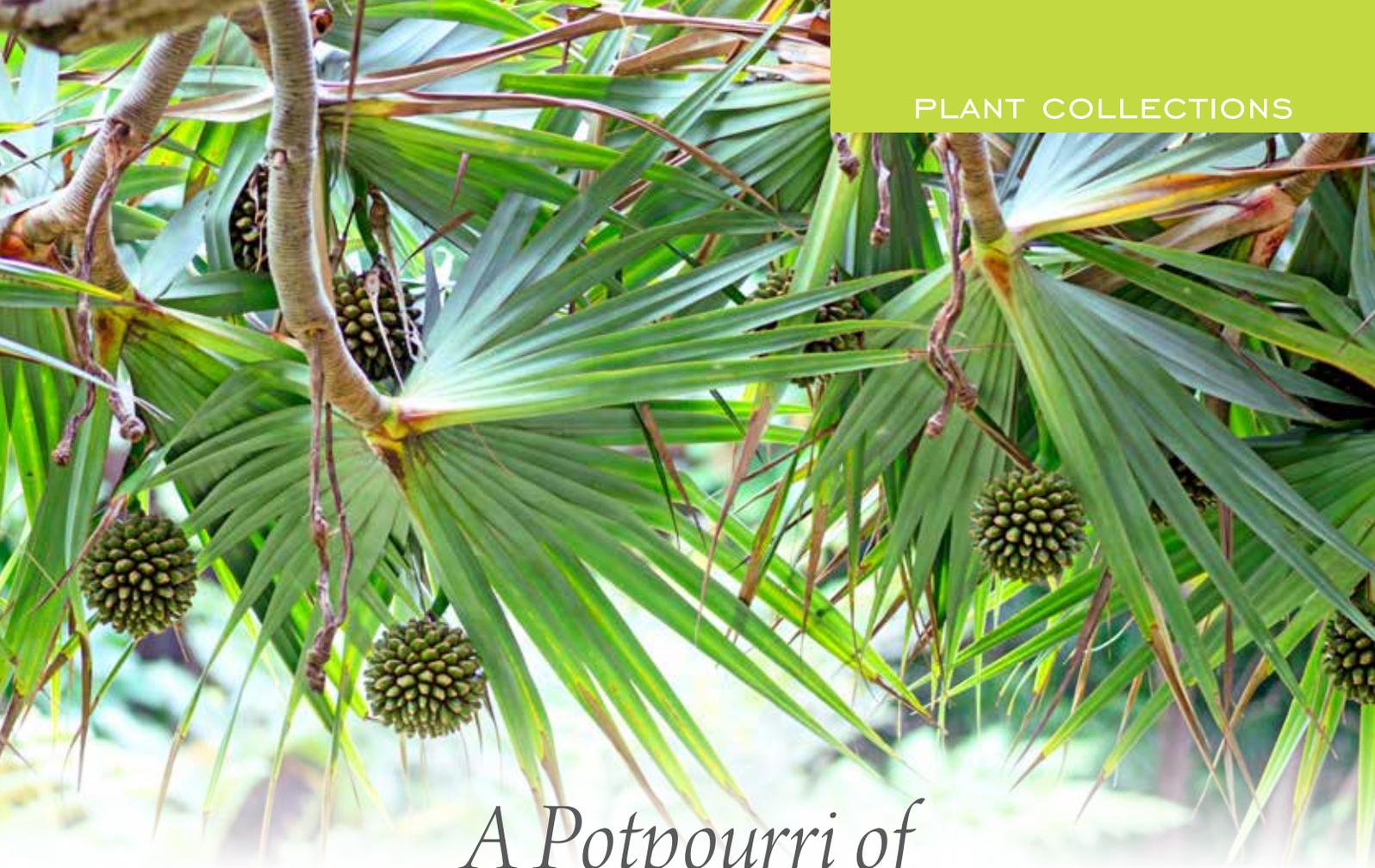
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A Potpourri of PANDANS

TEXT AND PHOTOS BY CHAD HUSBY

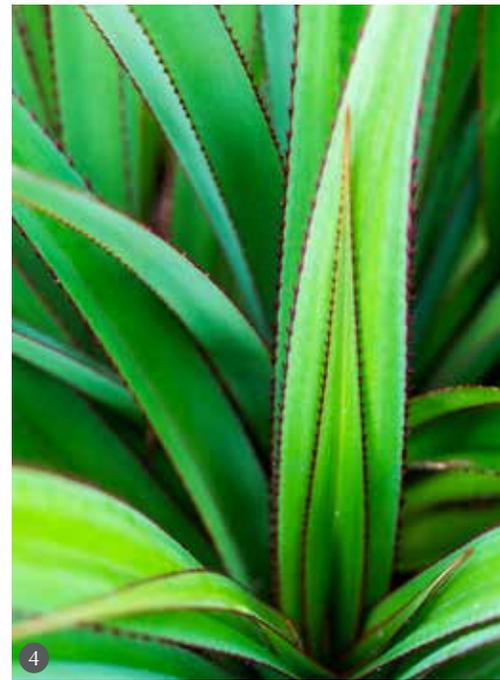
The Genus *Pandanus*

Pandanus plants (family Pandanaceae) are distinctive woody monocots of the tropics and subtropics, ranging from West Africa through Asia and the Pacific all the way to Hawaii and Pitcairn Island. They grow as trees or shrubs in diverse habitats from the seashore to swamps, riversides, and forests. There are about 450 species known and new species continue to be discovered.

The largest species can reach 60 feet or more in height, with leaves 15 or more feet long. As monocots (like palms and bamboos), they lack the secondary woody growth produced by most trees, so their stems do not continually increase in diameter as they grow. The tight spiral arrangements of their leaves leads them to be called “screw pines” or “screw palms,” though they are often simply called “pandans.” This spiral pattern remains imprinted on the stems in the form of leaf scars after the leaves are shed.

Many *Pandanus* exhibit branching, which is constrained by the inability of their stems to increase in diameter with secondary woody growth. Some species have a marked difference in orientation between an upright central trunk and horizontal branches, creating architecture not found in any other woody monocots and leading to surprising similarities with woody trees. This differentiation can be so great, with horizontal branches that cease growing once they reach a certain length, that some species in Madagascar develop a very regular architecture resembling conifers. Other species are either solitary or form clumps of unbranched trunks, their architecture much like that of typical palms.

A distinctive feature of this genus is the large aerial (stilt) roots that emerge from the trunks of most species. These roots can form a dense skirt around the trunks, providing benefits in trunk support and water transport



1. Leaf scars show the spiral pattern of the original leaves. 2. Pandan cake in the Moluccas, Indonesia. 3. Infructescence and leaves of a small *Pandanus* species collected during Dr. David Fairchild's 1939-1940 *Cheng Ho* expedition in the Far East. He hoped it would make a promising ornamental in South Florida. 4. Striking red-edged leaves of *Pandanus vandermeeschii*, planted in the Lowlands, shared with the Garden by the Waimea Valley Arboretum and Botanical Garden in Hawaii.

while leading to a quite ornamental effect. Male and female flowers are borne on separate plants. The flowers are small and lack petals, but often show large, dense and distinctive arrangements. The fruits are borne on large pineapple-like infructescences that can be quite colorful when ripe.

Pandanus Ethnobotany

Humans use *Pandanus* species in a number of ways. In Hawaii and the Pacific, the sweet fruits of *Pandanus tectorius* are eaten raw or cooked, as are the tips of stilt roots. A few other species also have edible fruits. *Pandanus odorifer* has edible seeds. *Pandanus amaryllifolius*, a small species often called simply 'pandan,' is used in Southeast Asian and Indian cooking. Its leaves are aromatic and lend a special flavor to rice and curry dishes. It is also used in desserts, often giving them a distinctive green color. An extract derived from *Pandanus* flowers is also used in Indian cooking. The leaves of *P. tectorius* and other species are used for weaving mats, baskets, fishing nets and ropes. With their distinctive forms and dramatic stilt roots, *Pandanus* are also widely planted as ornamentals in the tropics and subtropics. *Pandanus utilis* is frequently used as an ornamental in South Florida.

Dr. David Fairchild and *Pandanus*

Dr. David Fairchild was very interested in *Pandanus*. He especially came to appreciate them during his great *Cheng Ho* Expedition in 1939-1940, when he found several very promising species for ornamental and culinary use. He wrote about them in multiple publications:

We had not gone more than a hundred yards when we came upon the most amazing and the most lovely pandan I had ever beheld. The pandans are allies of the palms and for that reason we were quite as anxious to get them. They are handsome objects in the landscape, especially when their large rough fruits have turned golden-yellow or scarlet. Here was one rising from the bank of the stream sixty feet in the air, with a smooth trunk from one and one half to two feet in diameter. It reminded us of a Royal palm, but had a crown of narrow strap-shaped leaves that were each twenty feet or so long. The fruits had all ripened and fallen to the ground, breaking up into the long, wedge-shaped nuts of which they are composed. We collected a lot of these and Marian had a time scraping all the juicy flesh off them. Young trees of this beautiful species are now growing on filled land in the Department of Agriculture Garden at Chapman Field, but they have not yet weathered one of the cold winters we sometimes have in Florida.

~"Garden Islands of the Great East"
(The Heart of the Moluccas)

With the pandanus we had better luck. Already, plants three or four feet high are growing in Florida gardens. As they are long-leaved and quick-growing, and bear decorative, bright-red cluster-fruits they are sure to find their place in our ornamental horticulture. I was disgusted to find, however, that the plants of the species of pandan which Mr. Turno and Prof. Curran both had growing beside their doors, the leaves of which they put in the pot and boil with the rice to give it a fine flavor, died on the way home.

~"Garden Islands of the Great East"
(Zamboanga and Mindanao)



5. A tall *Pandanus* species with dramatic stilt roots on the shore of Pandanus Lake. 6. Ripening *Pandanus* fruit clusters (infructescences) at Fairchild. 7. Seedlings of a large *Pandanus* species from South Thailand, shared with us by Nong Nooch Tropical Botanical Garden.

The drooping flower cluster of the pandan does not recall to me anything else in the whole plant world. Masses of yellow flowers sit in the axils of long, white, leaf-like spathes. [...] In New Guinea, Dr. L. J. Brass reports, there are pandans a hundred feet tall, and the Papuans depend on their immense fruits for food.

~"The World Grows Round My Door"

Pandanus in the Garden

Fairchild currently has seven identified species of *Pandanus* planted in the Garden, along with several Yet-to-be-identified species. All but a handful are in the Lowlands due to their affinity for water. The known species in the garden are: *P. dubius*, *P. odorifer*, *P. solms-laubachii*, *P. spiralis*, *P. tectorius*, *P. utilis* and *P. vandermeeschii*. A large planting of diverse species follows the shore of Pandanus Lake. The oldest surviving *Pandanus* in the Garden, *P. tectorius*, was acquired in 1961.

Students at the Biotech @ Richmond Heights high school are using *Pandanus* to study root growth. The accessibility of their large aerial roots provides an exciting opportunity to investigate an aspect of plant growth that is usually hidden beneath the soil.

New introductions from plant exploration

Recent Fairchild collecting trips to the Far East and Hawaii have begun a new phase expansion of *Pandanus* collection. Our 2013 Hawaii expedition yielded two new species, one of which is the especially ornamental *Pandanus vandermeeschii* of Mauritius, which has red-edged leaves. This striking

species was shared with the Garden by the Waimea Valley Arboretum and Botanical Garden.

From last year's trip to Thailand, we brought back cuttings of a lovely silvery-glaucous-leaved *Pandanus* from Nong Nooch Tropical Botanical Garden. It that has rooted well and will soon be planted in the Lowlands. Our collaboration with Nong Nooch also yielded seedlings from a very large-leafed, tall, species from southern Thailand with colorful leaf bases; it was offered in the Members Day Plant Sale this year, and will soon also find a home in the Lowlands. We also obtained propagations of *Pandanus amaryllifolius*, giving us the opportunity to try fresh pandan leaves in cooking.

From Singapore Botanic Gardens, we obtained cuttings of *Pandanus pygmaeus* that are doing well. This species creates a delightful miniature *Pandanus* form less than 3 feet high, complete with stilt roots. Also from Singapore Botanic Gardens, we received an elegant and mysterious silver-blue leafed *Pandanus* that does not form a trunk. Since we have not yet examined its inflorescence, we are not entirely sure it is a *Pandanus*; it may, in fact, belong to the closely-related genus *Benstonea*—which would be completely new to the collection.

Pandanus is a large and fascinating group of plants, with many species that would be wonderful additions to the Garden. We look forward to finding more exciting introductions during our future travels to the East. 





THE HUNTINGTON: A GARDEN FOR YOUR SENSES AND MIND

TEXT AND PHOTOS BY GEORGIA TASKER



Half of all the world's aloe species live at The Huntington in San Marino, California. So does Thomas Gainsborough's painting "Blue Boy," the Ellesmere illustrated edition of Chaucer's "Canterbury Tales" and Shakespeare's First Folio. This 207-acre institution in San Marino, California (east of Los Angeles), has a 690,000-volume library, a history of science gallery, European and American art collections, and a dozen botanical gardens that cover 120 acres. It takes days to see and absorb the artistic, intellectual and botanical wealth on display here. Half a million annual visitors enjoy it. Put it on your bucket list.

The Huntington was the setting for the American Orchid Society's fall members' meeting, which itself included two floors of orchid displays and three days of talks. Against a backdrop of the San Gabriel Mountains, attendees learned about the evolution of *Paphiopedilum* orchids, how to set up a terrarium for miniature orchids and the way Euglossine bees pollinate catasetums. In between, though, the seductive call of The Huntington was siren-like.

THE HUNTINGTON FAMILY

Henry Edwards Huntington founded the institution in 1919 for the "advancement of learning, the arts and sciences, and to promote the public welfare." Huntington's family history is interesting: His uncle Collis Huntington built not only the Central



PREVIOUS PAGE (L-R)

The 10-acre desert garden contains about 2,100 species. The Munger Research Center opened in 2005.

ABOVE (L-R)

The children's garden is for kids ages 2 to 7. View of one of the lily ponds through bamboo.



Pacific Railroad, which completed the Transcontinental Railroad, but also the Chesapeake and Ohio railroads. Collis also founded the city of Newport News, Virginia, for shipbuilding. After his first wife died, he married a younger single mother, Arabella Worsham. He adopted her son Archer, whom he may have fathered. When Collis died, Henry Huntington married Arabella, who was close to him in age.

Together, Arabella and Henry Huntington were passionate collectors of art and books. When a large ranch in San Marino went into foreclosure, Huntington bought it for \$225,000. The construction of a 55,000-square-foot Beaux Arts home began in 1909. Today, the home is The Huntington's European art museum. The couple's book collection soon required a separate library, and as early as 1925, that library—which formed the basis of The Huntington—was opened to scholars. The building now houses more than 9 million items, including rare books, manuscripts, photography and prints.

Arabella loved orchids, but collected only those with white flowers. The Huntington's collection today comes in many colors, because Arabella's original collection was sold during the Depression.

Even though she had a hand in the design of their home, Arabella didn't like southern California and spent most of her time in Paris

and New York. She died in 1924; Henry Huntington died in 1927. They are buried in a mausoleum on The Huntington's grounds.

THE HUNTINGTON'S GARDENS

William Hertrich, a landscape gardener, was hired in 1904 to work in the ranch's gardens. He was born in Germany, studied horticulture in Austria and then in San Marino, and soon worked his way up to superintendent of grounds and buildings. He retired in 1948, but remained a consultant for the property until his death in 1966.

Today, a California garden greets visitors with low-growing, drought-tolerant plants and a long, narrow water feature. It sings California, with ornamental grasses, succulents, stunning gray-leaved *Acacia baileyana* specimens, dwarf bottle brushes, lavender and poppies.

In the palm garden, you will find imposing Chilean wine palms and enormous sabal palms, larger than any in Florida. European and California fan palms are accented with smaller understory palms, and Canary Island date palms reach 60 feet in height. Not far away, a monumental *Agathis robusta*, an Australian kauri tree, dominates its solitary place in the landscape.

The gardens include dedicated plantings for roses, camellias, lily ponds, an Australian



ABOVE (L-R)
A moon bridge is a feature in the Japanese garden.

BELOW
The main hall of the library.

garden, subtropical garden and jungle section, as well as herbs. Two of the most popular spots are the finely detailed Japanese Garden, begun in 1912, and the now-expanding walled Chinese Garden.

To me, though, the desert garden is among The Huntington's most stellar attractions, with 2,100 species jammed into 10 acres. It is one of the largest collections of arid plants in the world. Golden barrel cactuses number 500, and taken together they form majestic mounds of wicked geometry. To walk the trails of this garden is to be utterly astounded by the variety and beauty of these plants. Tall, buggy whip-like *Alluaudia procera* and upright *Delonix adansonoides* come from Madagascar. You'll see purple prickly pears, a 100-year old cereus, all manner of aloes from South Africa and a bromeliad, *Puya alpestris*, from the highlands of Chile. Euphorbias and agaves of every ilk have joined the crowd. The hairy plants are here too: *Oreocereus celsianus*—the old man of the Andes—is joined by many mammillaria that stick close to the ground. *Abromeitiella lorentziana* from Argentina covers a boulder like a star-studded blanket of miniature bromeliads, while the *Barleria rotundifolia* from the Transvaal produces lemon-yellow flowers atop its barbed stems. The size and scope of this collection will keep luring you back again and again.

The Huntington also includes a children's garden. Adjacent to that is the Rose Hills Foundation Conservatory for Botanical Science, with its beguiling entrance sign: "Plants are Up to Something." Here, children and adults can crank wheels to see seeds fly, lift doors to discover how roots grow, test the energy content of different flower nectars, learn how water moves through wood and measure nutrient levels in water. An adjacent rainforest beneath a massive glass dome (put on by helicopter in 2005) receives a goodly morning shower; a cloud forest luxuriates in its mist, and a bog is alive with carnivorous plants.

The usually-off-limits greenhouses are full of 10,000 orchids, handsome aroids and several young *Amorphophallus titanum* plants as yet unflowered but growing robustly for the day they will produce their big stink. The orchid collection is overseen by Brandon Tam, who began volunteering at the garden when he was 14. Now, at 24, he is building a *Cymbidium* collection as well as serving as orchid grower, accession manager and host for the American Orchid Society meeting.

Orchid collections are offered occasionally to the gardens, but, "we're very picky about accepting orchid donations," Tam says. "Each orchid has to have a record of its ancestry and a current name." And as with all orchid enthusiasts, Tam is running out of greenhouse room.

The library displays two works important to plant lovers: John Gerard's 1633 "Herball or Generall Historie of Plantes" and Maria Sibylla Merian's incredible "Metamorphosis of the Insects of Surinam," printed in 1790.

While we were visiting, an origami exhibit made its debut. Called "Florilegium, Folded Transformations from the Natural World" by Robert J. Lang, each piece was from a single sheet of paper. Koi, cactus, orchids, birds and even a rhinoceros beetle were awe-inspiring. Another exhibit, "Gardens, Art & Commerce," was on loan from the National Library of China as well as other museums and private collections. It showed Chinese woodblock printing from the 16th to 19th centuries.

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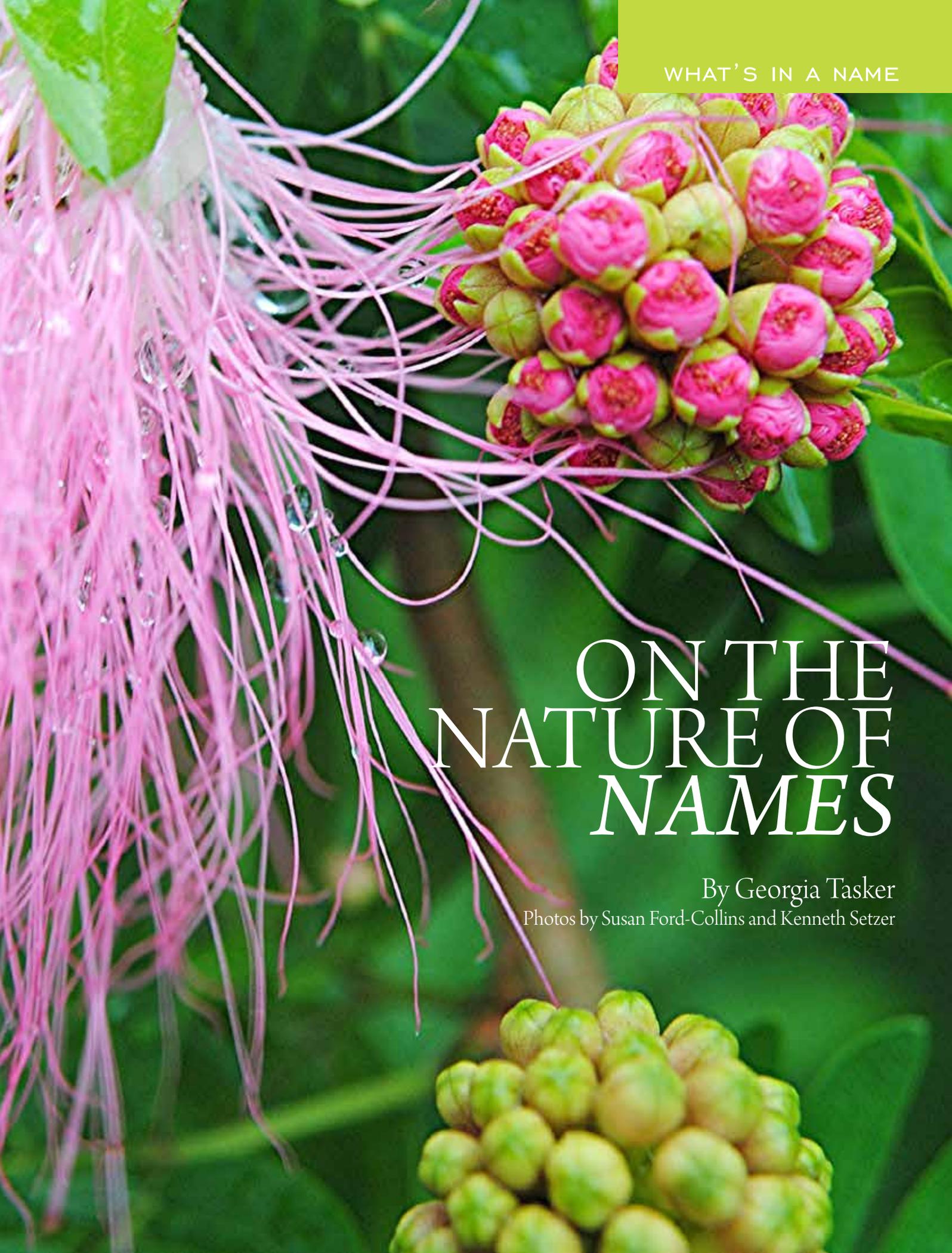
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WHAT'S IN A NAME

ON THE NATURE OF NAMES

By Georgia Tasker
Photos by Susan Ford-Collins and Kenneth Setzer

The subtitle of Anna Pavord's 2005 book "The Naming of Names," is this: The search for Order in the World of Plants. It was Aristotle who wrote "All men by nature desire to know."

Knowing means differentiating. Theophrastus, Aristotle's student, wrote the first book on plants, "Enquiry into Plants." Today, we still desire to know and name. With a name, a plant becomes a part of us, even if taxonomists keep changing names. Some names describe, some attribute qualities, some locate on a map. But as we learn them, we give the world order. It is an excellent pursuit in the increasing disorder around us.



x Ruttyruspolia 'Phyllis van Heerden'



Alvaradoa amorphoides



Schippia concolor

x Ruttyruspolia 'Phyllis van Heerden' is a mouthful, and Phyllis' story is even longer. The sprawling shrub with pink flowers from South Africa is a natural hybrid between *Ruttya ovata* and *Ruspolia hypocrateriformis* var. *australis*, two genera in the Acanthaceae family. The van Heerden part comes from the name of the woman who discovered the plant in 1957. She lived in Louis Trichardt, a town in Limpopo, South Africa's northernmost province. Phyllis van Heerden did not find the hybrid shrub in Louis Trichardt, however. She found it in Wylliespoort, elsewhere in Limpopo.

But, since this is a feature about names, we couldn't simply allow Louis Trichardt to stand without finding out how that town came to be named. Louis Johannes Tregardt was a leader of the Voortrekkers, a group of settlers (largely of Dutch descent) who left the Cape of Good Hope for the interior of southern Africa in 1836. Tregardt led a group north and east in search of better farmland, and the town, near where the group camped for nearly a year, was named for him. The town's name changed a couple of times and ultimately was established as Louis Trichardt.

Alvaradoa amorphoides, the Mexican alvaradoa, is named for Pedro de Alvarado, a companion of Cortes, conqueror of Guatemala and Salvador, according to Daniel Austin's "Florida Ethnobotany." *Amorphoides* means "resembling amorpha," and that means shapeless.

Poitea carinalis (*Sabinea carinalis* is a synonym), Carib wood, is endemic to the island of Dominica. *Poitea* is named for P.A. Poiteau, a French botanist and artist who lived in Haiti. *Carinalis* means “keel-like,” or having a keel. The flowers of Carib wood are red and have a keel similar to other flowers in the pea family.

Schippia concolor, mountain pimento, is a palm from Belize and Guatemala. William A. Schipp was an Australian botanist who worked in what was then British Honduras during the 1920s and '30s. *Concolor* means having the same color throughout. *Schippia* is pronounced “skip-ee-ah.”

Carpoxydon macrospermum, aneityum palm or carpoxydon palm, from Vanuatu is highly endangered in the wild. The genus comes from the Greek, meaning “woody fruit;” *macrospermum* is “large-seeded.”

Strongylodon macrobotrys, the jade vine, is native to the Philippines. *Strongylos* is from the Greek for round; *odous* means tooth. The reference is to the rounded teeth of the calyx. The epithet *macrobotrys* means “having large, grape-like clusters.”

Exostema caribaeum, princewood, is one of South Florida’s rarest trees. The genus name is from the Greek for *exo*, meaning outside, and *stemma*, meaning crown or wreath. Austin says the name refers to the ring of exsected—cut out—stamens. The species name means “of the Caribbean.”

Cyphophoenix nucele is a palm from New Caledonia. *Cypho* is from the Greek for swelling or tumor, according to “An Encyclopedia of Cultivated Palms,” and probably refers to the shape of the fruit. *Phoenix* references the date palm. *Nucele* is pronounced “noo-SHE-leh” and means nut or sling, according to the same encyclopedia, which also notes that the fruits once were used as ammunition for hunting birds with slingshots.

Calliandra surinamensis, pink powderpuff, is an evergreen tropical shrub. The genus name is from the Greek for “beautiful male,” and refers to the stamens. The epithet *surinamensis* refers to the country of Suriname, formerly French Guyana, in northern South America. 



Carpoxydon macrospermum



Strongylodon macrobotrys



Calliandra surinamensis

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A puzzlement ***Gnetum gnemon***

Over the years, botanists have labeled *Gnetum* as both an angiosperm and a gymnosperm, and many things about this genus of plants remain obscured.

By Georgia Tasker
Photo by Kenneth Setzer

Several *Gnetum* species are lianas: long-stemmed, woody vines that are rooted in the ground and use trees or structures to climb to the canopy.



A slender tree called *Gnetum gnemon* grows in the Garden’s Richard H. Simons Rainforest. It was brought here by now-retired research scientist Dr. Jack Fisher, who gathered it from a market in Singapore in 1985. Passing it, you would not suspect that it has bewildered scientists for generations and remains a taxonomic puzzle. Here is its story.

Gnetum gnemon has flat green leaves that are elliptical and occur in pairs, with leaf veins like those of normal trees—a central vein with smaller veins flowing from it. The trunk is upright with whorls of branches from bottom to top.

The plant bears curious spikes of what appear to be green “nuts” of different sizes, also arranged in whorls to form structures called strobili, or cones. These “nut-like” structures are the developing seeds, which are enclosed in fleshy coverings that turn red at maturity and therefore resemble fruit.

Several *Gnetum* species are lianas: long-stemmed, woody vines that are rooted in the ground and use trees or structures to climb to the canopy. Ten *Gnetum* species of lianas occur in South American rainforests, two to four occur in tropical Africa and 25 occur in tropical Asia. Only two species are trees. The “g” is silent, by the way.

“*Gnetum* has a long, contentious history,” says Dr. Brett Jestrow, curator of the Fairchild Herbarium. Carl Linnaeus, who gave taxonomy its binomial organization in the 18th century, listed *Gnetum* with angiosperms, and placed them next to crotons. But in 1907, a description of the family Gnetophyta was published, listing the plant as a gymnosperm and a sister to either conifers or pines.

Gymnosperms include conifers, cycads, ginkgos, cypresses, pines and cedars. They bear so-called naked seeds. However, it is more accurate to say that their ovules, the un-fertilized seeds, are naked, since the mature seeds may be covered with a fleshy structure as in *Gnetum*, *Ginkgo*, cycads and some conifers. Angiosperms, on the other hand, are vascular flowering plants, with ovary and stigma enclosed in carpels

contained in flowers. They appeared after gymnosperms. Flowering plants also are characterized by “double fertilization,” in which two sperm develop in the pollen tube, with one fertilizing the egg and the other creating the endosperm—food for the embryo. Angiosperms have xylem and phloem; they have net or parallel veins. *Gnetum* does undergo double fertilization, but the second fertilized egg dies and no endosperm develops.

Gnetum and two other genera, *Welwitschia* and *Ephedra*, are contained in the order Gnetales. You may have heard about *Welwitschia*, the famously weird wonder of Africa’s Namib Desert that lives for hundreds of years and bears only two leaves. There is only one species, *Welwitschia mirabilis*. The Garden’s director, Dr. Carl Lewis, once traveled to Namibia just to see this plant. A couple of young specimens are growing in the Garden nursery. *Ephedra* species, meanwhile, are mostly shrubs and grow in deserts and seasonally dry habitats in both the Old World and the New World. You can find *Ephedra* in Death Valley in the Western U.S., in the Andes of Ecuador, in the Himalayas and around the Mediterranean.

A 2016 paper in the *Journal of Systematic Evolution* says of the order: “In terms of their morphology and even basic ecology, the Gnetales remain enigmatic, with surprising discoveries continuing to be made.” Or as Jestrow says, the Gnetales are just plain “bizarre.”



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A climbing vine with baseball-sized fruit, this plant is a living link to our past, with a seed dispersal mystery.

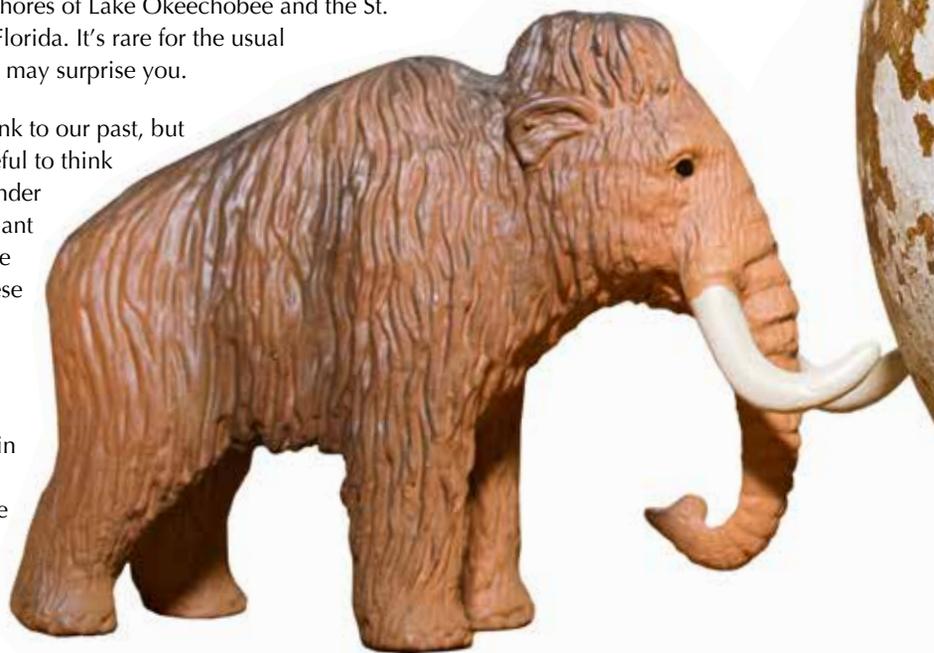
REVISITING THE RARE OKEECHOBEE GOURD

Text and photos by Kenneth Setzer

The rare Florida Okeechobee gourd grows in only two places in the world: The southern shores of Lake Okeechobee and the St. John's River, both in Florida. It's rare for the usual reasons, plus one that may surprise you.

This plant provides a living link to our past, but before we time travel, it's useful to think like the plants and animals under consideration. Why does a plant produce fruit that look or taste or behave a certain way? These features are not coincidental; it's all about survival and reproduction.

The purpose of fruit is to aid in dispersing seeds. Some seeds float, some are released to the wind, some stick to passing creatures, some appeal to



RIGHT
A preserved fruit from the Fairchild Herbarium; about the size of a baseball.

BELOW
Pleistocene megafauna and an Okeechobee gourd: Long-lost partners reunited?
Photos by Kenneth Setzer/FTBG



animals with their edible flesh. The last strategy has particular benefits: Some seeds will likely be consumed along with the flesh, and those that survive the digestive tract will be dispersed far from the parent plant in the animal's dung, a handy packet of moisture and fertilizer that leaves it ready to germinate.

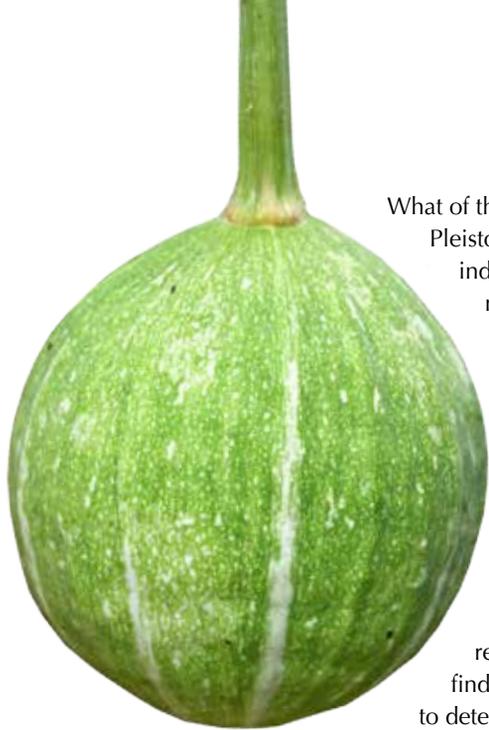
The Okeechobee gourd (*Cucurbita okeechobeensis*) is a climbing vine that produces pale, cream-colored flowers and a baseball-sized fruit—the gourd. Botanists John Kunkel Small and Liberty Hyde Bailey described it in the early 20th century; naturalist William Bartram noted it in the 18th century along the St. John's River. Its current scarcity—after Bartram, it wasn't seen in that region again until 1994—is due in part to clearing of land for agriculture and to flooding, especially along Lake Okeechobee. Small indicated that the gourd was common in the pond apple forests along the southern shores of Lake Okeechobee in the very early 1900s, but by 1930 he estimated the areas hosting the plant had been reduced by 95%.

Thinking like a plant

Evolutionary biologists Paul Martin and Dan Janzen famously researched plants that have no living seed disperser (among other oddities like plants with overbuilt thorny defenses), publishing “Neotropical Anachronisms” in *Science* in 1982. They describe anachronisms as morphology or other features that appear to have evolved in response to an ecological pressure or opportunity that no longer exists. Anachronistic traits have been observed in the fruit of the Kentucky coffee tree, Osage orange, and *Cucurbita foetidissima*, the desert gourd, among many.

Consider the avocado seed. The flesh is appealing, but the seed is bitter and reportedly somewhat toxic. No animal alive today that lives anywhere near the avocado homeland could swallow the seed whole. However, as recently as the Pleistocene Epoch, there were lots of animals that could swallow an avocado, seed and all—giant sloths, mastodons, mammoths, equids, glyptodons, camels, daeodons, toxodons—the so-called megafauna. Most all of these “ice-age” megafauna were extinct by about 12,000 years ago, not long before humans took an interest in plant cultivation. The avocado and its seed are anachronistic.





What of the Okeechobee gourd? Is it, too, anachronistic?

Pleistocene Florida was inhabited by all manner of megafauna; indeed mastodon remains are often found in the central and northern parts of the state, with a Columbian mammoth found as far south as Cutler Hammock in Palmetto Bay.

So megafauna were likely contemporaries of the Okeechobee gourd.

Many plants in the Cucurbitaceae family, like pumpkins and gourds, produce biochemical compounds called cucurbitacins. These impart a bitter taste, are toxins and are thought to deter herbivores from attacking the plant. The fruit, too, may repel smaller animals that would eat its flesh, as well as chew the seeds, thus destroying them. Recently, researchers analyzed bitter taste receptor genes in mammals, finding that larger animals (like elephants) had a reduced ability to detect bitterness. A large body also means toxins are more easily diluted and excreted. So this suggests megafauna like mastodons at least *could* have eaten the gourd.

The green-striped and rare Okeechobee gourd
Photo courtesy of Keith A. Bradley,
University of South Carolina Herbarium.

But did they? Remarkably, the Page-Ladson site in Florida’s Aucilla River contains thick layers of well-preserved American mastodon remains and dung (about 12,500 years old), and it contains gourd seeds—though not of the Okeechobee gourd. One seed was even found within the eye socket of a mastodon skull. Tantalizingly close evidence, this at least indicates mastodons ate gourds. Interestingly, Osage orange—another fruit thought to be anachronistic—was also found in the deposit.

So how do anachronistic plants survive once their primary means of seed dispersal dies away? They either face extinction, or are kept going by a secondary partner. As for the avocado, humans became the seed disperser thousands of years ago, and we still are, although the avocado we know today has been cultivated for taste, size and durability.

Many cucurbits likely survived thanks to human cultivation. Gourd fragments were even discovered along with the 8,000-year-old remains of the “Windover” people near Titusville, Florida. It’s odd however that no Okeechobee gourd remains have been found in the many well-preserved ancient sites in Florida, though other gourds and their seeds have. It doesn’t mean they weren’t around, but why, if mastodons ate gourds, would they not have eaten the Okeechobee? Maybe they did, or maybe it was rare then, too. I doubt it was introduced intentionally by humans, who would have cultivated it for less-bitter, larger fruit.

It just may be that since the megafauna extinctions, the Okeechobee gourd has indeed been dwindling, alone and without a major partner in seed dispersal, whatever the original seed disperser was. Natural process or not, let’s at least not hasten the gourd’s extinction with more habitat destruction.



One of the *Cucurbita okeechobeensis*
in Fairchild’s Herbarium.



Drain and Cover Gardening to control mosquitoes

Text and photo by Kenneth Setzer

Mosquitoes are again proving to be much more than a nuisance. So what can we do other than seal ourselves indoors?

There are more than 80 species of mosquito in Florida; about a dozen are considered disease vectors. Some mosquitoes are known to breed in as little as a capful of water, so, naturally, start by planning an attack on its breeding grounds by finding and eliminating standing water in your yard and garden.

Obvious breeding places include birdbaths, empty plant pots and saucers, garden ornaments, out-of-use fountains, garden ponds or pots containing aquatic plants. Take a close look around your yard; you'd be surprised what you may have left outside that will hold water. Drain or cover all containers, and remember to keep garbage bin lids closed also.

Other garden areas to watch are cavities formed by plants, called phytotelmata (singular: phytotelma) by ecologists and naturalists. The kinds we should consider are the tanks in the center of many bromeliads, *Heliconia* flowers, holes in trees and hollows created by large tree roots. There's no need to remove bromeliads or similar plants, though. The *Aedes aegypti* eggs can take two to seven days to develop, depending on temperature. So disrupt the cycle by flushing out bromeliad tanks, or any other plant cavity, at least weekly with a powerful shot from your water hose. Eggs can survive desiccation and, unfortunately, when the temperature drops, *Aedes* larvae can survive for months with sufficient water, so keep hosing out those plants even during cooler months. If this is not practical, treat them with Bti granules or mosquito "dunks."

My own garden pond has continually circulating water and lots of plants. The plants help to somewhat deprive mosquito larvae of surface area, but the flowing water must be what really makes the difference, as I have never seen mosquitoes associated with the pond. Stocking a few mosquitofish (*Gambusia affinis*), which can eat large numbers of mosquito larvae, couldn't hurt, either.

It's important to eradicate eggs and larvae and not just adults, and there are various larvicides available if you need control on a very large scale. Fairchild is using VectoBac WDG, which uses *Bacillus thuringiensis*, a common soil bacterium, as a biocontrol. It is designed specifically for use against mosquito and black fly larvae.

As for yourself, if you plan to be outdoors for any length of time, especially gardening or landscaping, you should cover up. The less skin exposed, the better. I know it is uncomfortable, but there are lots of options for outdoor, warm weather clothing designed to keep you as comfortable as possible. Wear garden gloves and shoes that cover the ankle. Finally, treat exposed skin with a repellent containing DEET, picaridin, oil of lemon eucalyptus or IR3535—all are considered safe and effective by the Environmental Protection Agency.

Zika spreaders are aggressive daytime feeders but can also sting at night, so beware. If you need to be out much, don't wear perfume or cologne; they can cause some people to be more attractive to mosquitoes. For reliable information on the Zika virus, visit www.cdc.gov. 





TEXT AND PHOTOS BY KENNETH SETZER

PLANTING THE PRIMITIVE GARDEN

WE PLANT EDIBLE GARDENS, ROSE GARDENS, CACTUS GARDENS—SO WHY NOT A *PRIMITIVE* GARDEN?

Consider primitive plants as those whose lineages can be traced back into the deep past, whose anatomy hasn't changed all that much in millions of years, or that retain some ancient, relict features.

But remember, primitive in no way means inferior—often, it's quite the opposite. Primitive plants are survivors, their forms and functions well-adapted for their environment. They're a little lucky, too. A catastrophe can change the environment in a flash, and plants can't pick up and run, fly or swim to a better location. Here are just a few we can grow and contemplate:

Conifer means “cone bearing,” as in the pine cone, but there are plenty of non-pine conifers. Araucarias are conifers now native only to the southern hemisphere, but they were widespread in the Jurassic Period. Forests of them are sometimes filmed as

backgrounds for dinosaur documentaries. The surviving populations of them are relicts, having made it through the massive extinction that took the dinosaurs.

The wonderfully primitive-looking monkey puzzle tree (*Araucaria araucana*), with its overlapping, scale-like leaves, sadly won't grow in South Florida, but the Cook pine (*Araucaria columnaris*) and Norfolk Island pine (*Araucaria heterophylla*)—both of which are not pines, but araucarias—are common here. Their ancestry stretches back to the early Cretaceous. But beware: They can become massive! In temperate areas, plant a *Metasequoia*, aka dawn redwood, once thought long-extinct but rediscovered in 1941. This deciduous conifer resembles our own cypress, another primitive.

Cycads are often called “living fossils.” With their pinnate fronds and colorful cones, they lend an otherworldly air to any landscape. Though recent

LEFT: 1. *Encephalartos* sp. 2. *Selaginella willdenowii* 3. *Equisetum hyemale* 4. *Nymphaea* sp.
ABOVE: Cone of the cycad *Encephalartos ferox*



5. *Pinus elliottii* 6. *Nymphaea* sp. 7. *Marchantia* sp. 8. The lycopod *Huperzia squarrosa*

research claims living cycad species date back only about 12 million years, cycads' ancient lineage dates back about 280 million years. Our native coontie (*Zamia integrifolia*) makes a great garden addition for its ease of care; I enjoy wondering how it got to its now-restricted range in the extreme southeast.

Lycopods, called club moss or tassel ferns, are just plain cool. They bear no flowers, no seeds; they are cryptogams, i.e. reproducing via spores. Some are upright little terrestrial plants looking just like tiny pine trees, sometimes called ground pine. Others are epiphytes, and hang down from trees and rocks as bright green tassels, dichotomously branching. Nowadays they get to a few feet long, but about 300 million years ago their late ancestor, *Lepidodendron*, reached upwards of 100 feet! Perhaps only the tallest dinosaurs could reach the tender new foliage.

Ferns are another ancient wonder. Certainly they must have dominated before the upstart angiosperms took over, though given their reproductive complexity, it's a wonder to me that ferns manage at all. With thousands to choose from, so-called tree ferns have a great "primitive" look—larger and thus suiting a lost world of giants. The native tree fern, *Ctenitis sloanei*, isn't very big (maybe 3 feet tall), but thrives in our alkaline soil. The Australian tree fern (*Cyathea cooperi*) can get 10 times as tall, but seems to need a bit more acidic soil. It's also an invasive in Hawaii.

Various *Selaginella* species look like they sprouted from a fairytale garden. What else could possess emerald green and electric blue iridescent feathery foliage? From the groundhugging mound of the chartreuse *Selaginella kraussiana*, to fronds of the blue-tinged peacock fern, *S. willdenowii*, they're all related to primitive lycopods. The blue is believed to allow them to absorb more light while growing on dimly lit forest floors.

Equisetum, the horsetails, are the only survivor within the class Equisetopsida. Horsetails usually prefer moist, sandy soil, and some grow partly submerged, so they makes a nice pond margin plant. Horsetail is considered an invasive spreader in some parts of the world, but oddly, not in South Florida. It's a bit hot here for it, I suppose, but I've had moderate success growing the common *Equisetum hyemale*, scouring rush.

While in the pond, include some *Nymphaea* water lilies. They diverged very early on from some of the first flowering plants, so you can grow primitive and have flowers. Also try *Magnolia virginiana*, sweet bay, found in wetland areas, and probably the most primitive flowering plant native to Florida.

If you want to get really primitive, cultivate bryophytes like moss and liverworts. They make ferns seem like garden newcomers. 

Got mulch?

Recycling plant material for use as mulch or compost is an environmentally sound way to enrich our South Florida soils.

By Richard Campbell, Ph.D.

Our soils in coastal South Florida are shallow and composed of mostly nutrient-poor, high pH rock or sand. We have a monsoonal climate with a rainy, hot summer and dry, cool winter; summers bring the threat of tropical cyclones; and winters bring the occasional killing frost. Yet, given these edaphic (soil) and climatic limitations, there are ways to enhance our growing and gardening experience.

Mulching and composting offer the most environmentally sound method for us to improve our soil fertility. No plant material should ever leave your home garden. All plant debris, including leaves, twigs and branches, can be cut into small pieces and placed within the mulch or compost pile, either beneath a pruned tree or in designated areas. The circle of life and nutrient cycle will both now be realized to their fullest. Instead of losing this energy- and nutrient-rich organic matter and filling local landfills, plant material is recycled for use as mulch or compost in the vegetable garden and throughout the home garden.

As a seasoned home gardener you have no doubt heard the party line: Mulch and compost are the cure for everything from poor tree growth and insect control to improving the health of the Florida Bay. Well, it turns out that these mulch- and compost-mongers are right—these activities really are essential for home gardening in South Florida. A consistent mulching program will allow you to convert your home landscape into an organic system that relies on nature's way and will change your entire gardening demeanor. No more need for commercial fertilizers and pesticides—only a firm pruning hand, a heightened ecological understanding and appreciation for the cycles of life.



It will take a number of years for your home landscape to fully embrace the mulch and composting system. Previous decades of poor stewardship are not swept away in a single season. You have to wait for the soils to recover from the years of other approaches. This recovery will take the form of a thriving soil flora and fauna, nourished by the organic matter that you will create. In nature, everything is a process and this process cannot be rushed. Make your labors part of the solution, but be patient and let nature take its course.

A hand saw, pair of hand loppers, a machete and hand pruning shears are all that is needed to embark on your new path. Twigs, leaves and branches removed from your trees can be cut up in place; if you prefer a more tidy approach, a special mulching area can be created. Let that membership at the local gym lapse, for making your own mulch will give you a great workout. It is also the best time to get your thinking done. Mulch piles composed of twigs, branches and leaves do not smell badly. On the hottest and rainiest months your mulch pile will have an organic aroma, sweet and slightly alcoholic. It is always a good idea to water the mulch pile during the driest weather. This will help the plant material break down faster into a product readily usable by your plants. If you are ambitious and sufficiently engaged in the doctrine, you can embark on a composting program as well. In the case of composting, there are many commercial contraptions to assist in your endeavors. If you prefer the zero-footprint approach, you can always make your own compost box, wire ring or pit. Compost piles can take your leaves, weeds and twigs as well as much of your kitchen refuse and other organic



waste. Layering and turning will be your mantra, as the compost pile is indeed more time-consuming than the mulch pile. However, the end result—a living and healthful humus for your garden—can make any ordinary homeowner a master gardener. You can regale your friends with tales of the organic life and the saving of the earth, and actually be a part of it.

A common myth about mulch and compost piles is that they harbor all of the most vile and dangerous creatures of the wild. Most of us live in rather “tamed” locations, so it is highly unlikely that your well-groomed mulch piles will harbor bears or panthers (pythons perhaps, but they will prefer to live underneath your nearby home or shed). Actually, the mulch pile will serve as a home for lizards and frogs, mice and possums. There can be some tree rats, so a control program with owl boxes is

always a good idea, and a rat-catching dog or cat is a good idea. There will be several harmless snakes around trying to eat some of the small creatures within the compost or mulch pile. If you leave them all alone, a peaceful coexistence can be achieved.

Weathered mulch and compost can be applied around each individual tree, or it can be applied in beds. You can pile it to a depth of 6 inches to 8 inches, but you must retain a 3-inch distance from the trunks of the trees so as not to burn the tender bark and feeder roots of small trees. The mulch will break down at an alarming rate here in South Florida, meaning that your work will never be done. Keep pruning, mulching, composting and applying.

You can also bring shredded plant mulch from tree trimming companies into your home garden, and this is a good complement to your own work. However, be careful of introducing unwanted weeds in commercial shredded mulch that has not been allowed to compost properly. Mulch can be purchased, but it is often expensive and may come with dyes and other chemical additives that are not conducive to an ecological balance or healthy plants.

Mulching and composting will allow you to achieve the gardening success that you have always wanted. It is not magic, but rather, nature at work. All of the plants within your landscape have evolved to take up nutrients from organic matter, provided from your decaying plant debris. It will be a bit awkward at first, but soon you will be moving effortlessly to the beat of nature and your mulch will be changing your home landscape and vegetable garden for the better.



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The Fairchild Oak, or What's in a Name?

By Janet Mosely

The story of the Fairchild Oak in Ormond Beach, Florida, is not necessarily a story of Dr. David Fairchild but of Eileen Butts, the woman who saved the largest and oldest live oak tree in Volusia County. Of course, David and Marian Fairchild, as well as their good friends Oakes and Blanche Ames, do play a part.

The oak's official name today is "The Fairchild-Ormond Oak." Abundant with resurrection fern and *Tillandsia*, its trunk measures 30 feet in circumference. It is almost 68 feet tall, with some branches that stretch outward over 300 feet. It was long believed to be more than 2,000 years old, although arborists recently ascertained its real age is between 300 and 400 years (still very impressive!).

Originally, the tree was called "Ormond Oak" after James Ormond II, who owned a plantation in the early 1800s on which the oak stood. The town of Ormond Beach is named after the Ormond Family; James Ormond II, who died in 1829 at a young age, is buried nearby in James Ormond Tomb State Park. The property has since had many owners, but of particular interest to our story is Norman Harwood. In 1880, he fled debtors in Minnesota to start again in Florida, purchasing several hundred acres of what was once the Ormond Plantation. He built his house not far from the Ormond Oak. In 1885, Harwood died alone under mysterious circumstances; his housekeeper found him the next morning. Rumors of murder or suicide quickly took root, but were never proved or disproved. It was said that his ghost could sometimes be seen in the vicinity of the oak. Over time, the oak's name changed to Harwood Oak or Haunt Oak. This is what it was called when the Fairchilds, the Ameses and Eileen Butts entered the story.

Oakes and Blanche Ames had a second home in Ormond Beach they called The Whim. Oakes, a Harvard botanist and well respected orchid expert, and Blanche, an artist and illustrator, were close friends of the Fairchilds. Their marriage was similar to David and Marian's, in that both women were tireless supporters of their husbands and their careers but also were accomplished in their own rights. They both were artistically talented, and championed causes on behalf of women and children. The Fairchilds were often guests at the Ames's home in Ormond Beach.

Eileen Butts, also a good friend of the Ames's, served on the Florida Board of Parks and Historic Memorials and is credited with helping to establish Tomoka State Park, Bulow Plantation Ruins Historic State Park and the Ormond Beach Memorial Art Museum and Gardens. She also saved and oversaw restoration



of The Casements—John D. Rockefeller’s home in Ormond Beach. An amateur botanist, her special interest was the native wildflowers of South Florida.

A tireless champion of historic preservation and natural areas, Butts is credited with first showing David Fairchild the famous oak tree. Legend has it that he liked to sit underneath it, but no proof of this has been discovered. It is also of interest to note that a review of Fairchild’s writings, relevant pocket notebooks and photographs finds no mention or image of the oak.

What is known is that Fairchild told Butts that she “must save that tree.” Butts took it to heart and focused

PREVIOUS PAGE

The Fairchild Oak today. A photo taken of it in 1975 by Walter Hodge when he visited the Oak with Dent Smith and Eileen Butts was featured on the cover of the July 1975 “Fairchild Tropical Garden Bulletin,” but could not be located in the Garden’s image collection.

Photo courtesy Katy Soule O’Day.

ABOVE

Marian Fairchild with Blanche and Oakes Ames at The Whim, March 1939.

Photo by David Fairchild. Archives/FTBG



Eileen Butts, date unknown.
Photo courtesy of The Ormond Art Museum, Ormond, Florida.

her considerable energies on this task. Over the years, she mentioned it in her letters to David and Marian, and even collected its acorns to send to them. Lehigh Portland Cement Co. bought the property to mine coquina in 1955, a year after David Fairchild’s death. As Butts says in an April 1955 letter to Marian, she immediately “wrote to the President of Lehigh and begged for its life. Telling them of what Dr. Fairchild had thought of that superb old tree and so on.” Thinking its local names were too negative, suggesting hauntings and murder, and not persuasive to her case, she renamed it The Fairchild-Ormond Oak and proposed that the Lehigh Company preserve it and dedicate it in memory of Dr. David Fairchild. “It would seem a very suitable living memorial and truly worthy of that bright and beautiful spirit,” she wrote. Happily, Lehigh’s president, Joseph S. Young, agreed with her.

In a letter dated April 20, 1955, Butts wrote to Marian Fairchild: “I do hope you will be pleased about the old Ormond Oak, and know that if it could speak for itself, it would ask nothing more than to stand another thousand years, as a tribute to so completely good and really great a man. And indeed it does seem to me that as one of the most perfect and noble trees in Florida, it deserves this honor.”

On December 11, 1955, a dedication ceremony was held at the newly preserved area. Butts, joined by many local notables and Lehigh officials, dedicated the oak to David Fairchild and in memory of James Ormond. The inscription on the plaque read: “This live oak tree is dedicated by the Lehigh Portland Cement Company to the memory of Dr. David Fairchild, the American botanist who introduced the soy bean and many other valuable forms of plantlife [sic] to the United States. As this tree has gladdened men’s hearts for 2,000 years, so will Dr. Fairchild’s legacy enrich the lives of future generations.”



If you’d like to visit, The Fairchild-Ormond Oak stands in Bulow Creek State Park. Please see the park’s website for information: www.floridastateparks.org/park/Bulow-Creek

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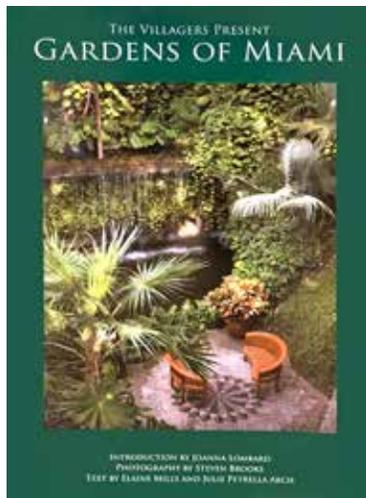
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“The Villagers Present: Gardens of Miami”

By Georgia Tasker

This book inspires, intimidates, reassures and educates about what is possible horticulturally on this end of our impertinent peninsula.

It is clear, from this coffee table-style book, that gardens play a central role in many of our lives. We have been given the right climate for year-round access to the green and growing stuff that surrounds us. Sunlight, which both rewards and punishes with its fierceness, demands that we respond, that we shield ourselves—and often we do so by making a garden.

The results, as featured in this lovely book, range from expansive estates to sweetly intimate niches. Throughout South Florida, plant materials are frequently similar, but our uses of them differ in style—from expansive, crisply edged lawns with tidy walks and pavilions, to riotous combinations of color and foliage. Water frequently has a role in our gardens, whether it is cascading or quietly reflecting the undersides of a lotus. Palms are leading players, from the royal to the red sealing wax, and many iterations between.

After Hurricane Andrew’s wholesale landscape destruction in 1992, our thirst for gardening seemed unquenchable. Over time—a short time in comparison to temperate gardens—our sophistication grew and we became assured in the way we planted our palms next to our ferns, next to our gingers and bamboo. For a few of us, the disappearance of natural ecosystems was met with a heartfelt response to restore with great care. More widely, we have learned to combine the native and the exotic, the buttonwood and the begonia, sabal palm and croton.

As you turn the pages of this book, you discover landscapes that thrill and soothe, but together say, “Yes,

there is a Miami garden style.” This style is extraordinarily rich in detail. It increasingly utilizes our native limestone in pavers, walkways, steps and patios. Art often finds its way into our gardens as statuary, mosaics and tile work. And even when there are no statues or waterfalls, the Miami garden exalts in the big leaves of the tropics, the many manifestations of palms, bougainvillea’s exuberant color, the finesse of orchids.

Steven Brooke is responsible for all the book’s photographs, and his eye is never wrong. Take the book as a lesson in gardening and photography. Elaine Mills and Julie Petrella Arch provided the text, often a little breathless with enthusiasm. The introduction, from Joanna Lombard, professor in the University of Miami’s School of Architecture, not only sets our gardens in their historical context, but also teaches us how to read and appreciate them. An admirer of the work of landscape architect William Lyman Phillips, who designed Fairchild Tropical Botanic Garden, Lombard stresses the principles of unity, contrast and variety that Phillips espoused. “These principles are evident in gardens of all sizes,” she writes. They point to the potential of the region, she adds, and offer “a vision of life in all its beauty and possibility.”

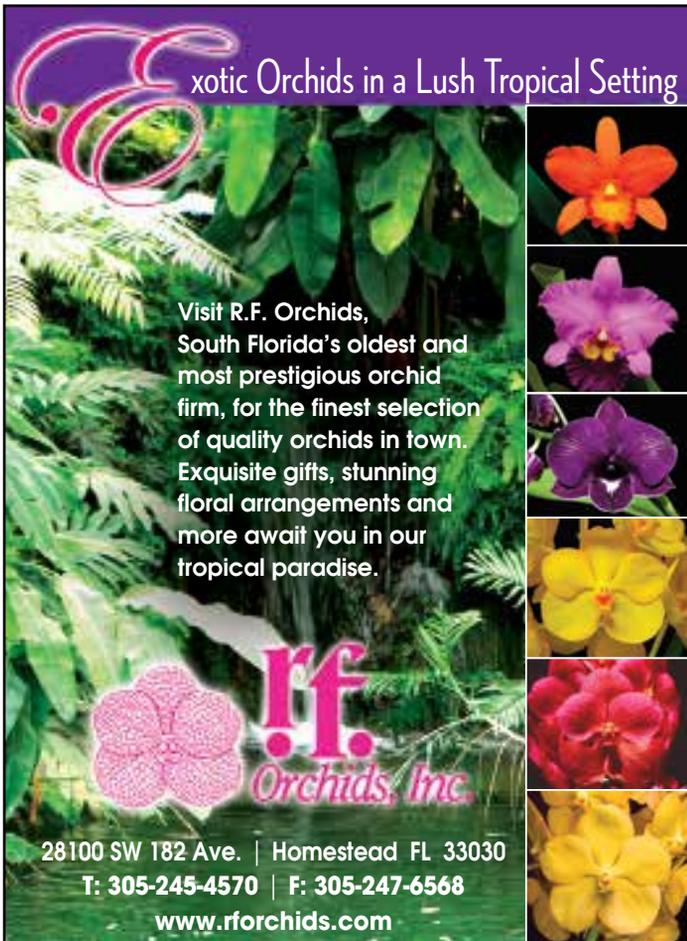
“Gardens of Miami” earned an Award of Honor from the Florida Chapter of the American Society of Landscape Architects, selected by the 2016 Design Awards Jury. The award was presented at the society’s annual conference in August.

The Villagers is a non-profit organization that preserves and restores historic structures and supports the education process necessary for these efforts. 



“Gardens of Miami” is available at the Shop at Fairchild. \$60. It is also available for purchase online at www.thevillagersinc.org.

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MOONLIGHT TOURS**
January 12, February 9,
7:00 – 9:00 p.m.
Tickets: \$12 for Members;
\$25 for Non-members

SPLendor IN THE GARDEN
Where philanthropy is
always in fashion
Wednesday, January 11,
10:30 a.m. Tickets start at \$300
**FAIRCHILD'S BLACK-TIE GALA
GALA IN THE GARDEN**
Saturday, February 6, 6:30 p.m.
Tables start at \$10,000; Tickets
at \$1,000



**78TH MEMBERS PLANT SALE
FEATURING THE 7TH ANNUAL
BIRD FESTIVAL**

Our annual celebration of plants grown by Fairchild was celebrated in early October. In the tradition of David Fairchild's legacy of plant introduction, we introduced 12 new plants to Fairchild Members from recent plant expeditions among the dozens of other spectacular specimens. We also celebrated South Florida's winged wonders with wonderful birding lectures, walking tours and even had bird calling tutorial for kids.



TRUNK AND TREAT

It was a park and bark kind of a weekend this past Halloween! Dogs in costumes celebrated with their version of Howl-o-Ween. And it was hard to tell who was more delighted, the dogs or their owners?





HOWL-O-WEEN AT FAIRCHILD

Kids in costumes and classic car owners celebrated with a fun Trunk-n-Treat celebration. It was a mix of classic and spiffy collectable cars in the Garden, and it was hard to tell if the parents were more excited at seeing the hot rods or the kids in costumes collecting treats!

COMING SOON Purchase your tickets now for these upcoming events

Events benefitting Fairchild's many programs in conservation, science, children's education and horticulture.



HOLIDAY CONCERT AT FAIRCHILD

Conductor James Judd and his orchestra return to the Garden December 11 for the annual Holiday Concert from 6:00 - 10:00 p.m. in the Adam R. Rose and Peter R. McQuillan Arts Center.

Individual tickets start at \$250, and tables of 10 start at \$2,500. Tickets can be purchased online or by contacting Morgan Brooks at mbrooks@fairchildgarden.org or 305-667-1651, ext. 3309.



SPLendor IN THE GARDEN

Luncheon and fashion show
Wednesday, January 11, 2017
10:30 a.m. - 2:30 p.m.

Leading members of the South Florida community are honored at Splendor, which features a champagne reception, luncheon, fashion show presented by Neiman Marcus VP and Fashion Director Ken Downing, and awards ceremony. Tickets start at \$300

For reservations and sponsorship opportunities, please contact Susannah Shubin at sshubin@fairchildgarden.org.

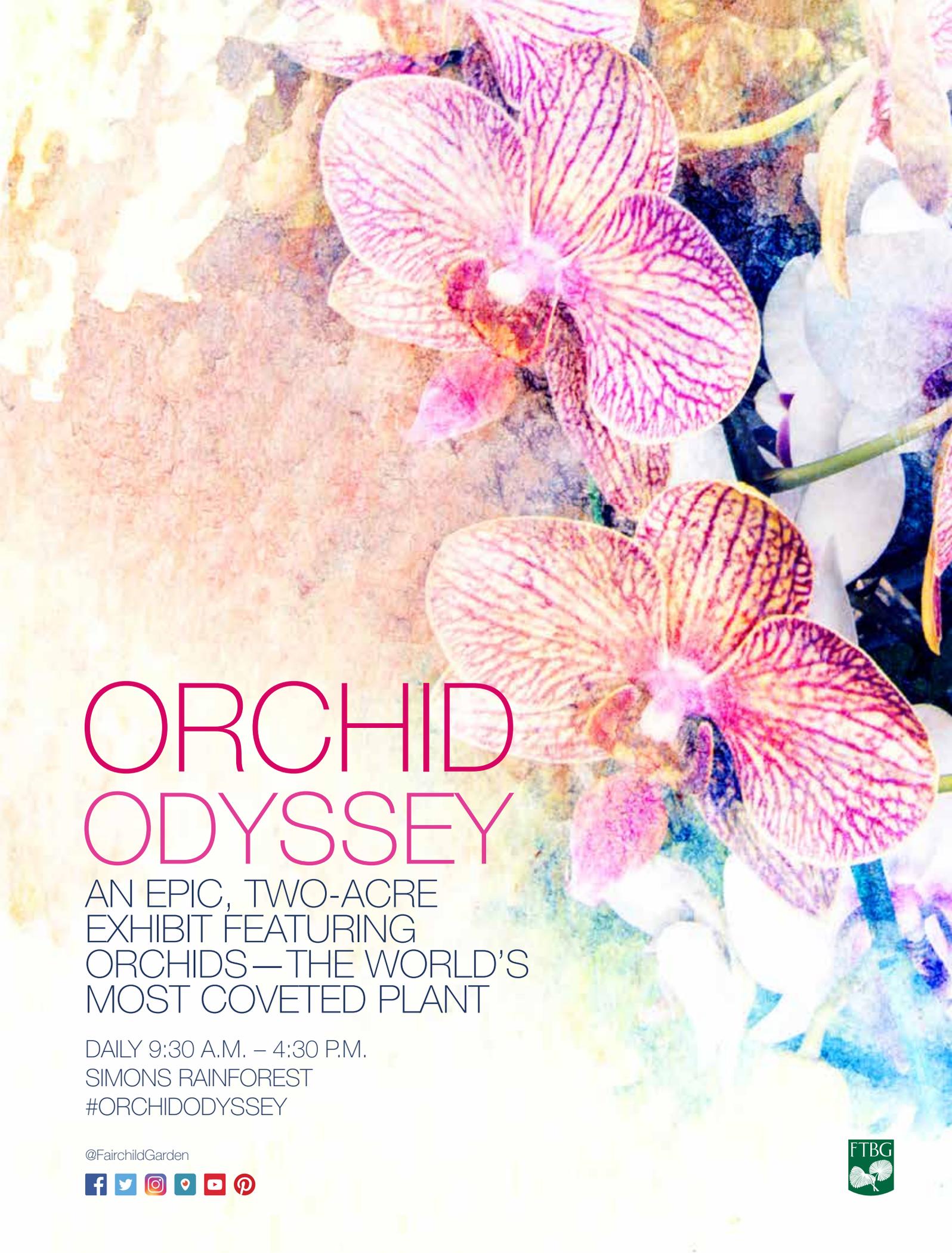


GALA IN THE GARDEN

Saturday, February 4, 2017
6:30 - 11:30 p.m.

Gala in the Garden is Fairchild's largest annual fundraiser. This black tie formal event begins with a cocktail reception and silent auction in the Adam R. Rose and Peter R. McQuillan Arts Center, followed by a seated dinner overlooking Pandanus Lake and dancing under the stars. Gala in the Garden 2017 is chaired by Swanee DiMare and Frances Sevilla-Sacasa. Tickets start at \$1,000 per person. Tables for 10 start at \$10,000.

For reservations and sponsorship opportunities, please contact Susannah Shubin at sshubin@fairchildgarden.org.



ORCHID ODYSSEY

AN EPIC, TWO-ACRE
EXHIBIT FEATURING
ORCHIDS — THE WORLD'S
MOST COVETED PLANT

DAILY 9:30 A.M. – 4:30 P.M.
SIMONS RAINFOREST
#ORCHIDODYSSEY

@FairchildGarden



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ART AT FAIRCHILD PRESENTS



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ADAM R. ROSE & PETER R. MCQUILLAN ARTS CENTER

AT FAIRCHILD

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