



the
TROPICAL GARDEN
SPRING 2015

Bursts of Springtime
Blossoms at Fairchild



PUBLISHED BY FAIRCHILD TROPICAL BOTANIC GARDEN

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Photo by Rey Longchamp/FTBG

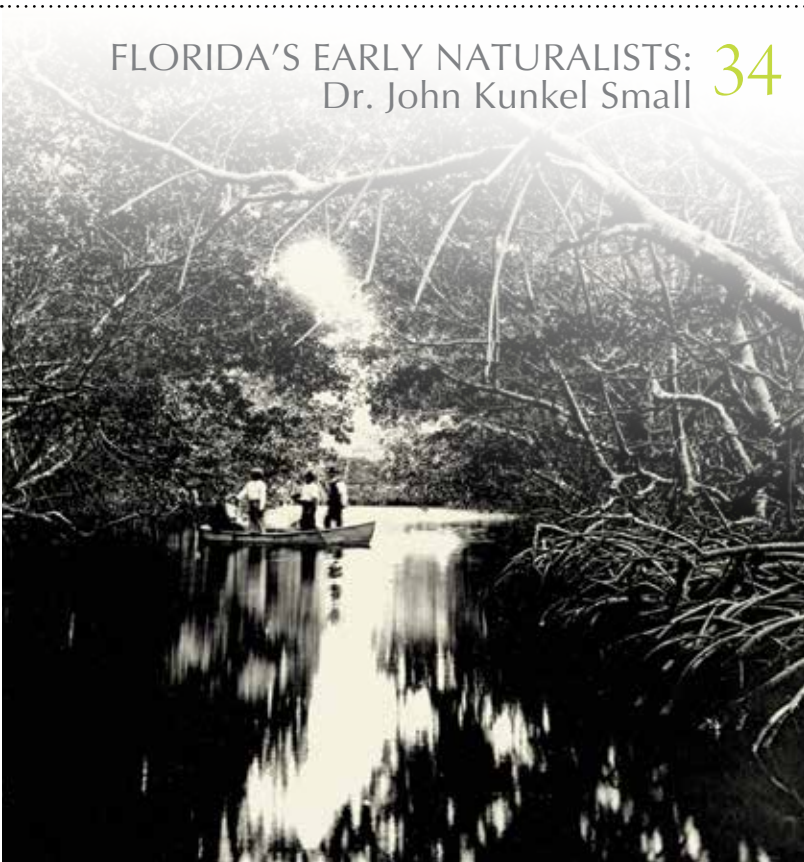
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This spring, as Fairchild's Million Orchid Project is still in its early stages, I am pleased to report an unexpected early blossoming in our community. As we work toward our goal of planting 1 million native orchid plants in local urban environments, we envision many of them coming into bloom during the next several years. Astonishingly, some of the first orchids are already flowering.

A year ago, our volunteers planted seeds of the pinepink orchid (*Bletia purpurea*) in our new micropropagation lab, part of the Paul and Swanee DiMare Science Village. The tiny, dust-like seeds grew surprisingly quickly, eclipsing the other native species that ordinarily live in the lab for 12 to 18 months. By early summer, just four months from seed, we began transferring young pinepink orchids from the lab into trays in our nursery.

By autumn, we were ready to release the first pinepinks into the community. The timing coincided with the start of the school year, so we enlisted elementary schoolchildren to help us replot the orchids and plant them far and wide throughout South Florida. As part of our Explorer field trip program, children were given pinepink orchids to plant at their schools and in their neighborhoods.

Now, we are learning that some of those first orchids are blooming, in sync with the pinepinks growing in our landscapes at Fairchild. As we never expected them to flower just one year from seed, this is an exciting result. Perhaps some of the year-old orchids will produce seeds and begin reestablishing pinepinks in our local neighborhoods.

The Million Orchid Project has many layers of community involvement, including volunteers, scientists, South Florida municipalities, the local school district and students of all ages. That means we have a great network of citizen scientists to report on the establishment and growth of our reintroduced orchids.

You can look forward to more orchid news from our community in the years ahead, and you can look forward to a resurgence of flowering native orchids throughout South Florida.

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



This winter, much of the country was buried under record-setting levels of snow. In Boston and Chicago, where there was an unprecedented amount of snowfall and record low temperatures, respectively, the U.S. Jobs Report for February noted that the brutal winter weather “may have curtailed hiring in weather-sensitive industries.” Although overall unemployment dropped from 5.7% in January to 5.5% in February, the report suggested that additional jobs would have been added had the winter weather not been such a factor, according to the Wall Street Journal.

Similarly, social media was peppered with pictures of winter’s relentlessness, along with constant cries from beleaguered northerners for spring to arrive. I have a friend who lives in Boston, and she posted—during the height of her whiteout despair—that she “thought [she] heard a bird today!” Humorously, however, it was her neighbor’s ringtone coming through her wall.

Contrastingly, people often joke that Miami has only one season: hot! But I disagree. While temperatures tend to stay consistently warm (which is a good thing for this thin-blooded native), there are remarkable seasonal differences throughout the year, apparent in our botanical richness.

I spend quite a bit of time thinking about the important and necessary impact of nature on humans, especially in terms of our everyday, routine interactions. And while a winter wonderland may defy our definitions of beauty, the disconnect with nature during those frigid months does have a profound effect on people and their daily lives. That’s why I’ve never taken for granted the fact that I grew up and live in Miami. I love everything about this great region: its people, its culture, its spiritedness, our year-round tropical climate and the abundance of lush foliage throughout our metropolis.

So what are some of the differences you can spot during our spring? Blooms, blooms, blooms! The Vine Pergola comes alive with glorious flowers, most notably the always-charismatic jade vine. The Tropical Flowering Tree Arboretum and Geiger Flower Garden are equally magical in their colorful symphony. You’ll want to photograph the surrealistic *Brownea* bloom with its orb-like tentacles beckoning onlookers. And this year, the *Saraca* is putting on a bouquet-rich display of golden flowers, the likes of which would require a trip to Indonesia to experience. And of course, springtime means mango blooms, which awaken our internal calendars to the fact that this evocative fruit is only a few short months away from being ready to eat.

So be sure to visit the Garden, because springtime at Fairchild is a color-wheel of effervescent beauty, because you don’t need a coat and because the bird calls you hear are real!

Warmest regards,

A handwritten signature in black ink, appearing to read 'N. Zapata', written in a cursive, fluid style.

Nannette M. Zapata
Chief Operating Officer and Editor in Chief

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GEORGIA TASKER

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



KENNETH SETZER

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



AMY PADOLF

is Fairchild's director of education. She holds a bachelor's degree from the University of Pittsburgh and a Master of Science in education from Duquesne University. Padolf began her career as the director of education at the National Aviary in Pittsburgh and has more than 20 years of experience in formal and informal education.



JASON DOWNING

is working towards a Ph.D. in biological sciences at Florida International University under Dr. Hong Liu, under whom he also earned his Master of Science. Prior to that, he completed post-bachelor studies in biology at the University of Miami, where he also worked for the Gifford Arboretum. Downing's dissertation research examines the fungal interactions of orchids in Florida and China.

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FAIRCHILD TROPICAL BOTANIC GARDEN



ON THE COVER

Flame Vine, *Pyrostegia venusta*
Photo by Susan Ford-Collins

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Chihuly Nights

Every Thursday and Sunday
through May 31, 6:00 p.m.

Thursday, April 23

Sunday, April 26

Thursday, April 30

Sunday, May 3

Thursday, May 7

Sunday, May 10

Thursday, May 14

Sunday, May 17

Thursday, May 21

Sunday, May 24

Thursday, May 28

Sunday, May 31

Family Fun

LET'S EXPLORE AT
FAIRCHILD (LEAF)

10:30 a.m. - 2:30 p.m.

Saturday and Sunday,

April 25 and 26

Saturday and Sunday,

May 9 and 10

Saturday and Sunday,

May 23 and 24

MOTHER'S DAY BRUNCH
AT FAIRCHILD

Sunday, May 10

10:30 a.m.

FAIRCHILD'S 16TH ANNUAL
MANGO BRUNCH

Sunday, July 12

Festivals

23RD ANNUAL

INTERNATIONAL MANGO
FESTIVAL

Saturday and Sunday

July 11 and 12

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

Lectures

*Fairchild Botanical Reliefs
of Artist Naomi Fisher*

Naomi Fisher, Artist

Wednesday, April 22

*The Passionate Traveler II:
Exploring Cold Ecosystems
from the Arctic to Patagonia*

Georgia Tasker,

Fairchild Writer

Wednesday, May 6

Plant ID Workshops

1:00 p.m.

Friday, May 1

Friday, June 5

Friday, July 3

Friday, August 7

Plant Show and Sales

BROMELIAD SOCIETY OF
SOUTH FLORIDA SHOW
AND SALE

Saturday, April 18

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

TROPICAL FLOWERING
TREE SOCIETY'S ANNUAL
SHOW AND SALE

Saturday, May 9

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

Walking Tours

EARLY-BIRD WALKS

7:30 - 9:30 a.m.

Saturday and Sunday,

April 18 and 19

Saturday and Sunday,

April 25 and 26

PALMETUM WALKING
TOURS

11:30 a.m. and 1:30 p.m.

Saturday and Sunday,

April 18 and 19

Saturday and Sunday,

April 25 and 26



*This schedule of events is
subject to change. For up-to-the-
minute information, please call
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www.fairchildgarden.org/events*



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- **Discounts** at The Shop at Fairchild
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Photo by Gaby Orihuela/FTBG

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GET IN ON THE CONSERVATION



Tiffany Lum, Fairchild horticulturist, transports a tall key tree cactus to a new home in the wild.

Photo by Joyce Maschinski/FTBG

Key Tree Cactus Gets a Second Boost

Thanks to Fairchild's South Florida Conservation Team, horticulture staff, interns, volunteers and state partners, more healthy plants of the federally endangered key tree cactus (*Pilosocereus robinii*) are now established in the Florida Keys. Our first reintroduction was in July 2012, and we selected a second location for a February 2015 reintroduction. Not only were more plants returned to the wild, but we also expanded our experiment in testing optimal conditions linked to the species' persistence in the wild. We thank our land managers and funding agencies—the US Fish & Wildlife Service and Florida Department of Agriculture & Consumer Services—for supporting this reintroduction.



An endangered Bartram's hairstreak butterfly sits atop a pineland croton in the Richmond pinelands.

Photo by Jennifer Possley/FTBG

New Publication on Rare Butterfly Host Plant in Miami

The South Florida Conservation Team recently had a new article accepted for publication in *Natural Areas Journal* during early to mid-2016. The paper, authored by Jennifer Possley, Stephen Hodges, Emily Magnaghi and Dr. Joyce Maschinski, is titled "Distribution Of *Croton linearis* In Miami-Dade County Preserves With Potential For Supporting The Federally Endangered Butterflies *Strymon Acis bartrami* and *Anaea troglodyta floralialis*."

This timely work describes the abundance of pineland croton in Miami-Dade County preserves located within the Richmond and Navy Wells areas. Pineland croton is the only host plant for endangered Bartram's hairstreak and Florida leafwing butterflies. The team performed detailed mapping of plant locations as well as habitat assessments in 10 preserves, and ultimately estimated that there are nearly 50,000 pineland croton in the sampled preserves. The study also found that not all preserves are equally well-suited to support the endangered butterflies, due to factors such as fire suppression, size and isolation.



Lee Adams' Daughter Visits Fairchild

The paintings of Lee Adams have long been treasured by the Fairchild community. His watercolors of palms, commissioned by the Garden in the late 1960s, illustrate some of the best examples of the beauty and artistic achievement of botanical artwork. Most of them now grace the walls of the Paul and Swanee DiMare Science Village. In early January, the Garden was privileged to host the daughter of Lee Adams, Camille Adams Helminski. She brought with her hundreds of letters between Dr. David Fairchild, Marian Fairchild, Adams and his wife Mimi, as well as numerous newspaper clippings and pictures. Fairchild archives volunteers will scan all the items so that they can be made available for research. In addition, Helminski was able to view her father's paintings and tour the Garden. From here, she visited The Kampong and enjoyed her recollections of visiting the Fairchilds when she was a child.



(L-R) Dr. Carol C. Horvitz Nutt, Robert M. McElderry and Dr. Joyce Maschinski.
Photo by Dr. Orou Gaoue.

First Anness Fellow Defends his Dissertation

Our first Lisa D. Anness Fellow in Tropical Plant Biology, Robert McElderry, has successfully defended his thesis and will graduate from the University of Miami this May. The fellowship provides a doctoral student in UM's biology program with a \$20,000 stipend, three years of waived tuition at UM, research funding, teaching assistant or research assistant funding and mentoring by Fairchild and UM researchers.

McElderry's thesis, "Leafwing Population Dynamics (Genus *Anaea*, Lepidoptera; Nymphalidae) and Viability of the Endangered Florida Leafwing," will help guide management decisions about the endangered Florida leafwing butterfly. Co-advised by Dr. Joyce Maschinski and Dr. Carol Horvitz, McElderry conducted laboratory and field studies on more common leafwings. He gained insight into the impact of predators on caterpillar developmental stages and the seasonal shifts in butterfly growth, survival and reproduction.



Fairchild/FIU graduate student Brian Machovina presents a lecture on the effects of agriculture and meat consumption on tropical conservation.

Fairchild Hosts Public Tropical Biology and Conservation Symposium

On February 4, Fairchild hosted a free, public, one-day symposium on Tropical Biology and Conservation. Topics included the influence of changing global temperatures on tree growth rates, the influence of tourism on the ecosystems of the Bahamas and food security under climate change. Researchers from Florida International University (Dr. Steve Oberbauer, Dr. Eric Bishop von Wettberg and Brian Machovina) and the University of Miami (Dr. Marjorie Oleksiak, Dr. Barbara Whitlock and Dr. Kathleen Sullivan-Sealey) shared their expertise and insights.

Two keynote addresses rounded out the symposium. Dr. Helene Muller-Landau of the Smithsonian Tropical Research Institute spoke about "Tropical Forest Carbon Cycles and Global Change," and Dr. Fabián Michelangeli of the New York Botanical Garden spoke about "The Assemblage of Neotropical Forests: A Phylogenetic Perspective."

Fairchild supported the symposium, which was organized by Dr. Ken Feeley, Fairchild research associate and FIU assistant professor of biology, and Dr. Al Uy, holder of the Aresty Chair in Tropical Ecology at UM. This was the fourth event in an ongoing series of symposiums about tropical biology hosted by Fairchild.

The Star Fruit




By Noris Ledesma

The carambola (*Averrhoa carambola*), or star fruit, was introduced into Florida more than 100 years ago from Southeast Asia. In Florida, fruits can be found throughout the year—but the main crop usually matures from late summer to early winter, depending on the cultivar.

Star fruit is the only fruit that can delight you with its star shape. Its taste depends upon its varieties, ranging from very sweet to tart. A ripe carambola is firm and has vibrant yellow skin. The more yellow the skin is, the sweeter the fruit will be.

Carambola generally has a sweet, slightly tangy flavor. Some compare it to a blend of papaya, orange and grapefruit, while others find it comparable to a mix of pineapple and lemon. Ripe carambolas are eaten fresh out-of-hand and are also delicious cooked or juiced, sliced and served in salads, or used as garnish on avocado or seafood. They are also served cooked in tarts and curries. A relish can be made of chopped, unripe fruits combined with celery, vinegar and spices; a refreshing juice may be served on sultry South Florida evenings. In Hawaii, the juice of sour varieties of carambola is mixed with gelatin, sugar and boiling water to make sherbet.

This tropical fruit is a good source of vitamin C, potassium and vitamin A. Here's a recipe that can be served as a complement to any dinner feast. 

Carambola-Cranberry Sauce

(makes about 5 cups)

4 ripe carambolas
 2 1/3 cups orange juice
 2 cups sugar
 1 12-ounce bag cranberries (fresh or frozen)
 2 tbsp. fresh ginger, grated
 2 allspice leaves
 (or several allspice seeds in a cheesecloth bag)
 1 small cinnamon stick
 Agar or arrowroot to thicken

Trim ends of carambola. Set one aside. Slice the remaining three carambolas into 1/2-inch crosswise slices, remove seeds and dice. Combine orange juice, agar or arrowroot and sugar in a large, heavy saucepan. Bring to a boil, stirring until sugar dissolves. Reduce heat and simmer for five minutes, stirring occasionally. Add carambolas, cranberries, allspice, cinnamon stick and ginger and cook until berries begin to pop, stirring occasionally, for about eight minutes. Remove from heat. Allow to cool, then pour into serving dish. Peel away any brownish skin from the remaining carambola and slice into 1/4-inch crosswise slices. Arrange in a decorative pattern on top of sauce. Refrigerate. Serve either cold or at room temperature.

If this sauce is too runny, remove some of the liquid off the top. The liquid is delicious added to seltzer water as a spritzer or to white cabernet sauvignon wine as an easy tropical sangria. It can also be served over pound cake.



Fairchild's own orchid collection, cared for by a small team of volunteers, supplies the blooming orchids on display in front of the DiMare Science Village and The Clinton Family Conservatory. They are also found mounted in the trees along the winding paths in the Rainforest.

Orchid Volunteers

By Georgia Tasker

Photos by Arlene Ferris

Behind all of Fairchild's beautiful orchids are half a dozen dedicated volunteers who share the meticulous work of caring for them at the nearby nursery, as well as the knowledge of the orchids' backgrounds. The orchid collection was moved to the nursery in 2010, when construction began on the DiMare Science Village. Prior to that, the collection was housed behind the old conservatory. Two years later, in 2012, the Garden acquired hundreds of orchids formerly grown in Delray Beach when the American Orchid Society relocated its headquarters to Fairchild.

Now the stanhopeas are suspended above rolling benches; small bulbophyllums growing on plaques of fern are hanging from the sides of a wire bench; rhynchostylis roots reach out in midair and cattleyas sit rather stolidly smug in their clay pots. Care of such a varied collection—which includes slipper orchids, dendrobiums, oncidiums and you-name-it—requires knowledge and patience.

"We do whatever must be done," says Tuesday morning volunteer Ellen Roth, who likes to work to the sounds of classical music. "I don't belong to

The Tuesday team of orchid nursery volunteers, (L-R) Ellen Roth, Sarah Owens, Yonna Levine and David Keil, enjoy sharing their knowledge of orchids with one another. They take care of the orchid nursery and monitor the health of the plants as they get them ready to be put on display at the Garden.





Yonna Levine works in the orchid nursery two days a week and loves caring for these plants. When the orchids bloom she is eager to get them moved up to the Garden as quickly as possible so the visitors and staff can enjoy their fabulous beauty.

(L-R) Saralee Lamb and Stephanie Thorman work in the orchid nursery every Thursday, arriving by 7:30 a.m. to put in a full day of work. Every other week they fertilize, and afterwards begin the pot-washing, weeding and repotting that are essential to the care of any orchid collection.




orchid societies, but in the 1970s, I took orchid classes with [nurseryman and landscape architect] Tim Anderson. I've been working with orchids since." This year, Roth, who was Sen. Bob Graham's South Florida office assistant, gave away her personal orchid collection ("I just gave up," she says.) and decided that Fairchild's babies will serve her orchid addiction just fine.

Team leader Yonna Levine says, "Our mission is to check what's blooming and get the plants ready for display." It's also their job to do what it takes to grow healthy orchids. Levine and her husband moved from Philadelphia to South Florida in 1994. "We were visiting the Garden as tourists and they were looking for someone to do office work. I thought I would apply but the position was already filled and they said 'Why don't you volunteer?'" Levine had no experience growing orchids, so she took orchid classes, joined several orchid societies and is now a 20-year orchid volunteer veteran.

Stephanie Thorman and Saralee Lamb—who traveled to China together last year to work with pandas—have the Thursday morning orchid shift. They fertilize the plants every two weeks and then take up cleaning, grooming or weeding. For several years, Thorman ran a small florist business from her home. A biology major in college, she also works with Fairchild's Million Orchid Project. Lamb, on the other

hand, is an orchid newbie. She took early retirement from teaching and decided to volunteer, following in the footsteps of her mother, who became a volunteer after Hurricane Andrew and was active for many years. "Arlene [director of volunteer services] called me a volunteer in waiting," she says laughing, while using giant tweezers to pull weeds from pots. A referee with the United States Rowing Club, she also volunteers at the Coconut Grove Sailing Club. Calling herself "an avid orchid person," Lamb says, "I love this. It's so relaxing. It's just me and the weeds."

Dr. David Keil is the newest addition to the orchid volunteer team. He and his wife moved here last year from Washington, D.C., where he enjoyed a long career as a dentist. After retiring, he became a volunteer at the Smithsonian Institution's orchid houses and the Dumbarton Oaks research library and museum. His favorite activities: come in early and wash the pots, then transfer overgrown orchids to plaques. He traveled to Brazil several years ago with a group from the Smithsonian to collect orchids, and met the botanical painter Margaret Mee, who is widely known for her exquisite paintings of orchids and bromeliads of the Amazon region. "I love what I'm doing here," he says, "it's a good fit."

Keep up the good work and thank you orchid nursery volunteers! 



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From Krome Ave.: East onto 248th St.; Right onto 162nd Ave.; Right onto SW 256th St. We're at the end on the right.



What's
Blooming
This Spring

Text and photos by Marilyn Griffiths

While exploring our database for plants that flower during the spring, I found a pattern. Many plants in the family Rubiaceae come into bloom in April, May and June.



Hamelia patens



Catesbaea spinosa



Portlandia proctorii



Portlandia platantha



Warszewiczia coccinea

The Rubiaceae is a large family with 611 genera and about 13,150 species, growing worldwide but mostly in the tropics. Fairchild has 362 plants in this family, including 105 species in 43 genera.

In William Lyman Phillips' original landscape plan of the Garden, Plot 24 is designated as the Rubiaceae plot. This long, narrow plot along the north side of the Allée is home to quite a variety of species in this family, including *Catesbaea spinosa*, *Nauclea orientalis*, *Cubanola domingensis* and several species of *Gardenia*.

Many common landscape plants belong to this family, including *Pentas* and *Ixora*. Our native wild coffee, *Psychotria nervosa*, is a "rube," as our living collections manager likes to call them. *Hamelia patens*, our native firebush, is a rube popular as a nectar plant for butterflies and hummingbirds.

A wide variety of flower forms and habits fill out the Rubiaceae. Many of these diverse characteristics are represented in our collections.


Gardenia taitensis, as its name indicates, is native to Tahiti. This large-leaved shrub has been part of the Fairchild collections since 1958, when a cutting was received from a nursery in Hawaii. More recent accessions can be found in Plots 24, 33, 50, 56 and 57a. Look for a large, white, pinwheel-shaped flower.

The genus *Portlandia* is represented by five species in the Garden, all native to Jamaica. Two accessions of *Portlandia coccinea*, one in Plot 25 and one in Plot 43, were collected in Jamaica during Fairchild's 2006 Jamaica expedition. This shrub's deep pink-red flowers stand out against its dark-green leaves. Our *Portlandia grandiflora* near the north end of the vine pergola has an interesting history. We received it as a cutting from a wild-collected plant at Harvard's Arnold Arboretum in 1979. The Arnold received it in 1975 as a cutting from George Proctor, one of our collaborators in Jamaica. It has developed into a stunning large shrub that is often covered with large, white, bell-shaped flowers. The Garden's other *Portlandia* species are *P. platantha*, *P. proctorii* and *P. harrisii*.

Arachnothryx leucocephala (formerly *Rondeletia leucocephala*) differs from the previous species in having a blossom composed of small flowers, similar to *Ixora*. These pink flowers are fragrant and

attractive to hummingbirds and butterflies. The genus name derives from the ancient Greek *arachne*, meaning spider, and *thrix*, meaning hair. Plants can be found in Plots 24, 49 and 57a, as well as in the Wings of the Tropics exhibit in The Clinton Family Conservatory, where they provide nectar for the butterflies.

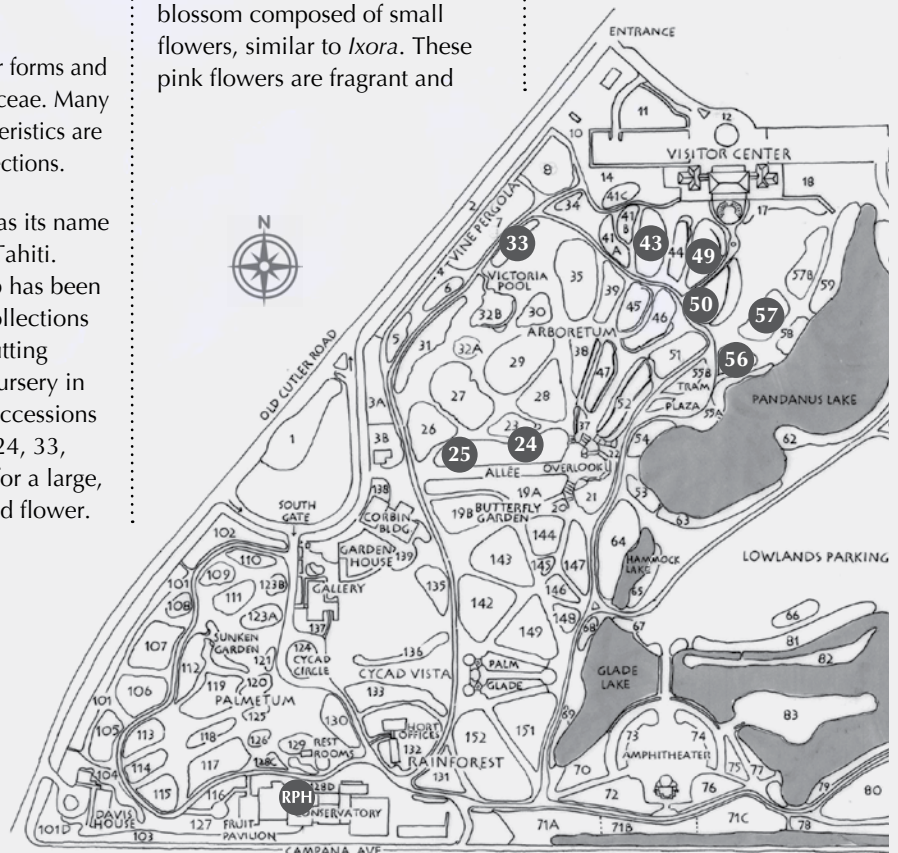
In the Rare Plant House, *Warszewiczia coccinea* explodes with stunning red and yellow-orange inflorescences along its branches. A cultivar, 'David Auyong,' produces double flowers. Native to the Caribbean and tropical Central and South America, this plant must be protected even from the cold of our mild winters. It is highly prized in Trinidad & Tobago.

Look for the family Rubiaceae throughout the Garden to see its variety of plant habit, flower shape and color and fruit type. 

PREVIOUS PAGE
Gardenia taitensis



Visit www.fairchildgarden.org to find the current year's list of flowering plants for each month.



Fairchild is putting the “S” in STEM Education

By Amy Padolf



High school students take a closer look at the Garden’s collection and careers in biological science during the Fairchild Challenge Exploring Environmental Science Day.

During the last five years, it has become quite apparent within Miami-Dade County, and throughout the country, that we face significant educational and environmental roadblocks that affect both formal and informal science education.

A shortage of opportunities for students to participate in authentic scientific research—combined with diminished access to natural areas and a lack of laboratory resources within our schools—has caused students to be less prepared for college-level science courses, and thus less-prepared for careers in STEM (Science, Technology, Engineering and Mathematics) fields. It is a perfect storm with cyclical implications, and Fairchild is helping counter it. Armed with our world-renowned K-12 science education programs (which draw the majority of their students from groups that are traditionally underrepresented in the sciences), a tradition of solid local and international conservation research and support from Miami-Dade

County Public Schools (MDCPS), Fairchild now has an opportunity to greatly enhance science education and identify and encourage talented young scientists.

Why now?

As technology plays an ever-increasing role in societies, individuals must be able to make informed decisions regarding scientific issues that affect their personal lives, the well-being of their communities and national issues such as health care and energy policies. According to a 2002 National Science Board report, though, “in the United States, the general level of understanding of basic scientific concepts and of the nature of scientific inquiry may be insufficient for the average citizen to be able to make informed decisions.”

Economically, a strong STEM workforce is becoming increasingly important for our nation’s economy, infrastructure and environment. America’s education agenda is focused on an urgent need for a population that is more STEM-literate and prepared for scientific careers. However, one of our nation’s major challenges is finding tools to encourage diverse populations to pursue STEM careers, particularly in fields related to the environment.

According to a 2010 report by the National Science Board, approximately 30% of US college freshmen start their academic career with the intention of completing a degree in STEM. Only a small portion of these students pursues and completes their STEM degrees in five years. Armed with this knowledge, our focus is to increase student success and involvement in STEM at the primary and secondary levels in order to facilitate greater success rates at the post-secondary level.

Locally, South Florida students have traditionally experienced limited training in science and had little exposure to careers in environmental sciences. Starting with early childhood education, young children are afforded few opportunities to systematically and thoughtfully learn science. On average, less than 10% of instructional time is spent teaching science in the early grades. Science instruction occurs sporadically and the science activities teachers use in early science instruction tend to inhibit inquiry and reflection on the part of young children.



Students collecting DNA samples.
Photo by Benjamin F. Thacker

Fairchild's Approach

At Fairchild, we have taken a unique approach of integrating our science and education while meeting the growing needs of our community. We have found that, by combining the history and strength of Fairchild's research, the wide-reaching success of our education programming, the magnitude of our partnerships and the power and passion of our community, we can change how informal educators look at educating the next generation to encourage careers in STEM fields.

There are plenty of examples.

Creating New Initiatives

BioTECH @ Richmond Heights: MDCPS's new conservation biology high school that hosts Fairchild's botany magnet program. This one-of-a-kind botany-intensive high

school magnet program was conceived as a significant path for students who have or can be encouraged to have an interest in botanical science. This year marks the inaugural class of nearly 140 freshmen from across Miami-Dade County. Outfitted with a state-of-the-art micro-propagation lab, the school facilitates student contributions to Fairchild's Million Orchid Project. Plus, the curriculum has built-in research opportunities within our collection.

Leveraging our Existing Programs


Conservation efforts have been integrated into The Fairchild Challenge, through which micro labs are being set up in high schools around the county to conduct botanical research. Similarly, in the Explorer Field Studies field trip programs, elementary students are planting rare native pine pink orchids to be taken back to their schoolyard later.

Involving our Community

We have also found that our graduate students' research naturally integrates into every aspect of our educational programming. We have looked to collect data through crowd sourcing or citizen science to feed usable and practical data into our graduate students' ongoing research at a level beyond what one person could gather. Currently, we have 30 high schools and more than 50 middle schools collecting important data that is feeding into and helping direct Fairchild's research efforts.

Beyond the School Year

In order to keep the momentum, we have developed opportunities for high school students to continue building their research portfolio through summer internships. This year, these students will work with our graduate students, staff and volunteers in our DNA lab to develop primer notes on several important Garden species, which will be publishable in scientific journals.

At Fairchild, it's always been a priority to find ways of getting our community involved. We now know that by combining all of our efforts, we can have a greater impact that will allow us to get ahead of the educational roadblocks and put the "S" in STEM. 



EXPLORING

Colombian Biodiversity in the Western Andes

An Ecuadorian Sylph,
Agelaiocercus sp.

Text and photos by Georgia Tasker



La Mesenia, Antioquia, Colombia. By van, jeep, mule and foot we travel to this hummingbird reserve in the Western Andes.

Dr. Stuart Pimm, Doris Duke Professor of Conservation Ecology at Duke University, is leading our trip. He characterizes the Western Andes as having “the richest biodiversity in the world.” A moss-draped cloud forest tops the ridge of the reserve, and the steep climb to the top is astoundingly beautiful, on a trail traditionally used by Colombians walking from one side of the mountains to the other. Twenty of Colombia’s 162 species of hummingbirds hover and flit here, with species changing by elevation. Mosses glisten, bromeliads shine and gesneriads twinkle from the forest floor.

The biological richness, says Pimm, may be explained by this: Isolated for millions of years, South American plants and animals became distinct. When the Isthmus of Panama connected North and South America 4 million years ago, temperate species began to move south and southern species began to move north. Hummingbirds, for example, developed in South America, while tanagers (the bird family Thraupidae) evolved in North America. Today, hummingbirds have moved their range north, while tanagers have flown south. In Colombia they mix well.



It is a forest full of some 329 species of birds, 16 of them threatened with extinction. It is also home to the newly discovered mammal, the olinguito, which resembles a cross between a teddy bear and a possum. Students working on their doctorates here have discovered six new beetles that pollinate aroids. A new species of frog and two new arboreal lizards live here as well.

The forest is surrounded by degraded pastures that often experience landslides due to the 120 inches of rain that fall here annually. They’re in disconnected patches—yet the patches can be reconnected and the process is underway.

TOP
(L-R) Purple throated woodstar, empress brilliant and white necked jacobin

LEFT
Dracula orchid



ABOVE
(L-R) Gustavo Suarez, Luis Mazariegos
and Dr. Stuart Pimm

BELOW
Looking at the dense growth

Three mountain ranges dissect Colombia, and it is the only country in South America with shores on both the Pacific and Atlantic oceans. About 1,500 plant species are endemic to the country, with habitats that vary from mangroves to cloud forests to the Amazon basin; about half are listed as threatened or endangered.

The Colibri Hummingbird Reserve

The Colibri hummingbird reserve covers 3,000 hectares; another 2,000 hopefully are to be added. Its story is serendipitous. For one thing, guerillas heavily impacted the area for many years, so few people ventured up its slopes and many farmers abandoned their homes, allowing forests to initiate regeneration. But Gustavo Suarez, a *campesino* (rural farmer) working on a fire and rescue team, grew up in the area, teaching himself to identify the birds, learning their sounds as well as their Latin names. Suarez



discovered the olinguito, a nocturnal fruit-eater that roams into Ecuador as well. He also found a

hummingbird so rare it was thought by many ornithologists to be an ephemeral hybrid, or possibly extinct as it was known from a museum specimen only. Hummingbird photographer Luis Mazariegos wanted to photograph the hummingbird Suarez had found. An American-educated Colombian, Mazariegos's work has been published in *National Geographic* as well as in his book, "Hummingbirds of Colombia." Mazariegos also is president and CEO of LAM, a biopesticide company located in Montana that sells products in 30 countries.

After he came to the area and met Suarez, Mazariegos set up the Hummingbird Conservancy (Fundación Colibrí) in 2005 to buy the land. "I looked at the whole thing and was sold 1,000 acres for \$70,000, with two years to pay," says Mazariegos, retelling the story in the two-story research station he constructed. "We started getting the community involved, building good relationships. Uriel Rendon had hunted throughout the area and he now is a guard. People started coming to us, offering land for sale. I had the means, and started building a credible conservation project."





Epidendrum schistochilum

In 2006, Pimm entered the picture here. That year, he received the A.H. Heineken Prize for Environmental Science, given by the Netherlands for his research on species extinction and conservation. The monetary award allowed him to set up a non-profit organization called Saving Species, which works to reconnect and replant forest fragments in highly diverse areas in order to help species conservation. Knowing the enormity of diversity in the western Andes, Pimm called his college roommate, Dr. Jorge Orejuela Gartner, for suggestions about projects. Orejuela is a biologist who works to identify and establish conservation areas. He is director of Colombia's Cali Botanical Garden, and recently published "Orchids in the Mist," about orchids in the cloud forests of southwestern Colombia. Orejuela knew of Mazariegos' Hummingbird Conservancy (he documented 70 orchid species there while working on his book) and put Pimm and Mazariegos together.

Using GIS (geographic information system) technology and studying biological hotspots in the world, Pimm's Saving Species solicits grants to make land purchases. Beginning in 2012, Mazariegos' Hummingbird Conservancy and Saving Species outlined two additional parcels to purchase for the reserve, with only \$21,000 left to raise.

Yet, this story is as many-layered as the tropical forest. A part-time Key Largo resident, Pimm also was on the board of Florida Keys Tropical Research Ecological Exchange (TREE) Institute, which planned our trip to Colombia and has led scores of trips to Cuba to research medicinal plants. The Cuba trips have helped pay for scientific exchanges there. This first Colombia trip, which we joined, was designed to show the country's richness as well as to raise money for the reserve.

Working with Pimm, the TREE Institute decided to showcase the town of La Mesenia as well as the Rio Blanco

ecological reserve near Manizales, owned by the local water company. The Rio Blanco reserve, also a birders' magnet, has surrounding pastures awaiting restoration. The 11-day trip also included a private arboretum and the botanical garden in Bogota.

Flora and Fauna of the Reserve

As we walked and rode mules to the new research station, we passed several people—all of whom waved and greeted us. "There are no signs here, and they appreciate what we are doing—conserving the area and the water," says Mazariegos. The water is the Rio San Juan Antioquia watershed, which is at the mountaintop.

For our trip to La Mesenia, Pimm has brought a satellite image of the area, and helps Mazariegos set up a GigaPan (panoramic) photograph to document how much regrowth has occurred around the research station and to record future growth. During the last two years, tibouchinas have appeared around the station and are a good 15 feet tall. Hummingbird feeders perched in the trees were surrounded by student bird watchers trying to photograph them as we arrived.

In the surrounding forests, miniature *Stellis* orchids quietly hang out their tiny blooms on the thinnest of spikes. *Pleurothallis* orchids are at their most numerous in this part of the world, setting their small flowers at the top of their leaves. *Masdevallias*, too, are among the riches, as well as species of *Habenaria*, *Epidendrum*, *Oncidium*, *Scaphyglottis* and *Restrepia*. And just behind the station is an orchid walk ascending into the forest where a gorgeous *Dracula* orchid is open.

Long fuzzy heliconias and slender upright heliconias attract hummingbirds with two distinctly different flowers as they loom among the anthuriums. Centropogons, with tubular red flowers, also provide nectar



ABOVE
Riding through degraded pasture

BELOW
Golden tanager, *Tangara arthus*



for hummers. *Symbegonia sanguinea*, which looks for all the world like a gesneriad, nestles in sphagnum moss, offering another red flower, this one fuzzy. This, says California University of Pennsylvania begonia expert Dr. Mark Tebbitt, is among the group of begonias being reclassified by one of his Colombian graduate students for a doctoral thesis; soon it should bear a new name, *Begonia kalbreyeri*.


Just five years ago, aroid specialist Tom Croat discovered 15 new anthuriums and five new philodendron species in these western mountains.

Insects are equally as colorful. We watch a wasp feed on a spider on our hike up to the station, and then find a wildly colored blue and orange carnivorous insect higher in the cloud forest. Beetles come in jade green or black with yellow spots, and decorative stinkbugs are geometrically marked.

After we ascend the ridgeline of the western Andes, we have one more vertical climb, to an area where Mazariegos set up hummingbird feeders the day before to attract many of the numerous species found here. A favorite: the collared Inca, black with a white collar, which a pundit insists

should be called saddle shoe, and is the most readily identified by us non-birders. All around us, the emerald, turquoise and tourmaline birds are jewels in the air, flitting and buzzing, giving fits to those of us trying to photograph them. It's not a bad way to spend an hour.

But contemplating the beauty before us does not keep us from contemplating the predictions of species extinctions in the coming years. Pimm and Dr. Peter Raven, director emeritus of the Missouri Botanical Garden, calculated that 18% of the species in highly diverse hotspots will become extinct "if all the remaining habitats in hotspots were quickly protected." Moreover, the two scientists wrote, "Unless there is immediate action to salvage the remaining unprotected hotspot areas, the species losses will more than double."

For more information on restoring habitats and donating to Saving Species, go to SavingSpecies.org. For more information about the Florida Keys T.R.E.E. Institute, its work in Cuba and future trips, go to FKtreeinstitute.org and cubajourneys.org. 


CONSERVING

RUNNING FOR THEIR LIVES

A Unique Assisted Colonization Experiment
for Orchids in Southwest China

Text and photos by Jason L. Downing



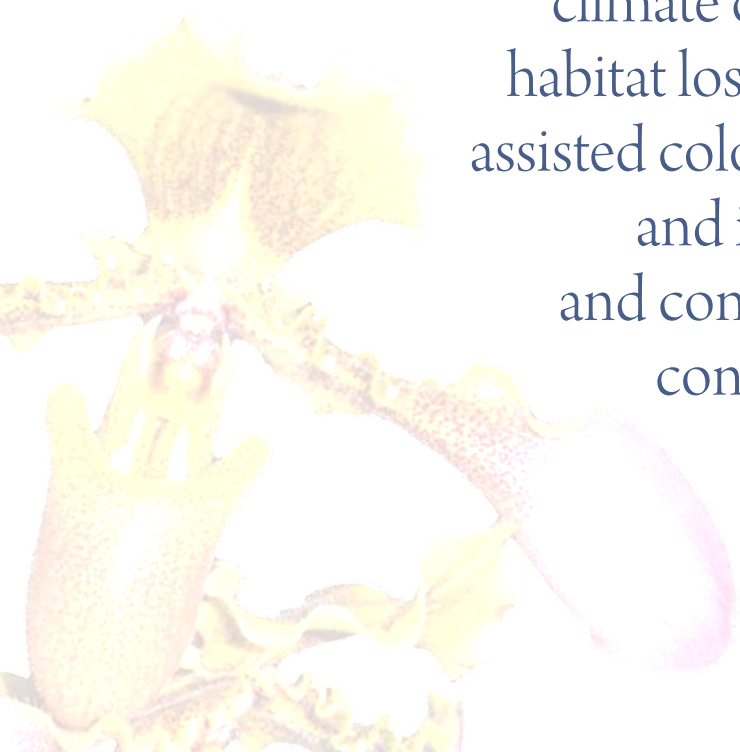


As I looked out the bus window, the endless expanse of green and blue was surreal, free from modern obstructions. Otherworldly limestone pinnacles, each one different from the other, were shrouded in mist and covered with lush tropical vegetation. The next mountain pass revealed a hidden valley and a small village with rice patties being tended by farmers and their water buffaloes. It was hard to believe—I was really in China.

As part of the National Science Foundation's East Asian Pacific Islands Summer Institute Program, I spent two months this summer studying orchids in Southwest China. The region is a world orchid hotspot, with several hundred native species (in comparison, Florida has 87 species, about half of the U.S. total). Orchids have been prized in China for thousands of

years, primarily for use in traditional medicine. (See "Preserving Edible Orchids in China," by Hong Liu, Ph.D. in the Summer 2014 issue of *The Tropical Garden*.) But there, as in other parts of the world, orchids face uncertainty from habitat loss and climate change. As a Fairchild graduate fellow, I work to restore some of Florida's rarest native orchids, so the opportunity to participate in orchid conservation in this special region was a dream come true.

In 2006, the completion of the Longtan Reservoir Hydro-dam inundated low elevation areas along the Hongshui River in Guangxi Province. In response, people moved dozens of species of wild orchids to a higher elevation site in the nearby Yachang National Orchid Reserve. My advisor, Fairchild Research Ecologist and Florida International University Professor Dr. Hong Liu, has been a major part of the Yachang Reserve conservation program since its inception.



Humans' movement
of species beyond
their natural ranges
in response to
climate change or
habitat loss is called
assisted colonization,
and it is a new
and controversial
conservation
measure.

Translocated orchids at
Yachang Reserve

Humans' movement of species beyond their natural ranges in response to climate change or habitat loss is called assisted colonization, and it is a new and controversial conservation measure. As a consequence, the debate around assisted colonization as a viable conservation method has been largely philosophical and hypothetical. The formation of the Longtan Reservoir provided a unique and rare opportunity to evaluate the feasibility of assisted colonization for orchids.

My task was to examine the changes, if any, in the mycorrhizal fungi associations of the orchids that had been moved. Because all orchids require these fungi in order to germinate and grow, understanding the dynamics of these plant-fungus associations will be critical to orchid recovery efforts. In the context of climate change, it becomes even more urgent to understand how range expansions can influence these, since global changes may have the most impact on populations that are heavily dependent on other organisms. Mycorrhizal fungi and plant interactions are among the most important of these vulnerable relationships. We chose to focus on four translocated species with different ecological niches: two lady slipper orchids—*Paphiopedilum hirsutissimum* and *P. dianthum*—that have wide elevation ranges and *Cymbidium bicolor* and *Geodorum eulophioidae* that have narrow elevation ranges. Particularly





(L-R)
Shan Wong, Dr. Hong Liu,
Jason Downing and a local
ranger at Yachang
Orchid Reserve



Lady Slipper Orchid
(*Paphiopedulum*
hirsutissimum) at Yachang
Orchid Reserve

important to our study was *G. eulophiodae*, which is among the rarest orchids in the world. At Yachang Reserve, the orchid diversity and population sizes are truly astounding, exemplified by dense stands of lady slipper orchids that blanket the limestone cliffs and form a spectacular and inspiring sight.

To begin our research, we collected DNA, root and soil samples for each species from existing natural populations throughout Guangxi Province, and from the translocated populations at Yachang Reserve. This fieldwork in steep and muddy mountain rainforests was extremely challenging, and would not have been possible without the help of fearless local rangers, Liu, FIU undergraduate Shan Wong and two Chinese Academy of Sciences graduate students, Wang Xilong and Jessie Han. Due to the sensitive nature of the samples, a long day of tough fieldwork was often followed by a bus ride through the night to deposit the samples in a deep-freeze refrigerator at Guangxi University. Working in such remote areas and interacting with the local people proved to be a life-changing experience.

After the field sampling, I traveled to Xishuangbanna Tropical Botanic Garden (XTBG) in neighboring Yunnan Province, where I

stayed for the last month to begin the lab work. Located on 2,780 acres (1,125 hectares) near the Myanmar Border, XTBG is a world-class research institute and botanic garden, with more than 13,000 tropical plant species in its collection. Using DNA and microbiological techniques, we screened the root and soil samples to identify the types of fungi the orchids at the translocated site were using, and to determine where in the surrounding environment the beneficial fungi are located.

These results offer a guide to the best locations and microhabitats to target for future introductions, as well as to which species are the best candidates for translocation. We were also able to culture fungus from *G. eulophiodae*; if this fungus is capable of germinating the seeds, it can go a long way toward the long-term preservation of this species through ex-situ propagation and re-introductions. Currently we are identifying the fungus using DNA sequencing techniques at Fairchild.

My time spent in China not only provided a rewarding research experience, but also allowed me to better understand Eastern culture, broaden my perspectives on conservation and build vital relationships with Chinese counterparts and other botanic gardens. 



LEAF

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Saturday and Sunday, May 9 and 10
Saturday and Sunday, May 23 and 24

LEAF is free for Fairchild members and is included with Garden admission. Registration is not required. It is open for children of all ages, but parents/guardians must accompany children at all times.

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lianas

the silent
competitor

By Belén Fadrique



While Tarzan has shown us lianas are useful for jumping from one tree to the next, there are a lot of other interesting things about their biology—and they are much more crucial in forest dynamics than most people believe.

When people ask me about my research and I say that I study “lianas,” they usually have no clue what I am talking about. When I tell them that lianas are woody vines, they almost invariably mention or make an impression of Tarzan. While Tarzan has shown us lianas are useful for jumping from one tree to the next, there are a lot of other interesting things about their biology—and they are much more crucial in forest dynamics than most people believe.

Lianas need trees to support their weight and help them climb all the way up to the canopy. But contrary to common perception, lianas are not direct parasites; they uptake water and nutrients from the soil. In fact, the roots of lianas can be up to eight times longer than their visible above-ground stems. Lianas do, however, use the structure that trees provide to climb to the canopy and expose their leaves to the sun. In fact, liana species present distinct climbing mechanisms that can be used to classify them as stem-twiners, branch-twiners, tendril climbers or spiny species. When they arrive at the canopy, lianas spread their leaves on top of the tree crown, partially or totally shading the tree leaves. Next time you are strolling through Fairchild, find a liana and try to follow its full length with your eyes; if you don’t lose it, you will probably see its messy crown lying on top of a tree crown. This is a crucial interaction between lianas and their environment, where, by shading tree leaves and outcompeting them for light, they can decrease tree growth.

I tested this hypothesis during my graduate studies in the south of Ecuador. I studied where lianas occur and their contribution to forest biomass in the Andes, at altitudes from 1,000 meters up to 3,000 meters. In a sample of more than 50 study plots in these “premontane,” “low montane” and “upper montane” forest habitats, I measured liana and tree sizes and recorded which trees supported lianas. As the trees had already been measured years before by other

PREVIOUS PAGE

Liana stems connect distant areas of the forest; they can measure up to 500 meters.

TOP

Lianas, on their way to the canopy, can create really intricate structures—which make them very difficult to measure.

NEXT PAGE

Trees and lianas normally become attached when they are young and both plants grow together. That is why we normally see big trees holding big lianas.




scientists, I was able to compare tree growth of liana-infested trees versus liana-free trees. As predicted, the liana-free trees grew faster than did trees with lianas. Lianas also increased tree mortality due to physical damage, such as broken branches, caused by all the weight they piled on top of the trees. Only a small fraction of the carbon dioxide released into the atmosphere as a result of the decreased tree growth and increased tree mortality is compensated for by the growth of the lianas themselves. Consequently, greater liana abundance leads to reduced carbon storage in these forests.

Many studies have reported that both abundance and size of lianas are increasing in tropical forests worldwide. This increase is probably due to the rise in atmospheric carbon dioxide concentrations and climatic change. This is because higher temperatures, enhanced seasonality and decreased rainfall favor lianas—as they generally perform better than trees do under these dry conditions. Lianas may also be increasing in abundance because of disturbance: they are well-adapted to grow on degraded areas and can quickly colonize and dominate tree fall gaps or other cleared areas, with some liana stems measuring more than 500 meters long.

Given lianas' increasing abundance and strong effect on forest function, we clearly need to be able to estimate liana abundance in tropical forests and monitor their changes through time. There are several permanent forest-monitoring plots around the world where scientists carry out liana censuses every year—measuring, recording and tagging every liana stem so they can track individual performance and community-wide changes. But monitoring plots can clearly cover only a limited amount of forest. As such, there is a strong emphasis on developing remote-sensing tools that can be used to monitor lianas. One state-of-the-art technology that holds a great deal of promise is based on laser-imaging detection, which makes it possible to obtain very high-resolution aerial images of forested areas from airplanes or even unmanned drones.

I previously helped to develop this new remote sensing system for liana research as part of an internship in Barro Colorado National Monument in Panama. In order to perform an accurate computer analysis of the laser images, we first needed to “train” the computer to distinguish between the different spectrums of light reflected by trees and the light reflected by lianas. With that aim, our team went into the field every day in order to find the trees that had been previously selected from the images. Once they were identified, we estimated liana coverage from the ground by looking with binoculars and calculating percentage of liana coverage; this estimation was then fed into the computers. This was a demanding job, as looking through binoculars at the crown of 40-meter-high trees quickly strains the neck. Lianas are not an easy system to study.

Due to the difficulties inherent in studying lianas and the general lack of background knowledge about their biology, lianas have generally been ignored in most studies of tropical forests and their place in the carbon cycle. Now that we have realized the important effect that lianas have and the functions that they serve, we are rushing to understand their complex dynamics and their role in determining the future of these rich ecosystems. 

Belén Fadrique is currently enrolled in the doctoral program at Florida International University, where she works with Dr. Ken Feeley, Fairchild research associate and FIU assistant professor of biology. For her master's thesis, Fadrique studied liana distribution along an altitudinal gradient in the Ecuadorian Andes. She is concerned about how global change will affect species interactions and how communities will respond.

PLANT COLLECTIONS

The Bamboos OF FAIRCHILD

Text and photos by Marilyn Griffiths



Dendrocalamus minor
var. *amoenus*

April 9, 1935.
 Introduced for Department specialists
 10509. ARUNDINARIA AMABILIS McClure
 Poaceae.
 A bamboo with erect cylindrical culms usually 20 feet high, rarely 40 feet, and near-lanceolate leaves about a foot long, probably of garden origin.
 10510. BAMBUSA TULDOIDES Munro.
 Poaceae.
Chang ko chuk. A thick-walled, straight bamboo of the sympodial type cultivated for its culms which in established clumps are 24 feet high and about 5 inches in circumference. It is one of the most important economic crops in this part of China.
 For previous introduction see 80875
 10511. PHYLLOSTACHYS sp. Poaceae.
 10512. SCHIZOSTACHYUM FUNGHOMII Clure. Poaceae.
 A cultivated clump bamboo, native to southern China, with erect culms up to 10 feet high and about 3 inches in diameter.

Plant inventory data from the USDA Plant Introduction Office

The bamboos are the largest and most diverse member of the grass family—a family that researchers estimate is between 70 million and 80 million years old. Ninety-one genera and more than a thousand species make up the tribe Bambuseae of the family Poaceae. Species of bamboo range from the slender-culmed (a culm is a stalk, the stem of a bamboo plant that emerges from the underground rhizome and bears branches), tightly clumping *Thyrsostachys siamensis*—monastery bamboo; to the giant stands of *Dendrocalamus asper*—one of the timber bamboos.


Dr. David Fairchild was one of the early pioneers in the effort to bring bamboos to the United States. In the early 1900s he was instrumental in creating the U.S. Department of Agriculture’s Barbour Lathrop Bamboo Garden, near Savannah, Georgia. During his trips to Asia, he had seen bamboo’s many uses in construction and woven products. Seeing the commercial potential for this tropical, easily grown plant, Fairchild persuaded the USDA to invest in its growth and study.

Today bamboo is used for flooring, textiles and even beer! Its natural beauty provides ample opportunity for creating decorative and useful objects. As we have come to see that our natural resources are not infinite, bamboo is filling the need for a sustainable source of timber. Clusters of plants can be thinned, removing the larger culms and leaving the plant to produce new ones.

In the spring of 1992, noted Miami landscape architect Raymond Jungles created a design for a bamboo garden that was planted in the Fairchild Lowlands area. Despite a setback by the storm surge from Hurricane Andrew, this garden has thrived. More species have been planted, and Dr. Fairchild’s dream of a green tunnel of arching bamboos has almost come true.

Our current collection holds six genera of bamboo: *Bambusa*, *Dendrocalamus*, *Gigantochloa*, *Guadua*, *Neohouzeaua* and *Thyrsostachys*. All are Asian except the *Guadua*, which is native to South America.

In Plot 71b, south of the Amphitheater, *Bambusa tuldoides* has survived the vagaries of the weather. The Garden acquired it from the Savannah garden in 1943 and planted it the same year. Lingnan University in Canton (now known as Guangzhou), China, gave it to the USDA in 1935—as can be seen in this page (left) from the original plant inventory data from the USDA Plant Introduction Office, which Dr. Fairchild created.

The bamboo garden fills Plot 159 in the southeastern area of the Garden. Here and across the tram road in Plots 157 and 156a, 40 beautiful specimens of bamboo can be found. Stroll among the large clusters, beneath towering and arching culms, and listen for the distinctive clicking sounds as the bamboo sways in the breeze. 





Florida's Early Naturalists:

Dr. John Kunkel Small

Racing against canal builders and developers, the color-blind botanist recorded Florida's natural environment and worked to preserve it.

By Georgia Tasker | Photos: Fairchild Archives



He saw the beginnings
of substantial changes
and “set out to record
what he could of
the way the land
had been.”

—Biologist Dan Austin

PREVIOUS PAGE

Crocodile Hole, a small bay along Indian Creek. Here the crocodile was first found in North America in the last quarter of the 19th century.

Photo by J. K. Small.

ABOVE

The same spot in 1927. “On sandy dunes adjacent to the mangroves now buried under a layer of marl and sand, formerly grew rare and showy plants....”

Photo by J. K. Small.

Five men in a small boat called the Barbee headed to Cape Sable on the southwest tip of the Everglades in the spring of 1916. They waited out a fearsome storm halfway to the Cape, but once they found Cuthbert Lake, “we were introduced to a strange new world,” wrote Dr. John Kunkel Small. “Not only orchids and bromeliads, but large cactus plants as well grew everywhere on the trunks of both dead and living trees.”

Because the channels in the area were “tortuous” and impeded by snags, he wrote “we had to either lie down in the boats in order to save our heads or to get out and pull the boats over the snags. ... After securing as many palms and orchids as we could carry in our small boats through the creeks and lakes, we started on the way back to the Barbee.”

Small, taxonomist and curator of the New York Botanical Garden’s museum and herbarium, recorded these details in the *Journal of the New York Botanical Garden*, as he always recorded plant explorations in South Florida. His work here spanned three decades. Considered to be in the pantheon of eminent South Florida botanists, Small did not drive a car and depended on others for transportation. More challenging for him was his sight: he was color-blind.

Botanist Edgar Wherry noted Small’s color-blindness in a 1957 reminiscence written for the Southern Appalachian Botanical Society. When the two were on a trip to Louisiana, “We would pass colonies of bright red *Clinopodiums* (now *Calamintha coccinea*, showy basil) ... and to him they looked gray so that he would not see them until some morphologic feature became evident.” In reading Small’s travel accounts, there is no indication of difficulty with color, but it may be that his driver or colleagues described colors for him. That is what Wherry wrote that he did for the Louisiana iris, a flower which Small loved and which he is reported to have saved from extinction: As swamps were being drained, he collected and distributed iris seeds.

During his lifetime, Small, who brought his wife Elizabeth and their four children to Florida for collecting trips, amassed an impressive 60,000 plants. His doctoral thesis was the “Flora of the Southeastern United States,” published in 1903, and revised in 1913 and 1933. From 1927 to 1931, he worked with Thomas Edison in a search for rubber-producing plants.



LEFT
Pinelands near Hattie Bauer hammock, Dade County. Clearing land. Pine trees pulled out by the roots and piled up for burning! January, 1916.
Photo by J. K. Small.

BELOW
This *Cyrtopodium punctatum* is a famous orchid similar to those found by the 1916 expedition.
Photo by Georgia Tasker/FTBG

Collaborating with Charles Deering

Charles Deering, retired chairman of International Harvester, funded Small's 1916 expedition on the Barbee to Cape Sable. Deering was an art collector, intellectual and lover of the natural world. After his retirement from industry, he built homes in Spain and Florida, where his brother James was building Vizcaya. Charles Deering's first Florida estate was in Buena Vista, today called Bay Harbour. In 1913, he began purchasing parcels of land farther south, including a hammock, pineland and waterfront to develop what today is the 444-acre Deering Estate at Cutler. It took him 13 years to assemble all the lots. He called on the New York Botanical Garden for advice while developing the property.

"Small was assigned to look into the matter," Wherry wrote in his reminiscence for the Southern Appalachian Botanical Society. "His genial manner and robust wit made such a hit with Deering that ... until [Deering] died he never had to worry about obtaining funds for travel." Deering provided the Barbee, boat captain Paul Matthaus, a truck and driver that Small called the "weed wagon," plus money for photography as well as publication of Small's papers. Small turned in expense reports annually. (1916: \$146.10 for exploration in southern Florida; \$96.60 transportation

N.Y. to Miami and return, including baggage; Subsistence en route: \$4.30.) Both men felt they were racing against canal builders and developers to save the natural environment, and an urgency to record what was here stimulated the pace of Small's work. Early in 1915, Small wrote to his benefactor that Florida "comprises the least disturbed region of concentrated natural vegetation, so to speak, in the United States. Unfortunately, Key West of the Florida Keys and the Miami-Homestead region ... have been seriously devastated."

During that 1916 Lake Cuthbert adventure that Deering financed, the men—including Miami nurseryman John Soar, boat captain Matthaus and Lemon City naturalist Charles Torrey Simpson—also went to Coot Bay. "The day turned out to be the greatest orchid-hunt in which any of us have ever participated. Unless some richer orchid locality is to be discovered in Florida, and this is possible, this [Snake] hammock is the most marvelous natural orchid garden in the United States," Small wrote.

Small went on to direct development of Deering's Buena Vista grounds (where he created an extensive cactus collection) and the Cutler estate, which he called a reservation. He sent his papers to Deering for approval, and came to Florida at least once a year.



“...this reckless, even wanton devastation has now gained such headway that the future of North America’s most prolific paradise seems to spell DESERT.”

—J. K. Small in “From Eden to Sahara: Florida’s Tragedy.” 1929

Charles Deering had converted the Richmond Inn on the grounds of his Cutler estate into a home, and Small lived in a second-story room when he was there. Today, that room is named the John Kunkel Small Room.

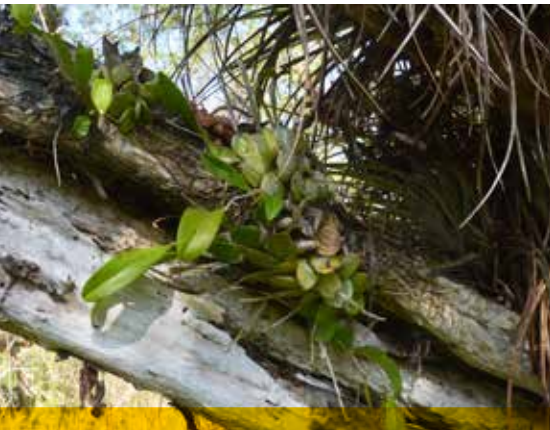
Dr. Brett Jestrow, keeper of Fairchild's Herbarium, has provided the museum with replicas of several of the herbarium pages Small made for Charles Deering (the originals are now housed in Fairchild's Herbarium), as well as an old-fashioned plant press, similar to the wooden presses used in that era.

Dr. David Fairchild had known Charles Deering before Small met him, and tried to persuade the industrialist that his Cutler property would make a wonderful arboretum. But, while Deering had donated a small parcel in Buena Vista for Fairchild's first plant introduction garden, he rebuffed Fairchild's request for the Cutler property. He decided to save the hammock and pineland—even building a fire extinguishing system among the evergreen tropical trees.

Eventually, Small became so distressed about the destruction of natural South Florida that he wrote a 1929 book called "From Eden to Sahara: Florida's Tragedy." The Index Herbariorum: A Global Directory of Public Herbaria and Associated Staff, claims that this book

sparked the movement for conservation of Florida's wetlands, which eventually resulted in the formation of Everglades National Park. That is something of an overstatement, to be sure, but Small was a seminal figure in understanding the region and in urging its conservation. A great credit must also go to Deering for his support. The two men had a close working relationship over the years, with innumerable letters exchanged between them. The tone of their correspondence, while formal, grew friendlier as the years went on. When, toward the end of Deering's life, he was quite ill, Small wrote him several letters a week or even daily. Small named plants for Deering, such as *Cyperus Deeringianus*, *Sabal Deeringiana* and *Cephalocereus Deeringii* (a cactus from lower Matecumbe Key). Few of those names stand today, and botanist Gleason wrote that during Small's lifetime, he was known to be a "splitter," creating new species without considering various forms or subspecies that might occur from growing conditions.

Because of Deering's interest in birds, Small once went to the Museum of Natural History and arranged "or think I have arranged, to have specimens of the smaller birds sent to you in installments of say one to two dozen each, for study. This is the only way to learn them."



ABOVE
Encyclia boothiana in present-day Snake Hammock.
Photo by Georgia Tasker/FTBG

RIGHT
The mule-ear orchid, *Trichocentrum luridum*, once grew abundantly in Snake Hammock, where Small photographed it in 1916.
Photo by J. K. Small.



Small the Man


Born and educated in Pennsylvania, John K., as he was called, went to Columbia University for his doctoral degree, studying botany under Nathaniel Lord Britton. When Britton went to direct the nascent New York Botanical Garden, Small followed.

"He was short, heavy-set, with a stern face which became deeply lined in his later years," wrote fellow NYBG botanist Henry Gleason. Small "had a gruff voice which always sounded as if he were in an argument of some kind." Edgar Wherry wrote that Small never wore a hat outside and his fiery red complexion occasionally aroused suspicion of alcohol addiction, but that Small avoided "all stimulants," even condiments such as mustard.

A short biography of Small on the NYBG's website notes that he played the flute in the New York Philharmonic. He encouraged his four children to learn two different musical instruments each, and "many an evening after dinner there would be a family concert for a couple of hours, after which work on plants could begin," Wherry said.

Small's first trip to Florida was made in 1901. "He covered the state thoroughly, collected extensively, and just in time to keep ahead of the great destruction of natural vegetation there by agriculture, grazing, town building and fire," Gleason wrote.

Small left a priceless photographic legacy. Many of his black-and-white images are found on the state's website, Florida Memory. He captured images of the once-famous pond apple forest south of Lake Okeechobee, of the cypress and oak hammocks of the lake's east shore. He photographed Seminoles at their villages and the Paleo-Indian middens that once dotted the east and west coasts, including the large one at Indian Creek. Often using a machete for scale in his pictures, Small was partial to limestone sinks and their ferns. He photographed baby burrowing owls on his jacket so their cryptic feathers would be clearly visible. He seems to have photographed any snakes he came across, including cottonmouth moccasins ready to strike.

The late biologist Dr. Dan Austin, once a professor at Florida Atlantic University, was one of four authors of "The Florida of John Kunkel Small," published in 1987. He said Small saw the beginnings of substantial changes and "set out to record what he could of the way the land had been." Austin calls Small's travelogues "ethnohistoric documentation of a changing landscape. ... They are notes written by an astute field biologist and biological historian." 

"He covered the state thoroughly, collected extensively, and just in time to keep ahead of the great destruction of natural vegetation."

—Henry Gleason

BELOW (L-R)

Young Florida burrowing-owls, removed from a burrow eight feet long, on Indian Prairie, west of Lake Okeechobee, De Soto County, Florida. May, 1917.

Photo by J. K. Small.

J. K. Small



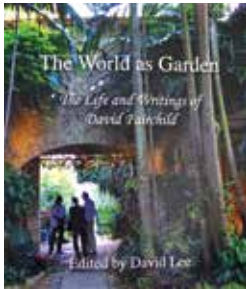


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Garden Inspiration

By Erin Fitts



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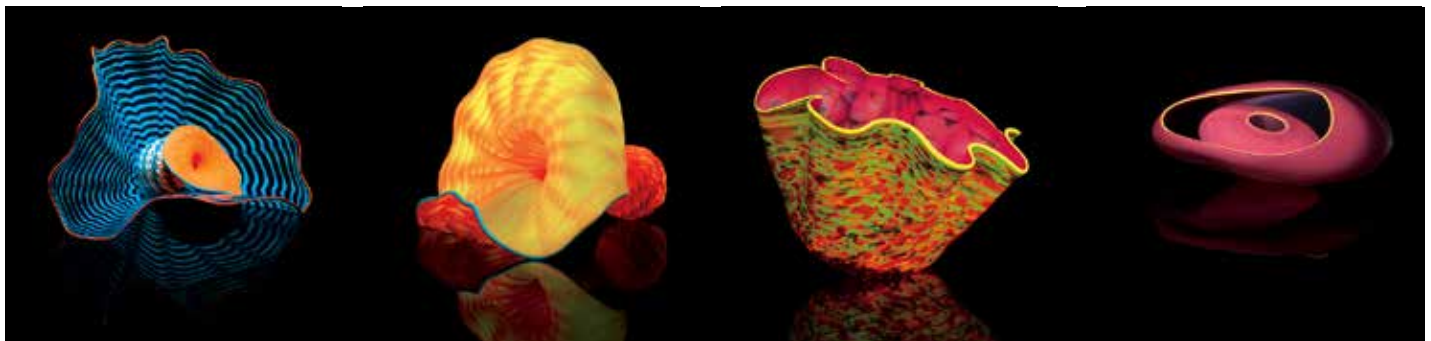
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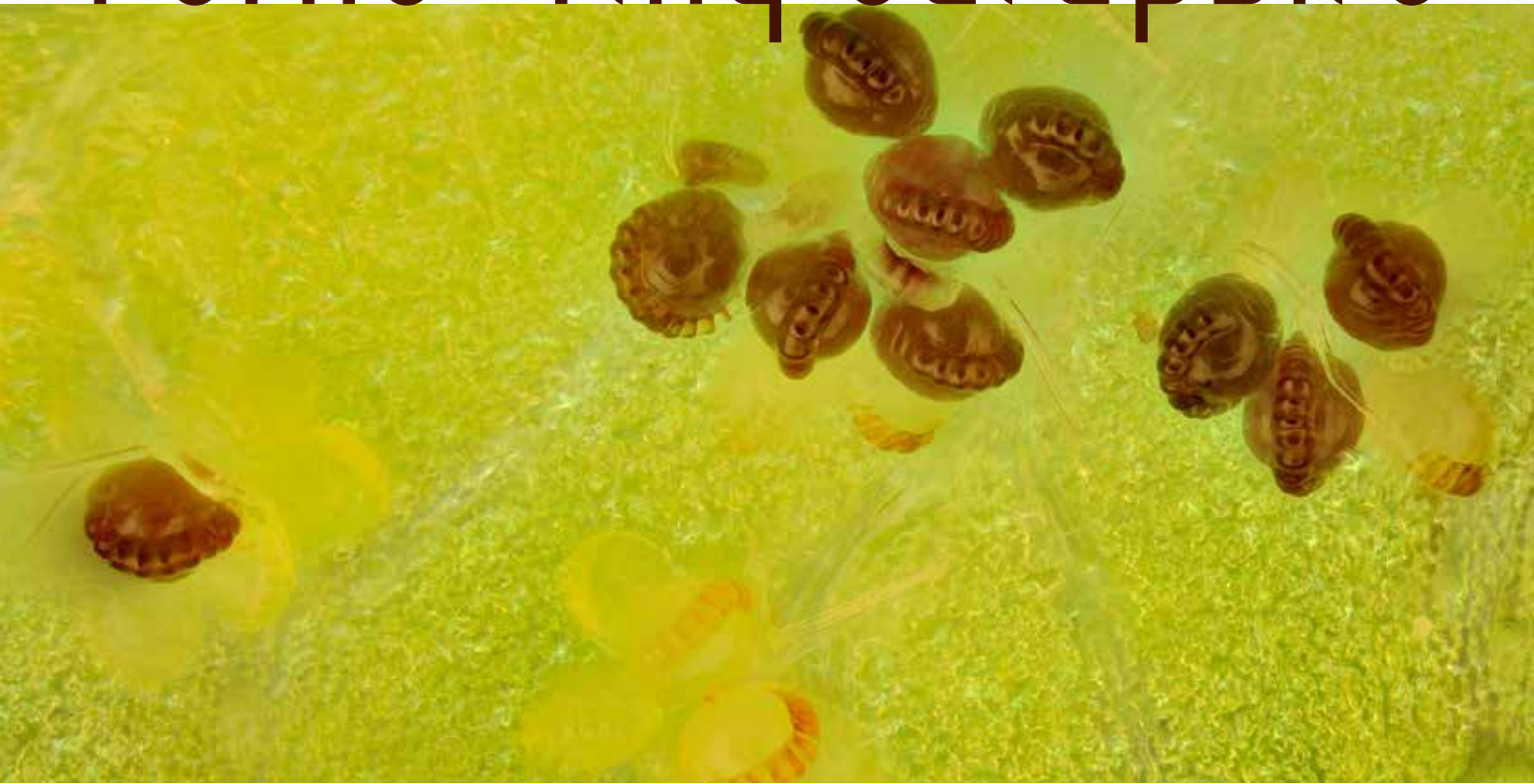
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FAIRCHILD TROPICAL BOTANIC GARDEN

Ferns' Tiny Catapults



Filled with 64 spores, a fern's sporangium will contract from water tension until it hurls its spores out into the world.

By Mike Freedman | Photos by Hank Poor

Those of us who have poked around below the surface greenery and have explored some of the curious mechanics of plants have been impressed by the beauty and seeming ingenuity of members of the plant kingdom. Often, some form of magnification is needed to fully appreciate the colors or geometry. Under a microscope, a plain green leaf can reveal intricate and—there's no other way to say it—clever devices that plants use to grow and multiply. The sporangia (spore cases) of ferns are just such clever machines. Nearly invisible to our feeble vision, a single fern sporangium launches the hopes of the next fern generation into a favorable (hopefully) bit of air. I'm a little ahead of myself at this point, so let's take a few steps back.


Ferns reproduce by spores, not seeds. Among the differences between spores and seeds is the general purpose of a spore: to grow into a separate, tiny plant that bears no resemblance to the adult fern. Spores are also tiny. A single spore is invisible to the unaided eye, but can be seen when they're in masses, as when collected on a paper as spore prints (for information on making spore prints, see *The Tropical Garden's* summer 2013 issue). A final big difference between seeds and spores is that spores have only half of each chromosome pair that the adult fern has. A spore is roughly equivalent to an unfertilized human egg, chromosome-wise.



Fern sporangia in a grouping (sorus). **A:** An immature sporangium hasn't started to show the dark brown color in its outer ring cells (annulus). **B:** Mature sporangium with dark annulus. The color of the dark spores inside is clearly visible through the sporangial wall. Also visible are wispy stellate hairs that are often found on fern fronds.

All of us have seen some of the interesting ways that flowering plants disperse their seeds. In fact, Georgia Tasker has selected some beautiful and ingenious seeds and fruit to photograph and describe in this and previous issues of *The Tropical Garden*. Without seeming too boastful on behalf of ferns, I have to say that all efforts by flowering plants to disperse seeds are puny in comparison to the catapults ferns use to disperse their spores.

A single fern sporangium is roughly the size of a period on this page. If all goes right in its development, it will contain 64 spores. You're starting to get an idea of how small each spore is. Viewed microscopically from the side, a fern sporangium is seen to have a line of thick-walled cells that runs around a spherical chamber holding the spores. The walls of this chamber are so thin and delicate that it's possible to see both the color and shape of the spores held within. When the spores are mature and it's time to launch them, the thick-walled encircling cells start to lose water. As they lose water, the disappearing

remnant of the liquid, attached to the ends of the cells, causes the cell walls to contract from water tension. In effect, this creates a contracting spring that also tears open the thin walls of the spherical chamber. The contraction of the spring continues until all the water in the cells is gone and, along with it, the water tension that was loading the spring. At this point, the stored energy in the spring is released, hurling the spores. This happens surprisingly quickly—in 10 seconds or so. I've detected hurled spores at a distance of three inches. Put in human terms, that would be equivalent to a person throwing a basketball 1,500 feet. In my book, that's impressive. 



To view fern spore videos, go to www.fairchildgarden.org/Fern or snap this code.

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The Tropical ROSE Society

By Barbara LaPradd

A recent magazine article prompted me to wonder, "Why do people grow roses?" I came up with a few answers.

Some like the thrill of winning a ribbon or being named Queen of the Show. They create exacting schedules so they can prune at the optimal time, almost ensuring that they have the blooms in the perfect state of openness for show day. They arrive at the prep stage with a box full of implements that will assist in teasing open the bloom ever so slightly, trim excess foliage, artistically arrange their entry to strict guidelines and hope to catch the judge's eye. They also meet other individuals who share their passion and form lasting friendships.

Others grow roses for their medicinal properties. In early recorded history, apothecaries used the rose in elixirs and potions to cure various ills, including but not limited to blood deficiencies, inflammation, cold or flu symptoms, insect bites and burns. The practice still exists today on a much smaller level. Rose hips are very high in Vitamin C and are also rich in Vitamins A, B1, B2, B3, K, E, niacin and bioflavonoids. Roses are widely used in aromatherapy to calm and soothe frazzled nerves.

A growing trend is cooking and baking with rose petals. Rose-infused chicken sausages, lemon and rose tart, rose petal jelly, the possibilities are limitless. They can also be used in teas and infused into beverages or liquors. Rose vodka anyone? Rose syrup is popular in the Middle East for use in sweets. If you choose to cook with the petals, be sure they are organic.



Tasting the petals first will help you to ensure they will impart enough flavor to your edible items.

Some grow roses to share. They bring them to their doctor's office, give a vase-full to a sick friend, prepare arrangements for nursing homes to lift the spirits of residents, share with their church or synagogue, offer them to neighbors, decorate at parties or weddings, etc. Some rose enthusiasts have 600 or more plants in their gardens and are willing to share with anyone who shows an interest in their passion. They open their gardens for tours, because for them the greatest joy is in what they give away.

Many individuals grow roses just for the beauty of the blooms. Walking through the garden taking time to "stop and smell the roses" can lift the spirit like few other things. Herbs make great companion plants for roses, and old-fashioned annuals like zinnias, cosmos and sweet peas will bring the butterflies and bees to your plants in droves. It is a great pleasure to sit on your porch or patio on a beautiful South Florida winter day and watch nature's workhorses busy in your garden while you sip a cool beverage with your feet up.

With thousands of rose varieties in commerce today, there are surely ones to suit your requirements. The Tropical Rose Society welcomes all questions and visitors at our meetings.

The Society meets the third Tuesday of the month in January, February, March, May, September, October and November at Fairchild.

WHAT'S IN A NAME



1

2

3

4



PLANTS NAMED BY GEORGIA TASKER | PHOTOS BY FAIRCHID STAFF FOR BOTANISTS

5

6



DIGGING INTO THE NAMES OF PLANTS CAN BE A HISTORY LESSON. THESE PLANT NAMES RECALL BOTANISTS AND GARDENERS WHO EARNED THEIR RECOGNITION.

Chapmannia floridana is in the pea family and found throughout Florida. Alvin Wentworth Chapman is the botanist for whom the yellow-flowering plant is named. He wrote “Flora of the Southern United States.”

Forestiera segregata remembers Charles Leforestier, a French physician. Its common name is Florida privet.

Leitneria floridana, which grows in northern Florida, remembers Edward F. Leitner, who was killed in the Second Seminole War.

Lobelia glandulosa, the glade lobelia, grows in climate Zones 10 and 11 (that’s us) and recalls Matthias L’Obel, a Flemish botanist.

Magnolia virginiana, our sweet bay magnolia, recalls a French professor of botany, Pierre Magnol, who taught in Montpellier in the 17th century. Bark of the sweet bay was put in brandy as a cough medicine and to treat fevers, rheumatism and dysentery, according to Dan Austin’s “Florida Ethnobotany.”

Muhlenbergia capillaris, our lovely muhly grass, is named for Rev. Henry Muhlenberg, an amateur botanist and Lutheran pastor who lived in Pennsylvania in the late 18th and early 19th centuries.

Rudbeckia hirta, black-eyed Susan, is named for Olof Rudbeck. He founded the Uppsala Botanic Garden and was a professor of medicine at Uppsala University. His son, Olof the Younger, also taught medicine, botany, zoology and chemistry at the university. Carl Linnaeus was his student.


Ruellia caroliniensis, wild petunia, recalls Jean Ruel, a French physician and botanist in the late 15th and early 16th centuries.

Sarracenia, the genus of the pitcher plant, is named for Michel Sarrazin, a botanist and physician in Quebec. Six species of pitcher plants occur in Florida, but none in South Florida.

Stillingia aquatica, water toothleaf, is found throughout South Florida and was described by Chapman in 1860. It is named for Dr. Benjamin Stillingfleet, an English defender of the Linnaean binomial system. The leaves are more fanglike than toothlike. Austin’s “Florida Ethnobotany” says the plant was used to treat venereal diseases, and the Seminoles considered the roots antidiarrheal.

Torreya taxifolia, an extremely endangered conifer in north Florida, is named for John Torrey, a physician and professor who, with Asa Gray, wrote the “Flora of North America” and was one of the original members of the National Academy of Sciences.

Tradescantia pallida, purple queen, is named for John Tradescant, a gardener for King Charles I of England.

Vernonia blodgettii, or ironweed, is named for two botanists: William Vernon, an English botanist who worked in Maryland, and John Loomis Blodgett, a physician and pharmacist who, in the mid-19th century, collected plants from the Florida Keys and South Florida. 

1. *Muhlenbergia capillaris* 2. *Forestiera segregata*
3. *Rudbeckia hirta* 4. *Magnolia virginiana*. Photo by Roger Hammer
5. *Ruellia caroliniensis* 6. *Tradescantia pallida*

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The Pawpaw

David
Fairchild's
Forgotten
American Fruit

By Kenneth Setzer



Our largest native edible tree fruit is tantalizingly out of reach, known mostly to a small coterie of rare fruit enthusiasts. In our search for bigger, better and varied fruit, why isn't pawpaw on the table?

ABOVE: Audubon's yellow-billed cuckoos along with pawpaw and zebra swallowtail butterfly.

There are hundreds of edible fruits and vegetables that never reach our markets. Some are from far-flung places and not easy to transport to consumers. Some are a bit off-putting in appearance, texture or taste, and not easy to introduce to a fresh palate—they are an acquired taste. Dr. David Fairchild himself often lamented American resistance to unfamiliar foods. But the pawpaw is historically as American as apple pie (though apples aren't native to America), yet few people today have even heard of it.

The pawpaw is botanically interesting. A North American native, the common pawpaw (*Asimina triloba*) is in the mainly subtropical and tropical Annonaceae family, right along with pond apple (*Annona glabra*), soursop (*Annona muricata*), custard apple (*Annona reticulata*) and even the intensely scented ylang ylang (*Cananga odorata*). But the genus *Asimina* is the only family member to have penetrated into temperate areas, even as far north as Ontario, Canada. *Asimina* contains eight species and one hybrid. Though

primarily understory shrubs, common pawpaws can grow into small trees—up to about 25 feet tall. Their drooping, alternating leaves give them an out-of-place tropical look and turn golden in fall. They are the only host food source for the zebra swallowtail butterfly (*Protographium marcellus*). Pawpaw trees send up suckers, forming a small colony—a pawpaw patch. If grown solitarily in a landscape, the trees take on a pyramidal shape.

The fruit resembles papaya in shape, maturing from green to yellow-brown in early fall. The flesh is described as custard-like, the color of mango flesh, and containing several large seeds. The taste, which I unfortunately can't personally describe, is noted as a combination of mango, pineapple and banana! Others claim it's fairly bland. The crinkly, dark maroon flowers are fetid, apparently to attract their beetle and fly pollinators.

The pawpaw has intrigued and nourished quite a few people, beginning with Native Americans.

Currently recognized pawpaw species

Asimina triloba

Common pawpaw, the most widespread of the species, can grow throughout much of the Eastern U.S. into Canada, but is found only sporadically in the Florida Panhandle.

A. incana (W. Bartram)

Woolly pawpaw, can be found in Central to North Florida

A. angustifolia (Syn. *A. longifolia*)

Slimleaf pawpaw, found in Central to Northern Florida

A. obovata

Bigflower pawpaw, grows in much of Central Florida, north of Glades County; a Florida endemic

A. tetramera

Fourpetal pawpaw, natural range includes Florida's Palm Beach and Martin counties; listed as endangered by the State of Florida and Federal government

A. pygmaea (W. Bartram)

Dwarf pawpaw, found in much of Central Florida north of Manatee County, and two counties of Southeast Georgia

A. reticulata

Netted pawpaw, grows in most of peninsular Florida, including Miami-Dade County

A. parviflora

Smallflower pawpaw, found throughout the Southeast, west to Texas, and in Florida excluding southernmost peninsula

Asimina × *nashii* Kral [*angustifolia* × *incana*]

Nash's Pawpaw, a hybrid found scattered throughout North Florida

Colonial plant explorer extraordinaire John Bartram introduced it to British horticulture in 1763. His son William describes the pawpaw in his 1791 book "Travels," writing about encountering multiple *Asimina* species throughout the southeast, in particular a dwarf and "very curious species." He described pawpaw fruit as containing a "yellow pulp of the consistence (sic) of a hard custard, and very delicious, wholesome (sic) food." George Washington agreed, and was fond of chilled pawpaw for dessert. Pawpaw is even credited with helping save lives on the Lewis and Clark expedition:

" . . . our party entirely out of provisions . . . perfectly contented and tell us they can live very well on the pappaws . . . "

William Clark, Lewis and Clark expedition—September 18, 1806

Yet, nearly a century later, Dr. Fairchild called pawpaw "the most neglected native fruit tree in America." What happened? Well, pawpaw fruit best ripens on the tree, perishes soon thereafter and is difficult to ship fresh, making commercialization unlikely. It also has a deep taproot, making transplants difficult. It is self-incompatible, and therefore needs to be hand- or open-pollinated (by animals, wind or other natural mechanisms). Plus, early European settlers brought with them fruits already cultivated over centuries for superior attributes; why invest in pawpaw?

Nevertheless, in 1916 the American Genetic Association announced in its *Journal of Heredity* a contest for best and largest pawpaw, with the hope that entries from around the country would reveal varieties, both wild and cultivated, with superior attributes. Fairchild experimented with growing seedlings from the winner—a pawpaw submitted by a Mrs. Ketter—at his "In the Woods" home in Maryland. The offspring of 'Ketter' that he found superior he named 'Fairchild.' With Fairchild's encouragement, pawpaw enthusiast Dr. G. A. Zimmerman

developed over 60 varieties beginning in the 1920s. After Zimmerman's untimely death in 1941, a small selection of his collection was donated to the Blandy Experimental Farm, but most of Zimmerman's varieties and their associated data are now lost.

Enthusiasm remains, however, as evidenced by the pawpaw research program at Kentucky State University, the Ohio Pawpaw Festival and Neal Peterson of Neal Peterson Pawpaws. Peterson has over 40 years' experience with the fruit. His search for Zimmerman's and other varieties reads like a decades-long mystery. He described to me exploring for the fruit trees: "After not finding too much of interest, I searched a 40-acre area; there I found immature pawpaws that had grown from suckers. These led to a line of adult trees—the original Zimmerman trees." Those from Blandy have served him most in developing superior fruit; for example, wild pawpaw fruit can contain up to 25% seeds, whereas Peterson's varieties, with Native American names like 'Susquehanna,' and 'Shenandoah,' contain only 4% to 8%.

With a range from Canada to Florida, west to Kansas, there's a lot of regional diversity within the common pawpaw. The other species aren't usually noted as providing palatable fruit, but they may provide rootstock or desirable qualities that could be incorporated into the common pawpaw. Tropical pomology expert William Whitman, writing "The Challenge of Pawpaws in the Subtropics" (*Tropical Fruit News*, February 1994), succinctly noted: "From my experience it does appear the pawpaw is not suited to South Florida culture." He suggested searching for a suitable rootstock. In "Uncommon Fruits," Lee Reich suggests "Some of the pawpaw's deficiencies could be overcome by hybridization with other members of the genus *Asimina*, to wit some of the Southern species."

We might just see pawpaw orchards yet. 



Gardening on the cheap offers great rewards. By using items from around the house, recycling trash or creatively repurposing, the frugal gardener can save money, reduce garbage and train the brain to think in imaginative and novel ways.

The Frugal Gardener

Text and photos by Kenneth Setzer

Plants for free—or nearly free

Plant acquisition is a logical place to begin gardening. I normally avoid the “big box” stores for plants. However, some of their less-beautiful specimens can be found on sale for a few dollars and easily nursed back to health. It seems to me that many of those poor plants’ problems arise because they were placed in an area of the store to appeal to shoppers, rather than one that meets their horticultural needs. Many of the plants are mislabeled or not labeled at all. Many are sunburned, and should never have been placed in full

sun; or the opposite may be true, with full-sun lovers being deprived of light. Many of these plants can be saved with proper care. I’ve even heard of some people getting these soon-to-be discards for free. You will need to ascertain whether the plant can be saved by identifying it, looking it up on your smartphone while at the store (saves a trip home) to determine how much light, water and general care it needs and judging whether the store is meeting the individual’s requirements. If the plant seems to be suffering from only a lack of proper care, you might be able to save it by reversing the situation.

Another way to find inexpensive plants is to shop after major “plant” holidays are over. You’ll find many leftover gift plants at bargain prices (think poinsettias after Christmas). Also, look for discards at nurseries. These plants may be healthy, but not quite perfect enough to appeal to the casual buyer. Landscapers and other gardeners also throw away plants, simply because they may just have too many of one kind. Find these through word of mouth and by keeping an eye out for piles of greenery at the curb.



A discarded potted plant holder gets a second life as a seed starter.

Grow your own

Propagating from cuttings is another satisfying way to get cheap or free plants. It's very rewarding to behold a flourishing plant that you have grown from a tiny, withered cutting; I have a stunning purple *Solenostemon* (formerly *Coleus*) grown from a cutting found in the trash. Cut a four-to-six-inch piece off the tip of your plant, remove any leaves near the bottom, as well as any flowers or fruit (these draw energy the cutting needs to root), and place into a small pot of perlite (potting soil or water can also work). Perlite is heat-expanded pebbles of volcanic rock. It holds some moisture, but not enough to encourage rot. The open, airy spaces among the perlite pieces allow roots to penetrate more easily than dense soil. Before placing a cutting in perlite, you may also try dipping the cut end into rootone, a plant hormone that encourages roots to grow. Keep the perlite moist, as the cutting doesn't yet have a root system to absorb water.

Of course, nature loves to throw exceptions at us; many plants cannot be propagated by cuttings this way. Monocots like grasses, bananas, bamboos and palms generally work differently, although some monocots can be propagated by division or grown the old-fashioned way, from seed. At any rate, if the parent plant isn't yours, always get permission before taking cuttings!

Growing from seed is a more time-consuming option. Vegetables usually taste bitter after flowering, but let a few of your plants go to flower and produce seeds that you can harvest for use next season, or to give away. Collecting seeds from ornamental annuals is a good strategy to avoid having to buy a replacement plant. Some seeds need to be soaked before planting, while others need to be sown—scattered on the soil surface. There are as many nuances to the art and science of propagation as there are species of plants, so it's best to consult a source specific to your species. Then you can research more advanced techniques like air layering, grafting and micropropagation.

Newspaper

Aside from reading its gardening columns, what good can a newspaper do for your garden? An approximately one-quarter-inch thick layer of newspapers placed over bare soil will inhibit just about anything from growing. I wet the paper so it stays in place, and a few rocks also help. This is useful if you pull weeds, but don't plan to cultivate anything in the bare soil right away. The same method can be used to kill weeds or grass already present. Cover with damp newspaper and check every week or so until the unwanted plants are dead and easily removed.

I hate throwing away toilet paper roll cores. What a waste. Instead, cut them in half and place a few in a tray to keep them from tipping. Filled with potting mix, they are perfect for starting small seeds without wasting the volume of soil a larger pot would require. Once outgrown, the rolls can be opened to remove and plant the contents.

Cinder blocks

Cinder block planters are almost too good to be true: cheap, very durable, stackable and not bad looking—you can even paint them. They are manufactured with internal cavities to reduce weight, and these cavities are an ideal size to house small plants. There are even split-face concrete blocks created with a textured faux stone finish available in

different colors. Place them on soil and fill their centers with the planting medium and plant of your choice. You can treat them like any other pot, albeit one with an open bottom.


Cinder blocks are available typically with two cavities, but also as smaller half blocks, so you can stack them in interesting patterns. Unlike wood, when used as the border of a raised bed, they will not decay, plus can hold plants themselves! Think of them as building blocks for horticulturally minded adults.

Shipping pallets in the garden

Pallet gardening has become very popular in recent years. Shipping pallets are often discarded after a shipment is delivered, but the lumber has many possibilities. Pallets can be disassembled to delineate raised beds or laid flat and their open areas filled with soil to create ready-made rows. An ambitious gardener can use one vertically as an herb or succulent garden; weed-blocking fabric stapled to the back and bottom areas holds soil while allowing for drainage.

Pallet wood has already been treated to kill any potential pests along for the ride. Look for a stamp somewhere on the pallet that, along with other information, shows the letters "HT," indicating it was heat-treated and should be safe to handle. If instead you find "MB," the wood was fumigated with methyl bromide and should not be used. Fortunately, the latter treatment is being phased out. If the wood appears stained by oil or other contaminants, discard it.

Composting

Composting turns your yard and kitchen scraps (uncooked only) into rich soil. It's a topic unto itself, with many books written on the subject. It's almost like magic: combine organic debris, some water, and the result is natural, nutrient-rich soil. I encourage you to research composting for yourself—it is the ultimate in recycling and frugal gardening. 



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FAIRCHILD TROPICAL BOTANIC GARDEN



Bringing Butterflies into your Edible Garden

By Richard J. Campbell, Ph.D.

Butterfly gardens have taken South Florida by storm. One can scarcely drive by a school without seeing one, alive with food plants for caterpillars. But alas, what about the adult butterfly—the object of our fascination? Shouldn't we provide nectar and shelter for them? The Edible Garden can help!


Tropical fruits in your edible garden provide delicious and nutritious products for the table, and they will provide the butterfly with shelter and food sources. Within my edible garden, I find the highest concentration of butterflies where there are food sources for both the caterpillar and the adult butterfly, and just like the caterpillar, the butterfly has its favorites.

One of the most useful fruit trees for the butterfly is the carambola (star fruit), (see pg. 11). The carambola forms a highly attractive tree in the home garden, with arching branches that will touch the ground if not pruned. The tree forms a shaded, protected dome. Beneath this dome is a favorite nighttime roosting place for zebra longwing butterflies. Among our most beautiful and graceful butterflies, they will group together at night beneath the carambola, one atop another in a pendulous mass. They return to the same place every night and over time there may be 100 or more zebra longwings in the group.

It is not quite the same as the thousands upon thousands of monarch butterflies clumped together in the highlands of Michoacán, Mexico, but you can see it without a plane journey. As long as the conditions remain favorable, the zebra longwings will return to their roosting place beneath the carambola. Certainly, there are other locations where they will roost (for instance, on Spanish moss hanging from an oak canopy), but in the edible garden the carambola can serve well for many a year.

Remaining beneath the canopy of the carambola, we will also find a riot of malachite, ruddy daggerwing and gulf fritillary butterflies partaking in the bloom and sweet juices of the fallen fruit. The malachite, in particular, is a sight to see, flitting and standing, flitting and standing throughout the late afternoon. Nowhere else in the edible garden will you be witness to this behavior. The malachite will go to other fallen fruit, but it is the carambola that it craves.

Anyone who has grown a mamey sapote, sapodilla, canistel or caimito may have pondered our next question. What does the earthy aroma of the flowers of this plant family attract? The answer is flies, wasps and butterflies. The butterfly is attracted en masse by the mamey sapote flower. On any given day, you can find malachites, ruddy daggerwings, various types of sulfurs and skippers visiting the blooms that cling tightly to its large twigs and branches. The canistel and sapodilla will also attract them, but given a choice, they do seem partial to mamey sapote.

The mango, too, is a good choice to draw butterflies, although the many species it will attract are usually of smaller size. In the early spring, as the bloom spikes sway in the breeze, one can enjoy the butterflies' comings and goings. Of course, with this flower visitation there is bound to be some pollination. We do not typically consider butterflies the most important means of pollination for fruit trees, but every little bit helps. Good growing. 





Wild coffees, *Psychotria nervosa* and *Psychotria bahamensis*, are full of fruit over winter. The *P. nervosa*, or shiny-leaf wild coffee, has fire-engine red berries, while the *P. bahamensis* shows off maroon fruit. Neither is edible, except by the birds.

seeds on a package

Text and photos by Georgia Taster

Delonix regia, royal poinciana, hails from Madagascar, but there may be more planted in South Florida than remain on the red island.

We love them in bloom, but grumble about the messy seedpods, right? Take a moment to consider how perfectly packed the hard black and brown seeds are inside a pod.





Gingerbread palms, *Hyphaene* species, not only branch but also produce cinnamon-colored fruits that are wonderfully shaped like bottom-heavy bell peppers. Miniature crevices and craters like subtle pigskin mark its surface—which makes a single fruit comfortable to hold.



Enterolobium contortisiliquum, ear tree, is a large legume with a pod so highly polished and sensuous it might be prized solely for its handsomeness. Coiled like an ear, the pod clearly reveals the hard seeds inside without you having to peek. Seeds of its Costa Rican cousin are prized for making jewelry.



Lady of the Night, *Brunfelsia nitida*, turns its clove-perfumed flowers into orange berries that may linger on the shrub over winter. Inside are many small seeds. Even when not in flower, this plant is therefore ornamental.

Bidens pilosa flowers year-round and produces those star-shaped burrs we call Spanish needles; they catch on anything by means of barbed awns or bristles. And while we often disperse them on our pant-legs, the design is meant to catch on animal fur.



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This is the fourth in the series "Plants and their Seeds." The first story appeared in the Summer 2014 issue, the second in the Fall 2014 issue and the third in the Winter 2015 issue.

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Citrus Greening Threat Goes Beyond Oranges

By Kenneth Setzer

Some attackers come at us visibly, while others take a more covert or circuitous route. The Asian citrus psyllid (*Diaphorina citri*) is sort of in between the two. A plant sucker, the psyllid gets its nutrients from the liquids it can extract with its mouthparts from mostly citrus plants. While this is not the worst attack a plant can encounter, a much more harmful, unseen invader hitches a ride.

The psyllid is native to south Asia, but over the decades has spread around the globe, invading nearly any location warm enough to support it, particularly in North and South America and the Caribbean. The adults are small—less than one-eighth of an inch long—and patterned a mottled light brown to beige. They are superficially shaped a bit like a plant hopper to my eye, sort of like the wedge-shaped sail of a ship with their tail ends angled upwards and heads down as they feed; they fall within the same order, Hemiptera, as plant hoppers. The immature psyllid nymphs, much like aphids, don't react very much when prodded and disturbed; the adult psyllid, though, can fly for short distances.

The Stowaway

Here's where the stowaway appears, wreaking serious damage. While the psyllid itself feeds on the plant, the damage it causes would otherwise be minimal, or at least survivable, were it not for a bacterium called *Candidatus*


Liberibacter asiaticus. The psyllid serves as a vector for this bacterium, infecting citrus with it when feeding. The bacterium may also be spread through infected plant cuttings. It is *Candidatus* that ultimately harms the plant. The resulting condition is known as citrus greening, yellow shoot disease, or what it's been called in Chinese horticulture: Huanglongbing, also known as HLB.

The psyllids' eggs are yellow and teardrop shaped; these are laid on new, emerging shoots and foliage. Note to the home gardener: if you find small yellow eggs on your citrus, be aware they may be of the giant swallowtail butterfly (*Papilio cresphontes*), for which citrus is a host plant. The butterfly eggs are rounder and a deeper yellow to burnt orange, but you need to get very close to tell the difference. You do not want to destroy the butterfly eggs.

A more reliable way to tell if you have psyllid problems—besides having the tiny adult insects identified by an expert—is by observing plant damage, unfortunately. First-glance symptoms are similar to those caused by many other diseases and nutritional problems: yellowing of new shoots; pale, yellow or yellow-white leaves (known as chlorosis); or leaves displaying “blotchy mottle” appearance—a mingling of greens and yellows. Fruit is often stunted, discolored, poor tasting and, when cut longitudinally, will appear asymmetrical inside. Seeds are also often stunted and non-viable. Branch

dieback and tree death ultimately occurs. In June 1998, the insect was detected on the east coast of Florida. By September 2000, this pest had spread to 31 Florida counties. In 2008, it was detected in California, possibly moving by means of infected nursery stock.

Insecticides applied to non-bearing trees have been proven effective against the psyllid, thus reducing the spread of HLB. Reducing the psyllid population has also shown to reduce the severity of HLB on already-infected trees, though total elimination and a cure for HLB are still out of reach. While foliar sprays may sometimes be necessary, they should be avoided as much as possible to avoid killing psyllid predators like ladybugs, lacewings, syrphid fly larvae and the beneficial parasitic wasp *Tamarixia radiata*. Researchers are looking for naturally resistant citrus varieties, but nothing has yet been found. Experimental treatments are also testing penicillin against the bacterium.

Be aware that the tiny psyllid can feed on and infect other plants in the Rutaceae family as well, like the ornamental orange jasmine or jessamine (*Murraya paniculata*). If you plan on buying a plant in this family, make sure it is inspected for possible infestation. By not transporting potential host plants, we can help minimize the great damage HLB is doing to citrus. 

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Anne Sutherland Ashe

Mrs. Leslie Angelo

In Memory of

Dorothy Moriarty

Mr. John Ashe

In Memory of

Vicente Llopis

Mr. Alfredo Cruz

In Honor of Fran Guerra

Dr. and Mrs.

Lawrence M. Fishman

In Memory of my family

Mr. Hector Perez

In Memory of Ida Salz

Mr. and Mrs. John Reichman

In Memory of Tom Ashe

Mr. Decio Sales-Filho

In Honor of Maria M. Angulo

Mr. Reynaldo Angulo

In Memory of

Cynthia Ann Keith

Ms. Trish A. Jesselli

Tribute Benches

In Memory of

Derrick de la Vega

and Alicia Cubas

Mr. Luis Salas and

Mrs. Maria de la Vega

In Memory of

Patricia Scully Allen and

Christopher Jude Allen

Mr. George Allen

In Memory of

Riley Hannah Sandler

Dr. and Mrs. Paul Plasky

Tribute Trees

In Honor of Libby Weintraub

Ms. Desiree Gruber



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FAIRCHILD TROPICAL BOTANIC GARDEN

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1

1. Model in striped dress

2. Luncheon at Splendor in the Garden

3. (L-R) Frances Sevilla-Sacasa, Swanee DiMare, Yolanda Berkowitz, Ken Downing, Katherine Fernandez Rundle, Raphael Bastian and Jennifer Valoppi

4. (L-R) Lydia Touzet, Madelaine Brockway, Kasi Geraci and Paula Brockway

5. Diane Ares and Andria Holtz

6. Nora Bulnes, *Selecta Magazine* Media Sponsor, and Silvia Trinidad



2


VISTAS



3

Celebrating Fashion and Philanthropy at the 4th Annual Splendor in the Garden

By Brooke LeMaire

Fairchild and Neiman Marcus Coral Gables partnered to host the 4th Annual Splendor in the Garden fashion show and luncheon on a sunny Wednesday, January 14. The event was co-chaired by Swanee DiMare and Frances Sevilla-Sacasa, and featured NM's Ken Downing, senior vice president and fashion director, who presented a spring 2015 runway show. This year's Fairchild Philanthropy honorees were Raphael Bastian, Yolanda Berkowitz, Donna E. Shalala, Katherine Fernandez Rundle and Jennifer Valoppi. Splendor in the Garden was sponsored by Mercedes-Benz, Marquis Bank, the Batchelor Foundation, Peony, Social Miami and *Selecta Magazine*. More than 350 attendees helped raise funds for Fairchild's programs in science, horticulture and conservation. 



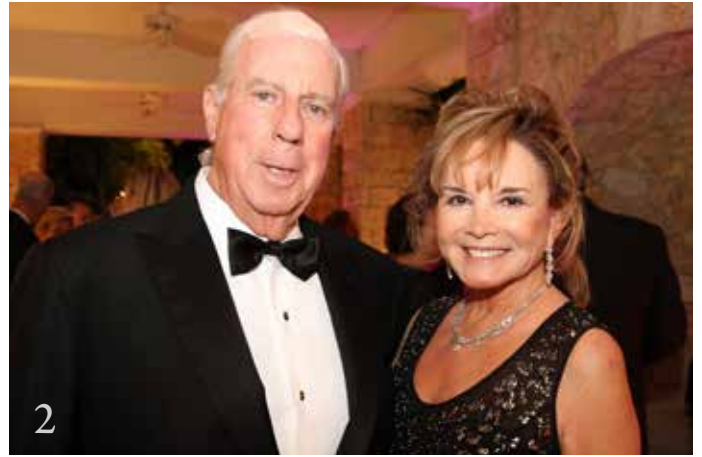
4



5




6



Fairchild Celebrates an Evening of Magical Glass at the 2015 Gala in the Garden Fundraiser

By Brooke LeMaire

More than 400 guests enjoyed an enchanted evening on Saturday, February 7 at the 22nd Annual Gala in the Garden at Fairchild. Bathed in the bright and bold light of Dale Chihuly's magnificent outdoor art exhibition, the Garden brilliantly showcased this year's theme, "An Evening of Magical Glass." Swanee DiMare and Frances Sevilla-Sacasa co-chaired the event, with Joyce Burns serving as philanthropic chair. *Selecta Magazine* and the *Miami Herald* were this year's media sponsors. Proceeds from the Gala support programs in conservation science, education and horticulture at Fairchild. 

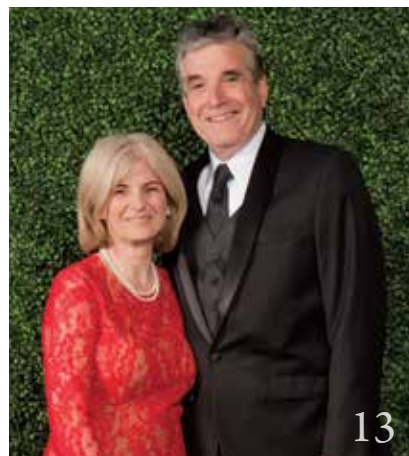
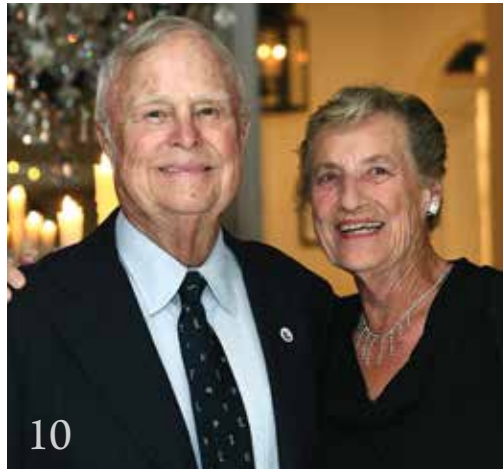


1. Eugenio and Frances Sevilla-Sacasa
2. Paul and Swanee DiMare
3. Robert and Ana Codina Barlick
4. Gala in the Garden decor
5. Joyce and Tony Burns





6. Robert and Judy Kramer
 7. Mary Jean and Lou Risi
 8. Roe and Penny Stamps
 9. Kenneth O'Keefe and Jason Stephens
 10. Willard and Virginia Wheeler
 11. Bunny and Raphael Bastian
 12. Raymond and Anne Baddour and Susannah Shubin
 13. Bruce and Evelyn Greer
 14. Chris Pedersen, Terry Buoniconti, Julia Bianchi and David Bianchi



GARDEN VIEWS



Photo by Chihuly Studio

After the much-anticipated unveiling of our Dale Chihuly art exhibition, Fairchild opened its doors on Thursday and Sunday evenings for Tropical Chihuly Nights. Strolling through the Garden by moonlight gave visitors a new perspective on the art and the surrounding nature, with lighted pieces radiating bright blues, reds and yellows.



Photo by Morgan Brooks/FTBG

The talented musicians of December's Holiday Music concert welcomed winter with beautiful melodies. Esteemed conductor James Judd led the concert with a repertoire of classical and seasonal favorites that delighted all ages.



Photo by Benjamin E. Thacker

Lauded musician Arturo Sandoval played soulful and expressive tunes for the Valentine's Day Concert, creating a special night for couples, families and friends. Visitors set up picnic baskets and enjoyed an evening of music and romance under the stars.



Photo by Morgan Brooks/FTBG

Music was abundant in January as well with the GardenMusic Festival. Organized by the Sixth Floor Trio of Teddy Abrams, Harrison Hollingsworth and Johnny Teyssier, the festival offered two weeks of performances spanning genres including classical, folk, rock and Latin jazz.



Photo by Morgan Brooks/FTBG

Afternoon Teas created a relaxing ambiance with calming live music and sweet and savory delicacies. Guests sipped tea and enjoyed the weather as kind volunteers poured refreshing beverages from antique teapots.



Photo by Morgan Brooks/FTBC



Photo by Arielle Sumner/FTBC

January also brought the 9th Annual International Chocolate Festival, which satisfied tastebuds of all stripes. Visitors sampled delicious artisanal chocolate dishes and had the opportunity to learn about the cacao trees growing in Fairchild's Rainforest and Tropical Fruit Pavilion—a rare sight in South Florida.



Photo by Morgan Brooks/FTBC

In March, the ever-popular International Orchid Festival drew a crowd of orchid enthusiasts from around the world. The American Orchid Society juried show, presented by the Orchid Society of Coral Gables, wowed visitors with beautiful and expertly grown rare orchids.



Photo by Morgan Brooks/FTBC

Ramble Donations

November 13-15 we will celebrate the 75th anniversary of The Ramble. The first Ramble was held in an effort to raise money to buy the Garden a new Rambler truck. Now, the weekend symbolizes history, tradition and family fun.

This festival has continued through the past 75 years because of volunteers and their countless hours and dedication to Fairchild and The Ramble. Volunteers who work on festival favorites, such as Antiques and Collectables and Old Books, have already begun the process of accepting donations, pricing and preparing items for sale. Their year-round commitment is what makes these two parts of the Ramble so successful.

To donate antiques, collectables or books to The Ramble, contact Natalie White at 305.663.9081 or via email at nwhite@fairchildgarden.org.

David and Marian Fairchild's Last Official Plant Collecting Expedition: A Trip to Venezuela and Colombia in 1948

By Janet Mosely, Nancy Korber, Jafet M. Nassar, Ph.D. and Javier Francisco-Ortega, Ph.D.



Dr. Henri Pittier, Dr. Tobías Lasser and Francisco Tamayo in the cloud forest at El Junquito, Venezuela. March 30, 1948.

Photo: Fairchild Archives

In the spring of 1948, David and Marian Fairchild traveled to Venezuela at the invitation of the minister of agriculture, Ricardo Montilla, and Dr. Henri François Pittier. Pittier, a famous Swiss botanist, had made his home in Venezuela since 1921 and is considered the most influential figure in that nation's recent botanical history.

Dr. Henri Pittier founded Venezuela's National Herbarium and was mentor to an outstanding generation of Venezuelan botanists who initiated modern taxonomic, floristic and plant conservation initiatives in the country. Dr. David Fairchild was to advise the Venezuelan government on the work of plant introduction. They planned to then travel to Colombia to visit their daughter Nancy Bell and her husband, entomologist Dr. Marston Bates, in Villavicencio, where he was director of the Rockefeller Foundation's laboratory. From Colombia, they planned to visit their son Graham in Panama, where he was vice director of the Gorgas Memorial Institute. Dr. Fairchild intended to collect plant material from palms and other species for the Garden in all of those locations. A thorough search of materials in the Fairchild archive and the plant record files of Fairchild's horticulture department have proven that the planned trip to Panama did not happen. But the Fairchilds did have a rewarding visit to Venezuela and Colombia.

In Venezuela, the Fairchilds were privileged to spend time with Pittier and to meet many other scientists working in Venezuela at that time, including the famous American naturalist and pioneer ecologist Dr. William Beebe; Dr. Hugh Curran, a famed tropical forester and old friend who was then advising the Venezuelan government on formation of its fledging forestry service; Dr. Tobías Lasser, a Venezuelan botanist who was the founder of the Botanical Garden of Caracas; and Francisco Tamayo, one of Pittier's most distinguished disciples.


Pittier and Fairchild had met 30 years earlier in Washington, D.C. Pittier was especially eager to take Fairchild to Rancho Grande National Park (now known as Henri Pittier National Park), which was established in 1937 as the first national park in Venezuela. Indeed, Pittier was the



Marian Fairchild with Dr. Henri Pittier and Mrs. Hernández, the wife of Héctor Hernández Carabaño, Venezuela's chief of forestry, at a goodbye party for the Fairchilds at El Junquito Country Club, Venezuela. April, 1948.
Photo: Fairchild Archives

founder of the national park system of Venezuela. Pittier and Fairchild spent four days exploring this unique protected area, which was originally established to preserve two exceptional ecosystems: the cloud forest and the estuarine coastal area. Beebe also joined them, since he was studying, among many other things, the birds of the cloud forest.

Ricardo Montilla, the agriculture minister, threw a well-attended farewell party for the Fairchilds at El Junquito, near Caracas. They then left by plane for Barranquilla, Colombia. They were headed for Bogota and Villavicencio to see Nancy Bell and her family but decided to take a quick side trip to Cartagena. As Fairchild recounted later, "There beckoned to Marian that old town of Cartagena which was built, or at least begun, in the time of Philip the Second of Spain. She never could resist an old town and I, too, have a liking for them." The side trip would last far longer than they had planned. According to Fairchild's writing: "On a seemingly normal April day in 1948 one of the most explosive and bloodiest of recent revolutions broke out in Colombia," sparked by the assassination of the leader of the Liberal Party and presidential candidate Prof. Jorge Eliécer Gaitán. The Fairchilds were stranded in Cartagena for 10 days before it was considered safe to leave, worrying about their daughter outside Bogota. They eventually learned she and her family were safe and managed to do some plant collecting around the city: "After all, a political uprising need not necessarily stop one from collecting seeds," Dr. Fairchild would later note in the February 1949 issue of "The Fairchild Tropical Garden Bulletin."

Fairchild Tropical Botanic Garden's scientists and affiliates are currently working with Venezuelan botanists to research this final official expedition of David Fairchild, and its botanical results. A paper is planned for the near future. 

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The authors thank Marilyn Griffiths for guidance with the early horticulture records of the Garden. They are also grateful to the Pittier family (Amalia, Brígida, Carlos, Emilio, María Elena) for their help interpreting the documents found in the Garden archives. Helga Lindorf, Ernesto Medina, Leyda Rodríguez, Luisa Virginia Pérez, Dainel Sarmiento and Eglee Zent provided relevant botanical history information. This article was possible because of the generosity of volunteers working in the Garden archives to process relevant photos and documents.



German botanist Dr. Ludwig Schnee and Venezuelan botanist Francisco Tamayo with specimens and seeds collected on their recent trip to the Orinoco Delta Region of Venezuela. They are at Dr. Henri Pittier's office in Caracas. March, 1948. Photo: Fairchild Archives

CONNECT WITH FAIRCHILD

Dale Chihuly, *Blue Flori Sun*, 2013
Exhibited in the Galde Lake
Photo by Chihuly Studio

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Admission: Free for Fairchild Members and children 5 and under.
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Plant writer extraordinaire Georgia Tasker writes about plants and everything Fairchild. www.fairchildgarden.org/GeorgiaTasker

For the Love of Mangos

Fairchild Tropical Fruit Curators Dr. Richard J. Campbell and Noris Ledesma write about traveling the globe in search of the world's most delicious fruit. www.fairchildgarden.org/LoveMangos

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Dale Chihuly
Polyvitro Chandelier, 2006 (front)
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Photo by Chihuly Studios

