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THE MILLION *Orchid* PROJECT

How Fairchild Tropical Botanic Garden and a supportive community are restoring imperiled native orchids to the south Florida landscape

words and photographs by
Kenneth Setzer/Fairchild Tropical Botanic Garden

It **BEGAN WITH** an idea to cultivate rare and endangered native Florida orchids and reintroduce them back into the environment. The environment being south Florida, where areas like the Everglades, Fakahatchee Strand, Big Cypress Swamp, hardwood hammocks and pinelands used to be festooned with orchids sprouting from tree limbs by the thousands. While Fairchild Tropical Botanic Garden is no stranger to plant reintroductions and conservation—staff and volunteers are working to conserve critically endangered plants like ferns and the key tree cactus—the plan to reintroduce the orchids is big. We're talking a million big.

The story actually begins more than a century ago, after railroad access to south Florida began to open up the area to everyone. When visitors saw the natural beauty so abundant in the subtropics, they naturally thought of ways to take it home with them, and also to exploit it. Along with cypress lumber, tree snails and bird plumes, orchids were an easy target, pulled from trees and shipped out, literally by the busting wagonload full. Natives like the butterfly orchid (*Encyclia tampensis*), cowhorn orchid (*Cyrtopodium punctatum*), cockleshell orchid (*Prosthechea cochleata*), dollar orchid (*Prosthechea boothiana*) and so many others are now quite difficult to find in the wild. Though most species are protected, orchid poachers to this day are caught stealing them from natural areas.

At Fairchild's Micropropagation Lab, orchid seedlings grow in sterile flasks of an agar mixture that mimics the fungi on which they rely for nutrients in the wild.





Once plentiful, the supply of orchids was soon nearly exhausted. With numbers low, a hurricane—something from which healthy populations can recover—combined with habitat loss, could lead to extinction. And while some of the orchids' preferred trees, like live oak and mahogany, are gaining popularity as ornamental landscape and street trees, the chances that the remaining orchids will rebound on their own are slim. This is due partly to their tiny seeds: Because they are carried aloft by the wind, they don't hold a lot of nutrition, which would add weight; therefore the seeds must find a compatible fungus to aid in their germination. And this all has to happen in the right tree, with the right amounts of light and moisture—all pretty unlikely even under the best of circumstances.

THE NURSERY LAB

To give species a fighting chance, why not just grow the orchids and actually place them back into trees? In nature an orchid may produce millions of seeds, with a very small fraction germinating. In the lab however, thousands may germinate from a single seedpod. Dr. Carl Lewis, Fairchild Director, did some calculating, and estimated our labs and greenhouse could produce one million orchid seedlings over five years—hence the Million Or-

chid Project. That is a whole lot of epiphytes.

Using established propagation techniques, Fairchild staff and volunteers grow these orchids under laboratory conditions to ensure maximum yield from each seedpod gathered, with many of the orchid species already growing and producing seedpods right here at the gardens. Inside our Hsiao Micropropagation Laboratory, trained volunteers open seedpods with sterile scalpels; there may be millions of seeds per pod, each seed no bigger than a speck of dust. Lab volunteers then sow the seeds on an agar medium infused with sugars needed to kickstart their germination—normally the job of a beneficial mycorrhizal fungus. This must all be done inside completely sterile glass flasks to ensure there is no contamination. Each one of the hundreds of growing flasks, resembling little terrariums, is placed on racks under grow lights in the lab, arranged according to their age. Then, like expectant parents, we must wait; in three to four months signs of green will appear.

The temperature, moisture levels and lighting are monitored to maintain levels appropriate for each species, though a lot of this is recently hard-won knowledge. Nurturing all of these seedlings is quite labor intensive, and performed almost exclusively by volunteers. Every two to four months after germinating, the grasslike seedlings are trans-

planted into new flasks, with fewer per flask each time to give them room to grow. Each transplant is performed under a laminar flow hood to keep out contaminants. After about a year to 18 months, the orchids can be removed from flasks for good and brought to Fairchild's nursery. (The first groups out of flasks and into the greenhouse included the butterfly orchid and cowhorn orchid.) After about six more months they can go into trees.

BACK INTO THE COMMUNITY

Here the project differs from most other reintroductions of endangered plants: The orchids aren't going back into wild places. Owing to inspiration from a similar project at Singapore Botanic Gardens, Florida's orchids are being placed in public, urban and suburban areas. The first planting, using adhesive to glue the orchids into trees, took place in a park outside of Coral Gables City Hall on Earth Day, April 22, 2014.

Community involvement is absolutely essential to the project; attaching a million or so orchids to trees is no easy task. Fairchild's extensive award-winning education programs have effectively connected the orchid project with local schools. In October 2013, TERRA Environmental Research Institute, a local public high school, received about 175 seeded orchid flasks to grow and monitor in the classroom, with students eventually deflasking the seedlings in their own greenhouse. The students have been very successful orchid growers, and TERRA is the first school to place orchids back into trees on their own campus. Through the Fairchild Challenge, more than 30 schools, both public and private, are so far on the list to receive their own flasks of cowhorn orchids to monitor, research and place into trees on their campuses. The new BioTECH @ Richmond Heights High School in Miami will also soon foster orchid seedlings in their extensive Fairchild Tissue Culture Laboratory.

Additionally, Ph.D. student and Fairchild Researcher Jason Downing has taken the opportunity to study the complexities of the orchid–fungus–pollinator relationship in the cowhorn orchid as part of his doctoral research, leading to a greater understanding of this orchid's natural propagation in wild and, eventually, re-established populations.

Future plans include propagation of up to eight rare native south Florida orchid species, includ-

Opposite: A closer view of the flasks.
This page: Dr. Martin Motes and
volunteers attach orchids to live oaks.





This photo: The butterfly orchid. Left: A cowhorn orchid in bloom. Bottom Left: Seedlings are carefully transplanted to a new flask to allow them room to grow. Below: Students tend to orchid seedlings at TERRA Environmental Research Institute.



ABOUT FAIRCHILD TROPICAL BOTANICAL GARDEN

Located just southwest of Miami in Coral Gables, Fla., Fairchild is dedicated to exploring, explaining and conserving the world of tropical plants, from the local area and all around the globe. It is open every day except December 25, with special events, classes and lectures taking place throughout the year. See more and plan a visit at fairchildgarden.org.

ing the cockleshell orchid and dollar orchid. More schools at all levels are lining up to grow orchids in their classrooms. The Fairchild Explorer Program for elementary schools will employ approximately 1,000 students in third through fifth grades to plant the Fairchild-cultivated terrestrial pink orchid (*Bletia purpurea*), another rare native; they'll be tasked with taking the orchids home or to school and reporting back on their growth. Given the combined passion for these orchids shown by volunteers, educators, students and the local community, it won't be long before we can all simply look up to see some of our most beguiling native orchids. ☞

KENNETH SETZER is Writer and Editor for Fairchild Tropical Botanic Garden, in Coral Gables, Fla. To learn more and become a supporter of the Million Orchid Project, visit fairchildgarden.org/science-conservation/the-million-orchid-project.