Montgomery Botanical NEWS

Advancing Research, Conservation, and Education through Scientific Plant Collections

Spring/Summer 2011 Volume 19, Number 1

Chris Tyson Plant Conservation Building

Moving Botany Forward at Montgomery

To advance science, education, conservation of tropical plants, emphasizing palms and cycads, Montgomery Botanical Center keeps living plants from around the world in population-based, documented, scientific collections in a 120-acre botanical garden exemplifying excellent design.

Montgomery Botanical Center is a tax-exempt, nonprofit institution established by Nell Montgomery Jennings in memory of her husband, Colonel Robert H. Montgomery, and his love of palms and cycads.

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Edited by Tracy Magellan

Masthead photo of Montgomery Palm (*Veitchia arecina*)

Printed on recycled paper

From the Executive Director

Dear Friends,

We are definitely MOVING BOTANY FORWARD at Montgomery. It's easy to see that consistent focus on the most important part of our work—living plant collections—leads to many great outcomes.

I have big news to share here: the dedication of the Chris Tyson Plant Conservation Building! On the facing page are photos and highlights from the gathering. This new facility moves our botanical capacity to a new level at MBC. We are ready for more plant work!

Through these pages are other nice examples of botanical effort. Working on plant questions and concerns, the MBC Team studies and conserves some true treasures. Here, Michael and Cristina share their ongoing work with a rare desert *Zamia* (p. 4), Larry relates his recent fieldwork in Trinidad (p. 5) and Chad journals our cycad studies in Belize (p. 6). Christine Bacon's work (p. 7) deals with some of the world's rarest palms!

The good work being done at Montgomery speaks directly to this newsletter's theme. There are many important things to work on at a botanic garden. Our team always puts Botany right up in front—plants are first on the list.

Our successes come from knowing that clear priority, and also from your support and participation. Thank you for working with us to advance botany—pages 10 and 11 clearly show how important you are to Montgomery!

I look forward to seeing you here at Montgomery again soon.

Pictured: Dr. Patrick Griffith in the Chris Tyson Plant Conservation Building during construction.

A New Building for Conservation and Research

The **Chris Tyson Plant Conservation Building** was dedicated on November 6, 2010. This great advancement provides Montgomery with needed capacity for important work. Mrs. Tyson's generous gift enabled Montgomery to construct a new, larger facility for the seedbank program, and also provide much needed workspace for research.

Christiane Tyson, a longtime volunteer at MBC and supporter of botany, horticulture and gardens, saw the need for this facility at MBC. Christiane and Christopher Tyson worked closely with MBC, its architect and landscape architect, to design a building that meets Montgomery's increasing work needs and also integrates with the existing architecture and garden design.

Over 100 guests gathered for the dedication—including many of the Tyson Family, who travelled great distances to attend. Montgomery's friends, colleagues, supporters, board and staff were represented, as well as many of Miami's botanical institutions. A selection of speakers offered remarks on the occasion, highlighting how horticulture and botany will see greater success through Mrs. Tyson's generous gift. MBC President Charles P. Sacher highlighted all of MBC's ongoing work in botany that will be based in the new building. John DeMott shared the history—and future growth—of the seedbank program. Dr. Carol Horvitz spoke of how this moves collaboration among our botanical community forward for the sake of plant science.

Christiane—a dedicated plant enthusiast—was presented with a seedling to commemorate the occasion. Dr. Patrick Griffith, MBC Executive Director remarked:

> "If you know Chris, you know that she loves to give and receive plants. This, of course, is what marks a true plant person—unfettered exchange of these living treasures. Today, I present Chris with a very special plant, one that exemplifies why her gift means so much. The plant here is *Microcycas calocoma*, a critically endangered cycad. This is a finicky, difficult to propagate plant and a glacially slow growing one. There are less than 600 plants in the wild. Our work at MBC has produced and distributed over 6,000 seeds!
>
> Making this rare, expensive, difficult and coveted plant widely available is our goal. This reduces poaching and ensures against extinction. This is just one example of why we grow plants and the great work we can do through our seedbank. Chris, with your gift, we look forward to many more successes like this one."

Christiane Tyson then related her perspective, and shared her vision for helping gardens and botanists—highlighting her values, how she realized she could help move botany forward and her desire to see good projects continue.

The Tyson family at the new Chris Tyson Plant Conservation Building at Montgomery

Open house highlighting research and conservation

Christiane Tyson unveiling the plaque

Please join us in thanking the Tysons for their deeply generous gift and for their dedication to plant science and conservation.

Dr. Patrick Griffith, Executive Director
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Cycad Conservation: *Zamia encephalartoides* in Colombia

Zamia encephalartoides is a cycad native to a network of deep, dry canyons carved into the Eastern Andes of Colombia by the Chicamocha River. The hot, dry, rocky and open landscape where it grows is quite different from that of other Colombian *Zamia*, which typically grow in humid forests.

With tough, leathery leaves and large, colorful cones, *Zamia encephalartoides* is remarkably adapted to this arid environment and superficially resembles *Encephalartos*, an African genus that typically grows in similar dry, open environments. In fact, the name, "*Zamia encephalartoides*" means "Encephalartos-like Zamia".

This unique cycad species was described by Dennis Stevenson only a decade ago, and has not been studied extensively. The tropical dry forest ecosystem in which it occurs is one of the most fragmented, degraded and poorly understood ecosystems in Colombia—expanding agriculture and other human activities are rapidly reducing the number of known plants.

Supported by a Future Conservationist Award of the Conservation Leadership Programme, Dr. Cristina Lopez-Gallego and Alvaro Idárraga of the Universidad de Antioquia (Medellín, Colombia) along with Michael Calonje of MBC have started a project that aims to better understand the distribution, abundance and conservation status of this cycad.

Zamia encephalartoides

The project involves locating and mapping native *Zamia encephalartoides* populations in order to determine the full geographical distribution of the species, as well as gathering data on plant survival, growth and reproductive rates from two of the largest populations in order to estimate their viability. Current mapping technology, with high-resolution satellite imagery and GIS software obtained through a ESRI Botanic Garden grant, enables the team to visualize the cycad's distribution in terms of slope, aspect, and elevation. These data will be used by the team to provide a detailed assessment of the conservation status, for the IUCN Cycad Specialist Group's Red List of Threatened Species.

Besides gathering information about wild populations, the team will conserve *Zamia encephalartoides* in *ex situ* collections to support an ongoing reintroduction program led by the local "Eloy Valenzuela" Botanical Garden (Floridablanca, Santander). Furthermore, the project will provide an action plan for conservation including potential management strategies to address known threats to this species.

We hope that results of this study will increase our knowledge of this poorly known species, and will benefit conservation by increasing its numbers in cultivation and in the wild and by providing useful recommendations to local conservation authorities.

Cristina Lopez-Gallego and Claudia Calonje with *Zamia encephalartoides* in habitat

Tobacco being grown around existing *Zamia encephalartoides*

Michael Calonje, Cycad Biologist
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Dr. Cristina Lopez-Gallego,
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Palm Fieldwork in Trinidad: Termites and Mud Glaciers

In October 2010, Montgomery Botanical Center worked with Fairchild Tropical Botanic Garden on fieldwork in Trinidad. Patrick Griffith and I last collected in Trinidad in April 2007, so by going in October, I was able to collect different species, which fruited during a different growing season (*Attalea maripa, Astrocaryum aculeatum, Bactris campestris, Bactris simplicifrons* and *Desmoncus orthacanthos*).

We collected a couple of populations of *Attalea maripa*, but since their fruiting season had just passed, good seed for these forest giants was not easy to find. With diligence, we collected viable seed that passed the float test (good seed sinks, bad seed floats).

While collecting *Astrocaryum aculeatum*, I learned that arboreal termites can be vicious. *Astrocaryum* trunks are so spiny they cannot be climbed, but I found one that had recently been knocked over by a fallen tree. While balancing on this fallen tree trunk, sawing off a palm inflorescence, the vibrations disturbed a termite nest and troops of pale soldier termites flooded down the trunk with their horn-armed heads in attack mode. It was difficult removing the inflorescence, while delicately balancing on the trunk, avoiding the long *Astrocaryum* spines and warding off termites bent on "goring" me with their unicorn heads. It did motivate me to work more efficiently, though.

Bactris campestris stems are adorned with spines and too skinny to climb, but we collected several from the marsh forests using a pole saw that I had fabricated by tying my pruning saw to a long woody stem.

Only a few mature red fruit of the relatively spineless, ornamentally attractive *Bactris simplicifrons* were gathered at a small roadside park. Their undivided leaves and unbranched, downward-bent infructescences adorned with red fruit helped to distinguish them.

Larry Noblick, Keisha Manaure, Winston Johnson, Brad Bharath, and Juan Rivera

Bactris simplicifrons fruit

Collecting a spiny, vine-like palm like *Desmoncus orthacanthos* is challenging. When there are no trees, it worms itself into an impenetrable thicket. Among trees, it climbs to the top of the canopy. Finding mature "accessible" fruits is a blessed discovery.

While on the mission to collect palms in Trinidad, I also climbed up the face of a mud glacier, in order to reach a specimen of *Sabal mauritiiformis*. Pressure between the Caribbean and South American plates have produced east to west fractures or faults in Trinidad. Along the southern fractures are some unusual geological phenomena, like a pitch lake, mud volcanoes, and a mud glacier. The mud glacier periodically exudes massive amounts of mud squeezed from a large area at the top of a steep slope just west of Palo Seco Beach and the mud slowly and deliberately flows down to the ocean surf, bull-dozing everything in its path like an avalanche in slow motion.

Melissa Abdo, Juan Rivera and I collected and cleaned over 6,000 seed of 15 different palm species, but none of this would have been possible without the full collaboration of our Trinidadian colleagues at the University of the West Indies, Yasmin Baksh-Comeau, Winston Johnson, Keisha Manaure and Brad Bharath.

Anglaise Point mud glacier flowing towards the southern coast

Dr. Larry Noblick, Palm Biologist
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Revisiting New Cycad Discoveries in Belize

Collecting *Zamia decumbens*

October 30, 2010

November 4, 2010

Gathering data

This past fall, MBC undertook research and conservation fieldwork in collaboration with Belize Botanic Gardens (BBG) and Gemini Botanical Garden (GBG). This project builds on MBC fieldwork from 2008 that led to two new *Zamia* species descriptions. Each of these species grows in an unusual habitat: The primary habitat of *Zamia decumbens* is in two deep sinkholes in the Maya Mountains of southern Belize, whereas *Z. meermanii* grows on the steep sides of limestone outcrops in central Belize. *Zamia decumbens* is unique among cycads in its preference for a sinkhole habitat and *Z. meermanii* is one of only three known *Zamia* species that normally live on cliffs. Despite the many differences between their habitats, both species prefer a dry well-drained environment for their roots. The primary goal of this fieldwork was to gain detailed knowledge of the size and genetic diversity of the sinkhole populations of *Z. decumbens*.

October 29: MBC Cycad Biologist Michael Calonje and Collections Manager Chad Husby arrived in Belize on Friday, met Cristina Perez of GBG and proceeded south to the Toledo District. Along the way, the expedition team examined a key site where *Zamia meermanii* was studied and collected in 2008. Mature seed cones were observed on two plants, an exciting discovery because no female cones had been found during extensive surveys in 2008. Arrangements were made to return to the site to collect the cones. The team continued south and met with Paul Craft of GBG and Rudi Aguilar and Freddy Salvador of BBG.

October 30: the team set out for Western Toledo to survey the nearest sinkhole population of *Zamia decumbens*. There they met with Valentino, who had provided key assistance in 2008. Michael, Chad, Rudy, Freddy and Valentino set out to survey this population, while Paul and Cristina remained behind to collect ferns and other flora. Careful survey revealed approximately 200 plants in the population. The team was able to label 150 plants in the population, measure their size, sample leaflets for genetic diversity, and collect seeds for *ex situ* conservation.

October 31: the team returned to Valentino's home to set out for a more distant sinkhole, which required a day's walk and overnight camping in the rainforest.

November 1: the team measured and sampled 183 plants of the approximately 200 plants in the population and collected seeds. In order to save time for collecting the *Z. meermanii* cones, the team decided to hike back to Valentino's place during the night rather than spend a second night at camp.

November 2 and 3: MBC and BBG staff drove to Belmopan to process leaflets, visit the Belize Forest Department to complete the permitting and make preparations to collect *Z. meermanii*. At the Forest Department, Michael and Chad met with ecologist and long-time MBC collaborator Jan Meerman, the namesake of *Zamia meermanii*.

November 4: Michael and Chad proceeded to the *Z. meermanii* site and met there with BBG staff Rudy, Freddy and Sinead McCormick. Although the *Z. meermanii* with cones were growing on steep limestone cliffs, the team was able to cut sufficiently long *Cecropia* trunks to use as tools to dislodge the cones. After collecting, seeds of *Z. meermanii* and *Z. decumbens* were shared with BBG. Michael and Chad stayed up all night on November 4 preserving leaflets in silica gel, cleaning seeds and packing.

November 5: Chad and Michael headed to the Agriculture Station to obtain a phytosanitary certificate in the morning before heading for the airport.

The expedition was a great success, exceeding initial expectations through the synergistic partnership of the gardens—and some sleepless nights hiking and working! Many seeds of both *Z. decumbens* and *Z. meermanii* are currently germinating in the MBC nursery.

Dr. Chad Husby, Collections Manager
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Christine Bacon Studies Rare Palms in Hawaii

In 2010, Montgomery Botanical Center, the National Science Foundation, the National Tropical Botanical Garden, and the Plant Extinction Prevention Programs in Maui and Oahu supported an important 12-day palm conservation project in the Hawaiian archipelago.

Ongoing Research

This research aimed at understanding phylogenetic relationships and conservation genetics of the threatened and endangered *Pritchardia* palms, and contributed to the Ph.D. dissertation that I am completing at Colorado State University. As a Research Associate of MBC, my fieldwork also helps contribute to the living collection of palms at Montgomery.

On my second trip to the Hawaiian Islands, I focused on two particularly interesting regions of the archipelago—the Koolau Mountains of Oahu and the Makaleha Mountains of Kauai. Both of these areas have numerous *Pritchardia* species growing in close proximity, a distribution pattern known as 'sympatry.' In the Koolaus, *Pritchardia bakeri*, *P. kahukuensis* and *P. martii* are found in close proximity and in the Makalehas, *P. hardyii*, *P. limahuliensis*, *P. minor* and *P. napaliensis* grow sympatrically.

A common explanation for so many distinct species in such a small geographic area is that they evolved separately and then came into contact with each other after reproductive barriers had been formed. I aim to test this hypothesis using genetic information. DNA material, herbarium vouchers and seeds will help elucidate genetic and biogeographic patterns that cause these interesting distributions.

Fieldwork Outcomes

Twelve days of fieldwork provided MBC with seeds for *ex situ* conservation of five very rare palm species—*P. bakeri*, *P. kahukuensis*, *P. limahuliensis*, *P. minor*, and *P. napaliensis*—and also provided an extensive DNA collection to study these endemic palms. This fieldwork was performed at three sites across two islands: Kahuku Army Training Site, Koolau Mountains (Oahu), along the Powerline Trail, Makaleha Mountains (Kauai), and in the Kokee State Park (Kauai). Herbarium specimens were deposited at the Bishop Museum in Hawaii, and the palms were also extensively documented via photography and GPS data. Morphological data was also collected from herbarium specimens at the Bishop Museum to help shed light on species boundaries in the genus, especially in these two mountain ranges.

Montgomery Botanical Center (MBC) obtained important conservation material of many Hawaiian palms, and helped support collaborative studies in support of palm research through this work.

Christine D. Bacon, MBC Research Associate
Ph.D. Candidate at Colorado State University
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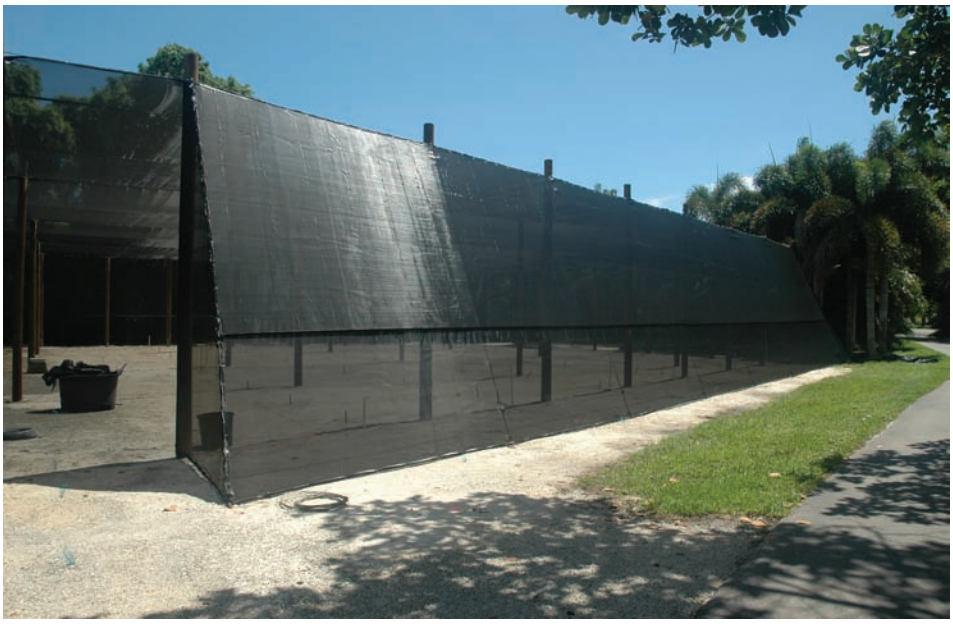
Pritchardia kahukuensis fruit

Christine Bacon with *P. bakeri*

Pritchardia bakeri

Prichardia kahukuensis in habitat

Thank You to the Batchelor Foundation



New Palm Shadehouse at Montgomery

M. Patrick Griffith, Executive Director
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Tracy Magellan, Outreach Manager
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The Batchelor Foundation generously granted Montgomery Botanical Center funding for a new full sun nursery and palm shadehouse. This greatly improves our work!

The new full sun nursery and shadehouse are beautiful and also function beautifully. The young plants have been relocated to the new areas and are doing well with all the added space.

With recent conservation and research fieldwork, Montgomery sees a growing volume of seed from rare and endangered species. Last year we collected over 4,000 new seeds—which quickly grow to fill ever larger containers. The additional nursery space helps support these young plants, ensuring that rare palms and cycads are conserved.

Montgomery has continuously grown interesting and rare plants in this nursery since 1932. Please join us in thanking the Batchelor Foundation for the generous support that continues this tradition—and moves it forward with modern plant propagation infrastructure.

Montgomery's Cycads Help Train Plant Protectors

Officers from the United States Dept. of Agriculture Animal and Plant Inspection Service Plant Protection and Quarantine (USDA APHIS PPQ) recently used the cycad collection for a specialized purpose. They took advantage of a generous offer by MBC to provide cycad leaf and cone specimens for an identification course on cycads offered at Miami International Airport. The training was organized by William Tang, PPQ Entomologist and longtime collaborator at MBC.

Leaves and cones from 10 of the 11 cycad genera were collected for use in the course. The class was held over 5 days from September 29 - October 5 at PPQ's new plant inspection station at Miami International Airport. Several dozen officers from PPQ as well as Customs and Border Protection (CBP) participated in the training. Officers from these two agencies provide the front line for enforcing Endangered Species regulations during baggage, cargo and vehicle inspections at borders and ports in the U.S. The training helps PPQ and CBP officers better detect and recognize cycad specimens and material during their daily inspection activities.

CITES, the *Convention on International Trade in Endangered Species*, is currently recognized by 175 countries and is the major international treaty regulating the trade of those animal and plants considered to be endangered. Training is essential for government officials to accurately enforce these regulations—and the MBC cycads helped these officials to better protect plants at our ports.

William Tang (left) giving instructions during the cycad identification class at the Miami plant inspection station.

Willie Tang, MBC Honorary Member
William.Tang@aphis.usda.gov

Thank You to Our 2010 Volunteers

AmeriCorps—City Year
Aronson, Larry
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BSA Eagle Scout Jonathan Hirst
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Scherban, Bernard
Schlessinger, Evan
Sen, Smita
Smiley, Karl
Sone, Gabriel
South Florida Palm Society
Twining, Penelope
Tyson, Chris
UM Hope Group
Wicomb, Kyle
Witcher, Brian

Salt and Water at MBC

Salt-water intrusion was not a concern for Col. Montgomery when he established the Coconut Grove Palmetum in 1932. Horticulturists with extensive local knowledge such as George Brett and Tom Fennel highly recommended our site for the Colonel's palm collection. The Everglades would keep the Biscayne Aquifer supplied with fresh water forever, it was presumed.

After WWII, changes occurred that would ultimately prove deleterious to the Aquifer. Dredging of the Snapper Creek Canal in the late 1940s allowed seawater to flow through the highly permeable Atlantic ridge into the Biscayne Aquifer, MBC's prime source of well water.

Expansion of Montgomery plant collections southward away from the primary irrigation main led us to explore supplementary irrigation water sources. There was an abandoned well in the south part of the property, and sampling showed that this could be a viable water source. In 2000 the well was brought back on line. Despite rigorous monitoring, the instrumentation was simply not sensitive enough to catch a subtle increase in salinity. And many of the plants in the area such as *Sabal*, *Phoenix* and *Serenoa* are known for their salt-tolerance, so there were no overt symptoms.

Currently, MBC uses water from a well further west for irrigation, and is exploring for the most salt tolerant plants for the lowland portions of the garden. For a garden that begins at sea level, this is a natural way forward.

Lee Anderson, Superintendant
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Longterm Montgomery Volunteer Trish Hicks helps in the Nursery. Would you like to? To volunteer to help at Montgomery call (305)667-3800 ext. 114 tracym@montgomerybotanical.org

Montgomery Botanical Center 2010 Collection Inventory

	Palms	Cycads	Other
Total Taxa	421	255	624
in ground	355	236	490
in nursery	138	98	195
Total Accessions	2,300	1,912	2,362
in ground	1,888	1,554	2,089
in nursery	523	544	293
Total Plants	14,126	9,336	3,280
in ground	5,688	4,099	2,463
in nursery	8,438	5,237	817

Montgomery Botanical Center
Gratefully Acknowledges Your 2010 Support

FOR THE MARION AND TEX HAYNES PATIO
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CORAL GABLES
THE CITY BEAUTIFUL

FROM THE MONTGOMERY ARCHIVE

Nell Montgomery, founder of Montgomery Botanical Center, sits here on a footbridge over Long Lake in this photograph from the 1930s. The saltwater lakes were established during that era, and designed to accommodate tidal flow through culverts. These healthy waters support many interesting fauna—barracuda, snook and crocodiles are often seen and the occasional manatee will also visit. Like Nell, visitors here enjoy spotting the wildlife in these lowlands.

In the background are some of the earliest palm collections planted in the lowlands. Many of these plants are at Montgomery to this day.