Montgomery Botanical NEWS

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Advancing Research, Conservation, and Education through Scientific Plant Collections

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

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

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From the Executive Director

Dear Friends,

We made GREAT progress this year! New scientific advances, more palms and cycads for the garden, further refinement of our landscape, and more conservation success. I am glad to share these outcomes with you.

I am very excited about our recent discovery – the facing page recounts how we unraveled a *long-hidden mystery* about our native cycad. I was thrilled to work with good friends and colleagues to uncover this interesting find. This is only one recent scientific milestone – see page 6 for more new discoveries.

Pages 4 and 5 highlight our recent Plant Exploration work in Namibia. I am deeply grateful for such good fortune there, and for the productive international collaborations made possible through our PLANT EXPLORATION FUND. I am glad that our botanical partner in Namibia, Leevi, could also join us here at Montgomery for specialized training (see page 7) – the friendships we build lead to so many positive results.

All of these great outcomes start with excellent people – page 7 celebrates those who joined in our efforts over the summer, as well as our beloved Martha who recently retired, leaving our buildings in beautiful shape. My gratitude for our team extends also to you, for all the ways you help Montgomery!

Pictured: Patrick Griffith at Nong Nooch Tropical Botanic Garden (Thailand), where he recently exchanged seeds and specimens (to be discussed in a future issue).
On the Cover: Fred Stauffer, Leevi Nanyeni, and Patrick Griffith with Makalani Palm, *Hyphaene petersiana* (see page 4).

Native Cycad Beloved by Ancient Floridians

A stunning recent discovery: our native coontie, *Zamia integrifolia*, was dug up and carried around the state by early peoples! This discovery completes a rich narrative about this plant's relationship with people – for better or worse.

The Coontie

Zamia integrifolia, the only cycad native to the United States, is presently found only in Florida; the plants were last seen in Georgia 50 years ago. It is widely used in civic landscapes, and is a critical food for the native Atala butterfly. In many places around the state, the coontie is now quite common. But 100 years ago, our coontie was nearly driven to extinction!

From harvest to overharvest

Florida's Native Peoples kept an ancient tradition of harvesting, slowly processing, and cooking coontie stems. De Soto's 1539 expedition records the first time hasty consumption poisoned an impatient adventurer; neurotoxins in the starchy stems require a slow leaching process to make the coontie safe for eating. Nineteenth Century settlers learned this method from Seminoles, and developed a cottage industry producing starch for local sale. By 1900, industrial mills near Miami and Orlando were processing (literal) tons of wild coontie stems per day – thousands of plants! Once called a limitless resource, the coontie was a rare find by 1921, the year the Hurst Mill – the very last starch mill – closed down.

A deeper history

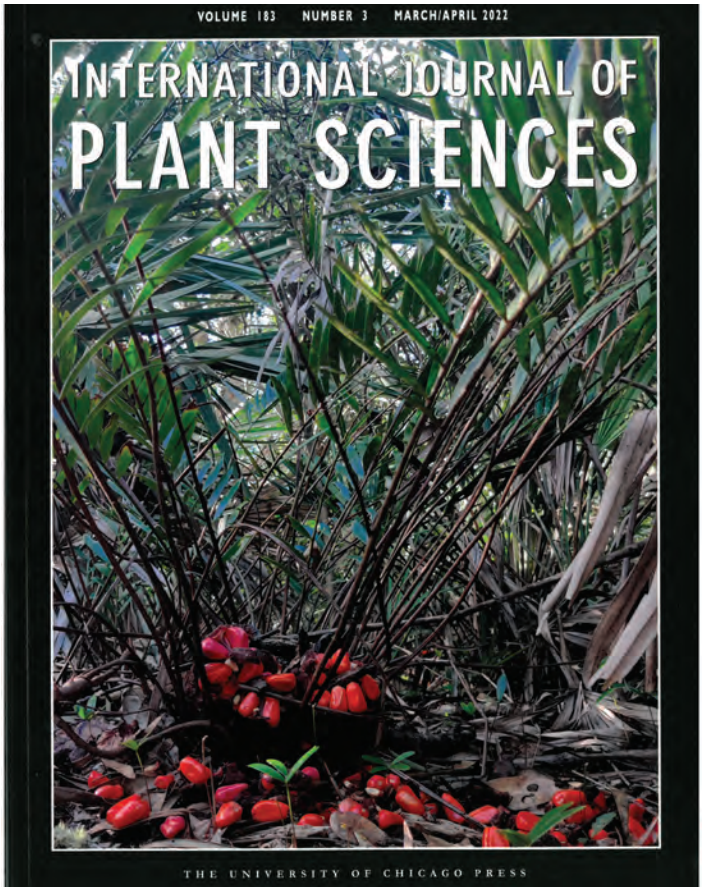
Experts studying this captivating plant have long asked from where the coonties came. Early theories proposed that Native Peoples may have traded this important resource. The genetic data showed one consistent pattern: plants from Crystal River always appeared to be central to any relationships. Even plants as far south as the Everglades and Cayo Costa always showed a close genetic affinity to this one location in the "bend" of Florida.

This result compelled us to read more deeply about Crystal River – and we learned that it was once the "Capital" of Florida! The shell mound building people there controlled a vast trade network reaching from Miami to Alabama. Artifacts from far-flung locales have all been recovered in the monumental mounds at Crystal River. Amazingly, the network of genetic relationships in Florida's *Zamia* closely matches that trade network recovered from the archaeological record.

So, we wondered if it was just a fluke – could pollination or seed dispersal give a pattern that looks

Continued on page 6

This photo from 1912 shows a parade float for the Hurst Mill decorated with zamia leaves and stems, parked in front of the Dade County Courthouse. The Hurst Mill was located at what is now the intersection of US 1 and 104th street, about 3 miles from Montgomery Botanical Center. *Zamia* starch was widely sold as "Florida Arrowroot" before natural populations were exhausted in 1921.



The study was featured on the cover of International Journal of Plant Sciences, and is open access on the IJPS website.

In Search of the Makalani Palm

As soon as international field collaborations became feasible again, we rekindled our efforts to study and conserve the iconic Makalani Palm. *Hyphaene petersiana* grows across the vast savannas of southern Africa, but at the edges of its range in Namibia, the palm is often found in scattered oases along waterways.

With a team of experts from Namibia, Switzerland and the US, we set out northwards from Windhoek through an immense, dry landscape. Long hours of dust and gravel were punctuated by the occasional wandering giraffe. As the sun dipped below the northwest horizon, we finally saw our first silhouette of the elusive palm. Bivouacked for a cold desert night, we rose at dawn to make our first specimens.

Two more weeks camping and searching yielded important treasures – the first complete male and female specimens for the Windhoek herbarium, numerous seeds to grow in Windhoek, Geneva, and Miami, and important DNA specimens – but our most important treasure was a greater understanding of the role of this palm in the lives and livelihoods of so many. As a vital source of shelter, food, drink, and craft, this palm is indispensable in these arid places.

I also find the Makalani Palm deeply compelling for its color, architecture, and beauty. As the seedlings I brought back grow and thrive I am filled with anticipation about how stunning they will look in the Montgomery garden – a sentiment shared by my friends in Geneva and Windhoek.

M. Patrick Griffith, MBC Executive Director
patrick@montgomerybotanical.org

Funded by Montgomery's Plant Exploration Fund, this project was a partnership between The National Botanical Institute of Namibia, the Conservatoire et Jardin Botaniques de Genève, and Montgomery Botanical Center – I was glad to work with my botanical colleagues Leevi Nanyeni and Fred Stauffer. We are grateful to the National Commission on Research, Science, and Technology for permission to study and collect these palms. Asteria Timoteus led camp logistics very professionally, and Coline Utz of Léman Bleu TV documented our work. I remain thankful to all of the local officials, leaders, and citizens who shared their knowledge and hospitality, and allowed our studies to proceed.

Background: An oasis of Makalani palms at Epupa Falls. and Angola (background). Locals in the river area depend

We spent many days searching for palms at the exact perfect stage to make complete herbarium specimens.

The remoteness of the landscape prompted classic methods such as campfires to dry our specimens.

The Cunene River here borders Namibia (foreground)
l on the palm fruits and also tap the palms to make wine.

Florida *Zamia* continued

like ancient, long-distance trade? As it turns out, zamia seeds have some of the shortest dispersal distances, and the pollinating beetles are not accomplished flyers! So, the best explanation for our genetic result is that Native Peoples took these cherished plants with them on their journeys to and from Crystal River.

A path forward

Our study also found a number of populations in need of conservation help. We are now examining how well botanic gardens are stewarding the remaining genetic diversity through cultivation practices. These plants survived a long and interesting history! Our work ensures that their history does not end in our time.

We are Grateful

This study – a joint project of USDA-Chapman Field, FIU, and Montgomery – was funded by the National Science Foundation (DEB 1050340), the Mohamed bin Zayed Species Conservation Fund (project 0925331), and the Christiane Tyson Research Fellowship. We are grateful to all of the landowners and land managers for granting permission to collect specimens and for expertise and guidance. Citation: Griffith, M. Patrick, Meerow, Alan W., Calonje, Michael, Gonzalez, Eliza, Nakamura, Kyoko and Francisco-Ortega, Javier. 2022. Genetic patterns of *Zamia* in Florida are consistent with ancient human influence and recent near extirpation. *International Journal of Plant Sciences*, *183*(3), pp.169-185. Our ongoing coontie collection project is funded by the Institute of Museum and Library Services (MG-245575-OMS-20), in collaboration with the Morton Arboretum.

Alan Meerow marks a GPS point for a *Zamia* specimen at Tomoka State Park. We studied a total of 762 plants from 25 different state parks, national parks, and national forests – a very broad and large-scale analysis.

To learn more, please listen to the In Defense of Plants (www.indefenseofplants.com) Podcast, episode 369: "A Historical Perspective on the Coontie."

Research Updates

Shayla Salzman (pictured here) performed this very interesting experiment in our greenhouse this summer, studying insect attraction to cycads.

James Clugston, a longtime colleague, published an innovative study on conserving Australia's native cycads. The study used important specimens from Montgomery.

Angela Cano, working with Fred Stauffer (see page 4) and others, completed a large-scale study of understory palms from Central America. Montgomery's palms augmented the analysis.

Shayla's colleague Rosemary Glos, along with an international team including our own Michael Calonje, published a large scale study of *Zamia* anatomy, phylogeny, and climate.

See more at montgomerybotanical.org

Team News

People Move Montgomery Forward!

Marta Lagos retired this summer after diligently caring for every one of our buildings for 26 years – she is greatly missed! Her care and attention to detail kept these cherished places vibrant and comfortable. We welcome **Maria Serrano** who has assumed this important responsibility, caring for the historic structures we use every day. Local high school students **Nina Castro Alves**, **Ciara Coloumbe** and **Jose Solorzano** interned and worked with us over the summer, helping with a variety of research and plant care tasks. We are grateful for their help and enthusiasm! **Kelsey Bartlett** joins us from George Washington University as our Stuart Y. and Peter R. Jennings intern, studying ex situ conservation, and **Christopher Elliott** from the University of Miami is this year's Peter R. Jennings and Robert K. Zuck Intern, studying mycorrhizal associations in *Sabal* palms – we are glad to have such talented students! **Caroline Van Staalduinen**, **Justin Smith** and **Liz Schunk** joined us from East Carolina University as our Dickerson Scholarship Interns, and provided exceptional skill in mapping some of our most important palms.


Martha Lagos


Maria Serrano


Nina Castro Alves


Ciara Coloumbe


Jose Solorzano


Kelsey Bartlett


Christopher Elliott


Caroline Van Staalduinen


Justin Smith


Liz Schunk

The Science of Naming Plants

Harvard University's Dr. Kanchi Gandhi (6th from the right), a world authority on plant nomenclature, delivered an advanced workshop at Montgomery this April, titled "Plant Taxonomy and Nomenclature: Applications in Latin America and the Caribbean." Dr. Gandhi is the main coordinator of the International Plant Name Index, a global database of scientific names used in botany.

The event was jointly organized by Montgomery and the Latin America and Caribbean Center of Florida International University (FIU), with academic guidance from the FIU Biology Department. The course was broadly international in scope, attended by experts from the Bahamas National Trust, Fairchild, FIU, Montgomery, the National Botanical Institute of Namibia, the Natural History Museum of Jamaica, University of Florida, and the University of Puerto Rico.

The course solidified botanical naming expertise among the diverse group, and has already led to several taxonomic improvements in cycads, sunflowers, and acanthi. Accurate, precise naming is critical to describing plant diversity – this workshop moved the botanical field forward, and also built many new collaborations.

Dr. Javier Francisco-Ortega, FIU Professor, MBC Kelly Research Fellow, ortegaj@fiu.edu

Background: A leaf of Makalani Palm, *Hyphaene petersiana* (see page 4).

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Colonel Montgomery on "Adonidia Avenue," 1943

Colonel Robert Montgomery inspects his collection of *Adonidia merrillii*, or Manila Palm, at his Coconut Grove Palmetum in 1943. The photo notes that this planting was nicknamed "Adonidia Avenue" at the time. A native stand of Dade County Pines is visible in the far background, and a young *Copernicia* palm is visible at right.

Native to the Philippines, the Manila Palm is named for Dr. Elmer D. Merrill, who was Director of the New York Botanical Garden when Col. Montgomery established his own garden in 1932. Dr. Merrill was a close friend and colleague of Col. Montgomery, and numerous photographs and letters in the archive document the two of them working together in the early days of the Coconut Grove Palmetum.

Dr. Merrill began his botanical career in the Philippines, and the International Plant Names Index (see page 7) tells us that this palm was named in honor of Dr. Merrill in 1909. At the time this photograph was taken, Dr. Merrill was working on classified botanical projects – lists of edible and poisonous plants in the Philippines and elsewhere – to support the Allies in the Pacific.