Montgomery Botanical Spring/Summer 2024 NEWS Volume 52, Number 1

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Advancing Research, Conservation, and Education through Scientific Plant Collections

Montgomery Botanical Center Established 1959

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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.

Montgomery Botanical News is published twice a year by Montgomery Botanical Center.

11901 Old Cutler Road Coral Gables, Florida 33156 Phone 305.667.3800

www.montgomerybotanical.org

Edited by Tracy Magellan

Printed on recycled paper



From the Executive Director

Dear Friends,

Montgomery moved forward amazingly in the last year! So many great initiatives and outcomes; for example, we are thrilled to be at the *very forefront* of cycad conservation science – the facing page introduces how we advance the understanding of cycad relationships and diversity, all while increasing their security. I am especially grateful to Dr. Tim Gregory for his leadership in generously supporting these innovative and essential studies.

Our explorations continue to bear fruit and seeds and specimens. Pages 5, 6, and 7 highlight the great distances we go to move botany and horticulture forward. I am deeply thankful for the expertise and colleagueship shared by our worldwide partners.

We go far and wide in search of plants, but far and away our greatest efforts are made tending our own garden. Page 4 highlights the very first part of that garden, a cherished collection that we continue to refine. Preserving the original feel of our 92-year-old Palmetum while continually adding to its depth and diversity is a challenge we embrace energetically.

All of these efforts and advancements are only possible because of your partnership and support (see pages 10 and 11). Your donation sends us further, lets us look closer, and builds our team in the service of palms and cycads. Thanks for your support!

MPGRUPFIN

Pictured: Dr. Griffith with a large *Cycas micronesica* in the Guam National Wildlife Refuge (see page 5).

On the Cover: A large grove of *Nannorrhops ritchieana* provides shelter from the sands of Dhofar (see page 6).

A New Era for Cycad Conservation Studies

Dr. Clugston with an Australian Cycas couttsiana at Montgomery. This project is generously funded by a grant from Dr. Tim Gregory.

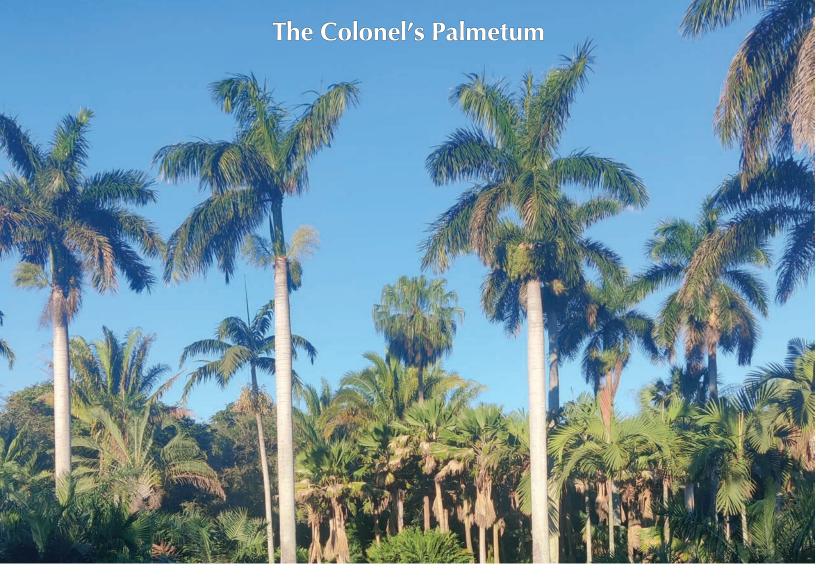
A t Montgomery, we have long used *genetic* methods to help inform us how best to conserve cycads, informing the diversity of populations and plants in our collection. The most recent genetic methods use orders of magnitude more data, and are known as *genomic* approaches. But the large genome size of cycads – occasionally 10 times larger than the human genome – presents some major challenges.

So, I am happy to announce that we have officially started a new cycad genomics project titled: *A New Era for Cycad Genomics – Custom Cross-Species Marker Set*. This project is jointly run between Montgomery and Western Sydney University in Australia, through the Global Conservation Consortium for Cycads. I took up a new position as a Postdoctoral Research Fellow, Cycad Genomics and Conservation funded by this project this past November.

Over the next three years we will design a universal marker set for all living cycad species, enabling great volumes of genomic data to finally be usable for cycads. This marker set will be used to address conservation related questions, with a main aim to characterize variation to better understand species boundaries, detect hybridization and create forensic applications for tackling illegal trade.

Cycads remain threatened, and having direct knowledge of their diversity can inform how best to protect and conserve these amazing species. This project will allow us to compare and monitor cycad species and populations in the service of conservation, in full alignment with the IUCN SSC Cycad Specialist Group's goal for "no more cycad extinctions".

James Clugston, MBC Postdoctoral Fellow J.Clugston@westernsydney.edu.au



Colonel Montgomery bought large palms from across Florida and installed them around his home as it was being built. Naming his collection the COCONUT GROVE PALMETUM, he then exchanged seeds with botanic gardens around the world, growing the most diverse assemblage of palms yet gathered.

The area around Nell's House still holds a number of these ancient specimens, which form the original core of Montgomery Botanical Center's palm collection. We conserve the name Coconut Grove Palmetum to refer to this central part of the landsite.

Passing through the Royal Palm Colonnade, the curve of the main drive highlights views to the east with open sight lines, while the west portion retains the character Colonel Montgomery established with his diverse assemblage of tall palms fronted by large old cycads. This area long had no specific landscape plan but was the result of the Colonel's wish to have his most interesting living prizes close at hand. His result was a forest of palms with a few open spaces to appreciate them from.

Balancing preservation of the Colonel's cherished landscape with the collection priorities of our modern operation required careful planning. Creating a Loop Road around the original Palmetum made a useful demarcation between the Coconut Grove Palmetum and the other areas of the garden, but the visual distinction is subtle. Our landscape planning now fits single specimen palms or small groups of plants into the Coconut Grove Palmetum, while mass plantings of genetically diverse palms are considered for the Palm Walk which starts just south of the Palmetum.

Cycad Crisis : How well can botanic gardens protect plants?

wenty years ago, a terrible insect pest arrived on Guam; Cycas micronesica went from being a common canopy tree to a rare plant. Our expert Michael Calonje collected the last remaining seeds in 2007.

As those seeds grew at Montgomery, new seeds those cycads produced were sent back to Guam - "closing the loop" on ex situ conservation. With fadang plants established at Montgomery and elsewhere, it may be that our garden plants now hold diversity that no longer exists in the wild.

To test this idea, I journeyed to Guam to collect DNA specimens from throughout the island. With local experts, we retraced Michael's route from 17 years ago. Many sites Michael collected fadang from now hold much fewer plants. In some places the cycads are completely eliminated.

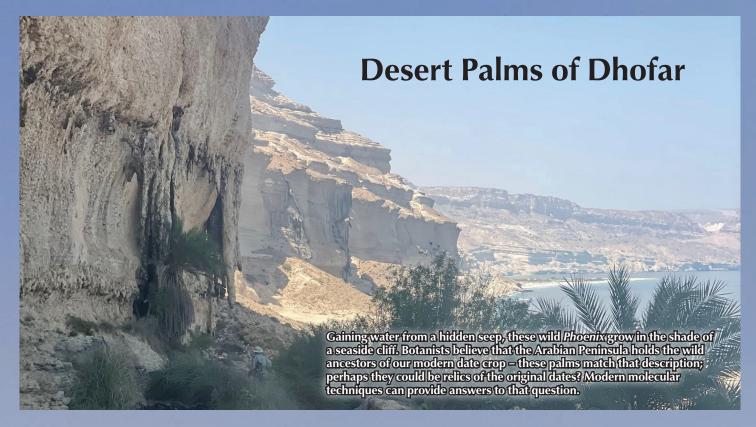
Three comparisons can illustrate the crisis, and how to improve our work: First, comparing the 2007 and 2023 specimens will show what has been lost in the wild; comparing our garden plants to the 2007 specimens can show if we captured that diversity; finally, comparing the garden plants to the 2023 specimens can show if we hold any diversity now extinct in the wild.

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

I am grateful for my expert colleagues: Michael Calonje, Gerard Chargualaf, Angelica Cibrian-Jaramillo, James Clugston, Gil Cruz, Benjamin Deloso, Lauren Eserman, Christine Federan, Vanessa Handley, Blaize Joie Palapac San Nicolas, Anders Lindstrom, Thomas Marler, Mario Martinez, Frankie Matanane, Toni Mizerek, Michael Park, CJ Paulino, Kawika Winter, and Si-Lin Yang, and for permission from the USFWS, USAF, and Guam Department of Agriculture. This study is generously supported by The Red List Project, AgriPlex, the Yang Conservation Foundation, the Plant Exploration Fund (see page 10), and Dr. Tim Gregory (see page 3).



Background: A giant fadang plant growing near the southeast coast of Guam in a protected limestone canyon.



Where the Arabian Peninsula reaches the Indian Ocean, a slice of tropical forest blankets the mountains, hosting baobabs, orchids, and ferns. Tall coconut palms join with abundant date palms to frame the city of Salalah, home to the frankincense trade since time immemorial.

Reading about this unique oasis, I was intrigued by the scant records of *Phoenix caespitosa* – the dwarf date palm – in this region of Oman; the very first herbarium specimens were only collected in 2001! While date palms are among the most useful of plants, *Phoenix caespitosa* might be the least known of all of these. Described as a stemless, clumping palm, it was first known from Yemen and Somalia, rarely seen in cultivation, and often confused with young *Phoenix dactylifera*, the widely farmed edible date. A palm not yet seen at Montgomery!

I partnered with experts at Oman Botanic Garden in search of these elusive plants, and several days of palm hunting yielded some surprises – those specimens from only two decades ago led not to our intended *Phoenix*, but instead took us to many other places: two ravines catastrophically



washed out in a major typhoon, a dry barren hilltop, and a spectacular grove of Mazari Palms! Changes in landscapes and (perhaps) a mis-transcribed field note or two challenged our pursuit.

Coming around a headland into a shallow bight, the bright coastal fog parted to reveal our palm just a few scant meters above the beach – fitting all the descriptions for the species, but defying those previously recorded locations. Another new specimen was located along the shore of a remote Wadi. With these new specimens, and plants growing in Muscat and Miami, these palms can now be better understood and appreciated by a broader audience.

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

I am deeply appreciative of my expert colleagues in this project: Laila Al Harthy, Abdullah Al Hosni, Yahya Aljabri, Mohammed Albalushi, Salim Almakhmari, Omar Alamri, Saud Alquarni, Ahmed Sakroun, Khalid Al Farsi, and Kevin McLaughlin. Permission was graciously granted from the Environment Authority, Sultanate of Oman. This work was generously funded by the Plant Exploration Fund (see page 11).

Backgrounds This extensive grove of Mazeri Palms (Namorthops ritchierang) awaited us in Western Dhofar after dozely following a lead for the dusive Rhoenix acceptions. That due was deep within a published flora – perhaps the author's notes were switched?

Research Updates

Phytotaxa 🐲



Two international teams, each including Michael Calonje, published two new Zamia species – one from Brazil and one from Mexico. Zamia magnifica from Chiapas is notable for its massive leaflets and very long leaves. The new species appear in TAXONOMY v. 3, and PHYTOTAXA v. 598.

Current Biology



Shayla Salzman and her colleagues, including Michael, published their findings on how cone humidity attracts insects to cycads. The innovative study was featured on the cover of CURRENT BIOLOGY V. 33.

A year of intense study yielded some amazing finds! Working with experts from the Dominican Republic, Sweden, and New York, Xavier Gratacos published five new Coccothrinax species, including the amazing Coccothrinax montgomeryana featured on this page – named after Nell Montgomery! These new species appear in PHYTOTAXA v. 589.

Team News



Graciela Hahn and **Luisanna Nuñez** join us from Miami Dade College, as our 2023-2024 Conservation Horticulture Fellows. They provide enthusiastic help and support for our plant care operation.

Jose 'Rudy' Espinoza is with us for the entire academic year as a South Florida Sustainable Environments intern through FIU. His project is to develop a machine learning program to ascertain the viability of cycad pollen.

James Clugston (see page 3) began work at Western Sydney University (WSU, Australia) to improve conservation of cycads. James's position is a joint appointment between Montgomery and WSU.

Zoë Manz is finishing her studies at the University of Miami and is working with Collections Development staff on various research projects.

MONTGOMERY BOTANICAL CENTER 2023 COLLECTION INVENTORY							
	Palms	Cycads	Other		Palms	Cycads	Other
Total Taxa in ground in nursery	430 390 98	264 248 48	475 473 3	Total Plants in ground in nursery	9,376 7,193 2,183	6,557 5,840 717	2,171 2,163 8
Total Accessions in ground in nursery	2,313 2,085 296	1,834 1,714 190	1,832 1,828 4		18,104 Plants !		

THANK YOU TO OUR 2023 VOLUNTEERS

Adair Reeve Castro-Alves, Nina Castro-Alves, Patrick Coconut Grove Garden Club Correa, Emilio Danielson, Laurie Deery, Jaime DuMond, Debb East Carolina University Espinosa, Jose (Rudy) Gobaira, Lilia Gonzalez, David Gulliver Academy Hahn Berberena, Graciela (Grace) Halderman, Michelle Harshaw, Delores Hicks, Trish Jacobson, Kay Jordan, Vivian Kraus, Mark Lagos, Marlos Leverett, Lynn MacDonell, Mayes Martin, Margaret Martin-Rami Fund MBC Board of Directors (page 2) Nghiem-Phu, Lan Noblick, Daniela Park, Lane Pincus, Linda Sacher, Charles P. Street, Michael UM HOPE Vail, Kate Yilmazkuday, Alex

Background: *Brahea armata* is a cherished palm from Mexico with a brilliant white leaf. Although long reputed to be poorly adapted to Florida's climate, Montgomery has a number of these palms thriving onsite.

Montgomery gratefully acknowledges your unrestricted contributions in 2023

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Montgomery apologizes for any omissions or errors in accuracy



IN SUPPORT OF THE PLANT EXPLORATION FUND

In November and December, Montgomery raised over \$100,000 in donations to the Plant Exploration Fund, which was then generously matched by Dr. Lin Lougheed, providing over \$200,000 for field botany, international plant partnerships, and conservation surveys. Dr. Lougheed says, *Patrick is* generous with his time and energy, but he is very conservative when it comes to Montgomery's finances. A donation to MBC is a great investment with a phenomenal return.

Montgomery Botanical Center Gratefully Acknowledges Your 2023 Support

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FROM THE MONTGOMERY ARCHIVE

COCONUT GROVE PALMETUM



This wide-format photograph was part of a study for Montgomery Botanical Center in 1992, for landscape planning purposes. Many of the mature palms in this photo were planted by Colonel Montgomery, and reveal his desire to build a diverse collection around his home. Depicted here are *Phoenix, Arenga, Roystonea, Hyophorbe, Hyphaene, Sabal, Thrinax,* and *Caryota.* Many of these palms remain living today, over three decades later.

The east half of the Coconut Grove Palmetum (see page 4) was built around a long open lawn stretching from Nell's House to Coconut Lake, shown here in full sun. This vista was originally designed by William Lyman Phillips, widely hailed as the Dean of Tropical Landscape Architecture. The vista is conserved today, and the edges of that lawn are further delineated with palm plantings. Montgomery's balance between preserving this historic landscape and building the palm collection contributes to a unique aesthetic.

