

Vol XLI No. 2

FALL 2025

# the • bulletin

of the National Tropical Botanical Garden







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# contents

## 3 MESSAGE FROM THE PRESIDENT & CEO

## features

## 6 ENSURING A FUTURE WITH BOTANICAL GARDENS

by Jon Letman

## 12 EXPLORING THE COLORFUL, TINY WORLD OF HAWAII'S BRYOPHYTES

by Cassandra Jensen

## 22 THE SCIENCE OF SURVIVAL: RARE PLANT RECOVERIES FROM THE BOTANICAL RESEARCH CENTER

by Dr. Tiffany Knight

## 28 A FAMILY LEGACY OF POSITIVE ENGAGEMENT

## in every issue

## 11 RED LISTED

IUCN conservation status profile

## 20 PLANT PEOPLE

Exploring people’s relationships with plants

## 30 GARDEN SPROUTS

News from around the Garden

## 32 EYE ON PLANTS

Select species in focus



## ON THE COVER

Horticulture technician Fumi Waugh maintains a pathway in the McBryde Garden, one of five NTBG gardens that offer people a place to interact with tropical plants and nature. Read about NTBG’s commitment to our mission-driven work on page 6. Photo by Erica Taniguchi

The Bulletin is a publication for supporters of the National Tropical Botanical Garden, a not-for-profit institution dedicated to tropical plant conservation, scientific research, and education.


We encourage you to share this publication with your family and friends. If your household is receiving more than one copy and you wish to receive only one, please inform our Development Office at our national headquarters at: [members@ntbg.org](mailto:members@ntbg.org).

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# National Tropical Botanical Garden



Allerton Garden



Kahanu Garden  
& Preserve



Limahuli Garden  
& Preserve



McBryde Garden



The Kampong

We work across five botanical gardens and throughout the tropics to grow a brighter tomorrow for plants and all they sustain. We do so through a biocultural approach, where Indigenous knowledge, community priorities, and scientific research guide our path forward. Together, we will restore flourishing relationships between plants, people, and places.

National Tropical Botanical Garden is chartered by Congress as a not-for-profit, non-governmental institution.



## Vision

A sustainable future where flourishing relationships are restored between plants, people, and places

## Mission

To enrich life by perpetuating tropical plants, ecosystems, and cultural heritage

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## Message from the President and CEO



To say I am delighted to be back at the helm of the National Tropical Botanical Garden is an understatement. My return marks a very personal milestone — overcoming a major health challenge and making a full recovery, something I could hardly have imagined ten months ago. I am profoundly grateful for this new chapter and the opportunity to once again serve NTBG as president and chief executive officer, a role I love.

I first came to NTBG in 1997, nearly three decades ago, and yet it feels like yesterday. Over the years, I have watched this organization grow and adapt, always guided by the same core mission: to perpetuate tropical plants, ecosystems, and cultural knowledge. My appreciation for our mission has only deepened. As I write to you today, three themes come to mind: gratitude, resilience, and opportunity.

I am deeply grateful to our staff, volunteers, donors, and Board who form the core of NTBG 'ohana. What binds us is more than a shared mission — it is a collective passion and responsibility for the work we do. This spirit sustains us in times of uncertainty and guides us toward new ways forward.

The last few years have taught us that resilience is not only about surviving challenges, but also about adapting and continuing to grow. For NTBG, resilience means caring for collections through storms and droughts, sustaining education programs, and advancing conservation research despite economic uncertainty. Our experiences affirm that this work is not optional — it is essential.

Looking ahead, thoughtful succession planning will ensure NTBG's strength and longevity. In the coming year, we will begin the search for a new chief financial officer, with the goal of welcoming a new CFO in early 2026. This transition period will allow our current CFO, Tami Rollins, to share her expertise before her retirement. We will also recruit a director of education to support, expand, and unify our programs across our five gardens, ensuring NTBG continues to educate and inspire.

My return also allows the Board to prepare for NTBG's next chapter of leadership. In 2026, we will begin the process of selecting my successor, and I am committed to supporting that transition every step of the way. True leadership is about ensuring the organization is stronger when the baton is passed.

With every challenge comes opportunity. Botanical gardens and conservation organizations worldwide share the responsibility of advancing science, conservation, and education. In this edition of The Bulletin, you will learn how NTBG is responding to today's federal and economic realities. Your support demonstrates that you too, are part of the solution.

Finally, as we continue our work, determined and unbowed, we also have the opportunity to introduce our new individual garden brands — beautiful, distinctive logos representing each of NTBG's five garden locations. We hope you enjoy our new look. You can read more on page 30.

Thanks to you, NTBG will continue its mission-critical work long after today's challenges have passed and new opportunities emerge.

Mahalo for being part of this journey and our NTBG 'ohana.

With gratitude and renewed energy,

Janet Mayfield  
President and CEO



# A special thank you to our new Fellows and Members!

## Become an NTBG Fellow and join a special group of tropical plant enthusiasts

The Council of Fellows was established in 1985 as NTBG’s leadership membership group to advance NTBG’s core programs in tropical plant conservation, research, and education. This exceptional group of philanthropists has been instrumental in helping NTBG to become one of the most important tropical botanical gardens in the world. Annual membership dues begin at the \$1,500 level and continue up to the \$20,000 Chairman’s Circle level. In addition to enjoying general membership benefits, Fellows are invited to NTBG’s bi-annual Board of Trustees meetings and also have the opportunity to participate in specially arranged travel programs, which include visits to private and public gardens and explorations of botanical hotspots around the world.

## Become a Member of NTBG and support tropical plant conservation

Your membership dues directly support tropical plant conservation and research, provide the resources to protect and cultivate our living collections, and educate the public about the importance of tropical plants at NTBG’s five gardens and preserves. Membership levels range from \$90 to \$500 with a level to fit everyone from individuals to families. **Contact: [members@ntbg.org](mailto:members@ntbg.org)**

### NEW FELLOWS JANUARY - JUNE 2025

The Baskin Family  
Rob Evans and Terry Micheau  
Roxie Graham and David Blanton  
Edward R. McDowell  
Damon Ockey  
Kyle Rasmussen and Kimberley Mayfield

Viviana and William Brown  
Joan Slattery-Burke and Frank Burke  
Michaele Call  
Berta Campa  
Judith P. Capertina and Judy A. Arrigo  
Susan and Robert Carlson  
Mark Casey  
Teo Castellanos  
Catherine Cathers  
Pamela and Thomas Catlin  
Sabrina Cheikhali  
Milton Chen and Ruth Cox  
Kristin and Preston Chong  
Todd Christenson  
Emilie and Brandon Christiansen  
Julie and Stephen Churchley  
For Fam Ciacchi  
Gianni Cialini and Nicholle Sanchez  
Jeanette M. Clough  
Alexandra Cloyes  
Shawna Colgrove  
Ronald Cornew and Lula Folgosa  
Candace Crouch-Kelsey  
Sally Dadmun Bixby and Denny Bixby  
Ned Dana  
Kathryn D'Archangel and Jason Manges  
Robert Davis, Jr. and Vivian George  
Lynda and Jim Deer  
Gabrielle Dempsey  
Garrett Denzer  
Samantha Dervichian  
Alix DeSeife and Daniel Small  
Michael Desmarais and  
Carol Anne Lee-Desmarais  
Donna and Richard Devries  
David DiFiore  
Lisa Dokter  
Bonnie Douglas  
Elizabeth and Jeremy Dreier  
Margaret and David Duggan  
Roland du Luart and Zuleika Penniman  
Katie Dugan

Kara and Jonathan Eads  
Pia Elgas  
Lisa Elliott and Isabella Elliott  
Andrea Espinosa  
Kristen Espinosa  
Michelle Fanale and Adrian Rodriguez  
Nancy Field  
Pat Finberg  
Leslie Fleeman and Davis Jeffries  
Maureen Fodale  
Lanya Forster  
Edward Franzen and Judy Whitney  
Beverly Frost  
Kirstan Fulton and Joseph Ferring  
Joy Galatro  
Paloma Gallardo  
Susan Garrett  
Elizabeth Giddens  
Jonathan Giese  
Darcel Gilbert  
Robert Glustrom  
Soulei Goe and Gabriel Venturelli  
Debra and Fred Goetz  
Rick Golba and Ted Faigle  
Alex Goldstone and Chris Crawford  
Olivia Gomes  
Ivonne Gomez  
Clara Gonzalez  
Jillian Gonzalez  
Jason J.A. Gregg  
Faith Gross and Joe Chervenak  
Travis Gunter  
Sabrina Haas  
Katherine and Randy Hanna  
Hurley Haywood  
Brian Hedlund and Marjorie Wyman  
Gene Helfrich  
Lucas Hernandez and Victoria Cividini  
Kristin Hoffman  
Karl E. Holderle  
Rob Holmes  
Merren Hso

Karen and Martin Hutten  
Charlie Jackson  
Jackie and Gary Johnson  
Casey Jones  
Martha Kanter  
Diane and Sid Kaskey  
Cindy and Jerry Keesee  
Patricia Kelley  
Kathleen King  
Mina Kirkova and Kalin Kirilov  
Dena Kirtley  
Jayna Klesper  
Kristi and Charles Knight  
Linda Kolko  
Kai Nani Kraut and Walter Michel  
Lori and Steven Kruger  
Marika Kyrimis  
Jacqueline LaBorne  
Ursula Lamberson and Misha Lamberson  
Gary Lange  
Michelle Langmayer  
Terry Leppo and Brian Glenn  
Paula and David Levine  
Wendy A. Levitz and Sanjiv S. Desai  
Niketa Kimberly Lewis  
Susan and Michael Liuzzi  
Shari and David Lombardi  
Jody LoMenzo and John Godec  
Debra Lovejoy-Bland and Joan Gugliotta  
Francesca Luzuriaga and Ross Larkin  
Anne MacDonald-Korth and James Korth  
Kathleen and William Maffett  
Deon Mandelstam  
Tracie and Vince Mando  
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Melissa McCartney  
Robin McCoy  
Pat McDowell  
Adriana and Welcome Meister  
Susana Mendive  
Barbara and Matthew Menghini  
Christine Metz and Michael Gennet  
James Miersma and William Hammer  
Laura and Hayden Montgomery  
Randolph Mullis  
Cynthia Murrill and Lisa Stattelman  
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William Neil  
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Philip Pierce  
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Sandra Portal-Andreu  
Samantha Porzelt  
Andrea and John Poulos



ASPLENIUM CAUDATUM

### NEW MEMBERS JANUARY - JUNE 2025

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Jennie Riley  
Delia Rivera  
Jordan Robertson and Erica Forgione  
Susan and Thomas Robertson  
Amy Rodriguez and Eric Dyrenforth  
Melanie and David Rosenfelder  
Joel Roth  
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Barbara Rusinko and Brent Landry  
Delia Saenz  
Melissa L. Sarmiento and  
William G. Morton, Ph.D.  
Sonie and William Schermer  
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Marta and Bob Seger  
Whitney Seifman  
Anne and Wayne Shanks  
Dharam Sharma  
Susan and Joseph Shea  
Gail and Mark Sherman  
Judy Shiroma  
Zubin Shroff and Phoebe Eng  
Elaine Signorini  
Thomas Smith and Pamela Evans  
Debra G. Speyer  
Janis Ing Strauss  
Ryland Taogoshi and Chareena Shamia

Yadira and Alan Tatis  
Ricardo Tessarotto  
Jeff Thomasson  
Allison Thompson  
Jana Timar  
Pamela and Brian Tipton  
Gretchen and William Tunkey  
Margaret R. and John W. Ueleke  
Charles Valentine and Colleen McGee  
Michelle Van Berkomp and Brian Yelland  
Elizabeth Van Volkenburgh  
Gary Venet and Brian Dale  
Susan and John Wagner  
Sherri Waialeale  
Earnest Ward  
Teresa and David Wayne  
Bonnie Webman  
Susan and Thomas Weimer  
Daniel Weiss  
Connie Whitehead Hanks  
Kelly and Randall Wildman  
Ken Youngren and Phil Clawson  
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Laura Zeisler  
Evelyn and Stuart Zimmerman  
Sam Zink  
Marsha Zorich

BECOME A MEMBER NOW.







KAHANU GARDEN AND PRESERVE.  
PHOTO BY MIKE OPGENORTH

# Ensuring a Future with Botanical Gardens

BY JON LETMAN, BULLETIN EDITOR

**D**edicated to perpetuating tropical plants, ecosystems, and cultural heritage, NTBG's staff face a long list of challenges – everything from battling invasive species and noxious weeds to working in hot, humid, and muddy conditions to collect, monitor, and grow some of the world's rarest plants. Field botanists endure working on steep cliffs and teeth chattering cold nights in tents, maintenance crews are forever repairing equipment and fixing irrigation lines, while administrative staff juggle spreadsheets and

schedules, balance budgets, and ensure the Garden's broad range of programs and priorities are well-organized and efficiently executed.

Neither drought nor rain nor thorny underbrush stays Garden staff from their commitment to the Garden's appointed mission. But today there is a new challenge – how to most effectively pursue scientific research, biocultural conservation, and environmental education in a time of change and uncertainty.

As funding and support for science and environmental protection sees a significant shift, NTBG is redoubling our commitment to our work. Today the world faces multiple environmental threats from climate change and the loss of biodiversity to new pressures on public lands and irreplaceable wild habitat.

## NAVIGATING UNCERTAINTY

NTBG, established by a congressional charter in 1964<sup>1</sup>, has always been a non-governmental not-for-profit organization. While NTBG is less dependent on federal funding than many of our peers, we are not immune to the loss of grants that offer budget relief and cover staff time, particularly for science and conservation programs. "The loss of future funding will be impactful to our organization," says NTBG's chief financial officer Tami Rollins.

As of September 2025, NTBG was partially supported by active grants from the National Science Foundation, the U.S. Fish and Wildlife Service, the National Oceanic and Atmospheric Administration, as well as the State of Hawai'i's Department of Land and Natural Resources, and Florida Department of State.

Science and Conservation director Dr. Tiffany Knight says that on one hand NTBG is in a relatively strong position thanks to the foresight of the Garden's founders who created an endowment which reduces reliance on federal funding and provides stability. However, the current restriction of grants reduces our ability to pursue time-sensitive ambitious strategic goals.

Tiffany says there are so many conservation challenges urgently in need of being addressed which NTBG is uniquely poised to do. She says there is a limited window open now when NTBG could be making advances in preventing plant extinction. NTBG is equipped with new conservation tools and technical knowledge that would allow us to increase the collection of rare and declining wild plant populations that still hold invaluable genetic diversity, but she says this situation will not continue indefinitely.

"The time is now. We need to act *now*, and we don't have the capacity to act like we should and neither do our partners," Tiffany says.

The loss of grant support can translate into missed opportunities and stymied scientific progress. For example, under the U.S. Department of Agriculture, the

<sup>1</sup> Established as the Pacific Tropical Botanical Garden, the Garden became National Tropical Botanical Garden in 1988



“In 2024, the IUCN reported that 38% of the world’s tree species were at risk of extinction.”



PHOTO BY KEN WOOD

Natural Resources Conservation Service (NRCS), awarded NTBG a grant of more than \$85,000 in 2020 to develop innovative ways to revegetate difficult to access cliff habitat using drones and other new technology. That work had to be scaled back and delayed for years, first because of the Covid pandemic and then the FAA backlog to approve the drone license.

Ultimately, NTBG learned that the funds would not be released because the project’s description included the phrase “climate change.” As a result, the work has stopped (temporarily, we hope) as we try to find a solution.

Previously, Institute of Museum and Library Services (IMLS) grants have supported NTBG conservation of native Hawaiian plants, the digitization of herbarium collections, and other important projects. Earlier this year, the future of IMLS looked uncertain, but as of September, both the Senate and the House of Representatives have drafted funding bills with budget cuts far less extreme than originally proposed, possibly the result of pressure from advocacy groups.

### STRENGTH IN SOLIDARITY

Individually, the loss of a relatively modest grant of ten or twenty thousand dollars may appear to be of limited impact, but over time, as the number and size of grants multiplies, the cumulative effects could be debilitating. Today, strategic planning and flexibility are just as important as during an economic recession or global pandemic.

We remain committed to funding essential infrastructure projects that will make our buildings and facilities more energy-efficient and environmentally sound. At the same time, NTBG continues to advance mission-driven science, conservation, and education programs.

As we look to the near future, NTBG needs to consider how to cover the cost of priorities and critical projects. Diversified funding, including memberships, private donors, public tours, and the generosity of Trustees and Fellows have all been a source of stability, vital threads in the fabric of NTBG support.

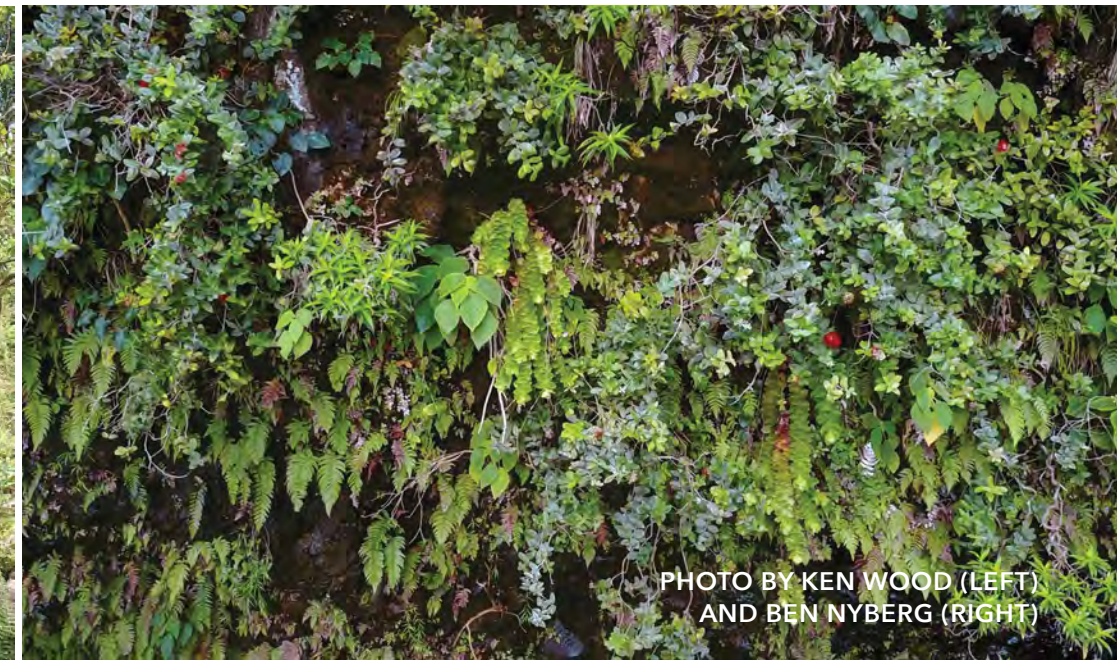


PHOTO BY KEN WOOD (LEFT)  
AND BEN NYBERG (RIGHT)

NTBG’s director of philanthropy, Natalie King, says that while the Garden is affected by funding cuts, we are also trying to be a good collaborator in advocating not only for ourselves but also our peers. She has been encouraged by the outpouring of concern by supporters. “They’re very conscious of how this impacts people,” Natalie says. “We’re being asked, ‘is your staff ok?’” She says it’s a powerful testament to the strength and commitment to NTBG’s mission “because we’re about connecting plants and people.”

The importance of scientific knowledge and expertise cannot be overstated, Natalie says, adding that NTBG’s decades of institutional knowledge is our powerhouse. “We want to help sustain and preserve expertise and knowledge because that’s what carries us through.”

### PLAYING A POSITIVE ROLE

NTBG is unique in that we are a tropical botanical garden in the United States spread between two Hawaiian Islands and Miami, Florida. With a focus on rare and endangered species, many of which are narrowly endemic, we have established impactful programs like the Breadfruit Institute and a suite of environmental education offerings. NTBG’s botanical research center, seed bank and laboratory, herbarium, and other resources, along with important cultural, archaeological, and historical sites, stand out as conduits for biocultural conservation and community involvement.

Through NTBG’s many partnerships including with Florida International University at the International Center for Tropical Botany at The Kampong, along with our mentorship of students and interns, we are fostering the next generation of botanists and encouraging a host of other professional and academic pursuits.

### THE NEED FOR DIVERSITY

In the world of biological sciences, specifically botany, diversity is a fundamental quality of healthy populations and well-balanced ecosystems. For example, certain trees like koa and ‘ōhi’a (*Metrosideros* spp.) need ferns and mosses in order to germinate. They struggle to reach maturity if they don’t have adequate ground moisture retained by companion plants. On remote islands, native plants which evolved in isolation may decline or become extinct if they are overgrown by more numerous but less diverse alien introductions.

Biological diversity makes our planet healthy, but today we face a biodiversity crisis. According to the International Union for Conservation of Nature (IUCN), nearly one-quarter of the world’s fish and freshwater animals face a high risk of extinction with migratory shorebirds, fungi, and other life forms from reef-forming corals and conifers to mammals, reptiles, and amphibians all facing elevated extinction rates. In 2024, the IUCN reported that 38% of the world’s tree species were at risk of extinction. Other studies highlight the large number of declining plant and animal species around the world.





PHOTO BY ERICA TANIGUCHI

NTBG is trying to stave off greater losses. Loulu (*Pritchardia*) palms, Hawaiian ferns, mosses and other bryophytes (see page 12), as well as species-rich lobeliads are endemic to Hawai'i. If they go extinct, diversity is diminished and our planet is impoverished.

### COMMITTED TO OUR CAUSE

In the face of a rapidly changing environment, NTBG remains steadfast and committed to our work in Hawai'i, Florida, and around the world.

For over 60 years, NTBG has been powered by people. Now, more than ever, we need you. Support comes in many forms, from financial contributions to volunteering, visiting our gardens, reading our stories and sharing our online posts, to telling a friend about something that the Garden has done that excites you or fills you with hope.

NTBG is dedicated to preserving a healthy planet where nature is revered, curiosity is valued, and knowledge is treasured. Preserving plants for future generations is a worthy pursuit, and something we can do when we work together, to create a world with botanical gardens and places where people and plants can flourish together.

READ AND SHARE ONLINE



## National Tropical Botanical Garden The Garden Club of America SCHOLARSHIPS

The National Tropical Botanical Garden and The Garden Club of America are collaborating to offer two scholarships related to tropical botany. The Garden Club of America Fellowship in Tropical Botany will award \$5,500 to PhD students. A second scholarship, The Loy McCandless Marks Scholarship (an International Scholarship in Tropical Horticulture or Landscape Architecture), will award \$5,000 to graduate or undergraduate students.

The deadline for both scholarships is January 15, 2026. Learn more at: <https://www.gcamerica.org/scholarships>



# red listed

The International Union for Conservation of Nature (IUCN) publishes the online resource, The IUCN Red List of Threatened Species, ranking taxa (species, subspecies, or varieties) in one of nine categories from 'Not Evaluated' to 'Extinct'. The Red List is an invaluable tool for not only scientists, educators and policy makers, but for anyone seeking a better understanding of the conservation status of plants, animals, and fungi around the world.

In recent years, conservation agencies, institutions, and organizations including NTBG have increased efforts to assess the nearly 1,400 native plant taxa in Hawai'i. To date, over half have been assessed, reviewed, and published on the Red List, adding to the more than 74,000 plant taxa published through the latest update of the Red List worldwide. In 2021, NTBG scientists completed assessments of all Kaua'i single-island endemic vascular plants (currently at least 256 species) and even more recently, collaborated with conservation partners to complete assessments for all of Hawai'i's native trees.



### Species: Ma'o (*Gossypium tomentosum*) Malvaceae

**IUCN RED LIST CATEGORY: VULNERABLE (VU)**

Ma'o (*Gossypium tomentosum*), the native Hawaiian cotton, is endemic to Hawai'i. It was historically found on all the main Hawaiian Islands except Hawai'i Island, but has become locally extinct on Kaua'i and Ni'ihau in the past century. Today, ma'o grows in leeward coastal areas on rocky, sandy, or clay soils as a sprawling shrub with striking silvery-gray foliage, bright yellow flowers, and distinctive seeds covered in soft, reddish-brown cotton fibers. Ma'o holds cultural significance, with traditional uses of its flowers, leaves, bark, and seeds for crafts and medicine.

While the species' total population size remains unknown, it now persists in only about nine known locations across the archipelago and continues to decline due to threats including invasive plants and animals, wildfires, and coastal development.

In 2023, NTBG and University of Hawai'i at Mānoa researchers included ma'o in a collaborative study on seed germination of Hawaiian coastal plants under salinity stress. The study found that ma'o exhibits low germination during exposure to increased salinity and limited recovery



PHOTO BY KAPOLANI CHING

after rinsing with fresh water. These findings suggest that increased salinity exposure, expected as sea-level rise accelerates with climate change, could further threaten ma'o's ability to regenerate in its coastal habitat.

At NTBG, we continue to contribute to the conservation of ma'o through ex situ (not wild, managed) seed banking, propagation, curation of living collections, research, education, and outreach. This work is particularly timely climate and environmental conditions put increasing pressure on coastal native plants like ma'o.

—Dr. Seana Walsh, Conservation Scientist and Curator of Living Collections



Exploring the colorful, tiny world of

# Hawai'i's Bryophytes

BY KASSANDRA JENSEN

**H**iking through the cloud forests of Kaua'i, you can find mounds of yellow, orange, and white lining the trail and black and red wrapping around trees and dripping off branches. In the mesic<sup>1</sup> forests, you might glimpse a golden line scaling a tree or dull green cushions coating rocks. Even in the driest areas, furry, black objects can be found in the dirt. At the beach, salt spray hits the colorful speckles nestled into tiny holes of volcanic rock. Even in parking lots, the careful observer can discover bright green star-shaped growths thriving in concrete that is inhospitable to other plants.

From Hawai'i's volcanic peaks and high elevation bogs to lowland and coastal areas, mosses and their relatives are found in almost every Hawaiian habitat. While often overlooked, I have been drawn to examine the ecological roles of these small plants.

Mosses and closely related liverworts and hornworts are collectively known as bryophytes, an ancient and diverse



taxonomic group, comprising about 20,000 species<sup>2</sup> worldwide. Bryophytes were among the earliest land plants and have played a crucial part in colonizing the planet. These extraordinary plants are haploid (containing one set of chromosomes), unlike flowering plants and animals which are diploid (containing two sets). It's as if an unfertilized egg grew into a living, breathing being.

<sup>1</sup> Receiving moderate rainfall

<sup>2</sup> Bryophytes are comprised of mosses (60%), liverworts (36%), and hornworts (4%).



OPPOSITE PAGE: *MACROMITRIUM PILIFERUM*  
PHOTO BY KEN WOOD  
THIS PAGE: *MACROMITRIUM MICROSTOMUM*  
PHOTO BY KASSANDRA JENSEN





KASSANDRA COLLECTING MOSS (TOP).  
PHOTO BY EZIKIO QUINTANA. *PYRRHOBRYUM*  
*SPINIFORME*. PHOTO BY AMANDA VERNON

Bryophytes are unable to store water internally and are dependent on their environment for water. Their survival can be attributed to their ability to endure fluctuations in moisture availability by cycling in and out of periods of dormancy and activity. When rainfall and other forms of moisture are available, some species can absorb more than ten times their weight in water. Others can dry out to less than 10% of their body weight for long periods of time, able to resume normal function just minutes after hydration. Botanists have reported that some specimens kept in storage for over 50 years have “come back to life” after rehydration.

Globally, bryophytes help maintain healthy ecosystems by preventing erosion, cycling nutrients, and fixing nitrogen through their associations with cyanobacteria (blue-green algae). Sphagnum moss-dominated peat bogs which have developed over thousands of years sequester more carbon than any other vegetation type in the world. Additionally, bryophytes act as forest “nursery sites” for flowering plant germination and seedling growth and can facilitate invertebrate life cycles in streams. Specifically, many moth-like caddisfly species rely on bryophytes to provide habitat and as a source of food in the form of leaf litter and other organisms.

In Hawai‘i, bryophytes have important associations with native plants and animals. The larvae of the endemic moth *Hypsmocoma* are consistently found within mats of the endemic moss *Donrichardsia bartramii*. These invertebrates and others like them may go on to pollinate plants or become food for larger animals.

Native flowering plant seedlings often sprout within mats of mosses and liverworts. In higher elevation forests, seedlings of ‘ōhi‘a<sup>3</sup>, ‘ōlapa<sup>4</sup>, and many epiphytic plants are often exclusively found in patches of moss.

Hawaiian forest birds, such as the ‘elepaio<sup>5</sup>, use the reproductive structures of bryophytes of the native fire-moss<sup>6</sup> to build their nests. Bryophytes also act as refuges in harsh environments, such as Haleakalā crater on Maui, where vascular plants are more likely to be found growing in biocrusts<sup>7</sup> composed of different species of the alpine moss *Grimmia* and lichens.

<sup>3</sup> *Metrosideros* spp.  
<sup>4</sup> *Cheirodendron* spp.  
<sup>5</sup> *Chasiempis sandwichensis*  
<sup>6</sup> *Pyrrhobryum spiniforme*  
<sup>7</sup> Thin layers of soil rich in tiny living organisms

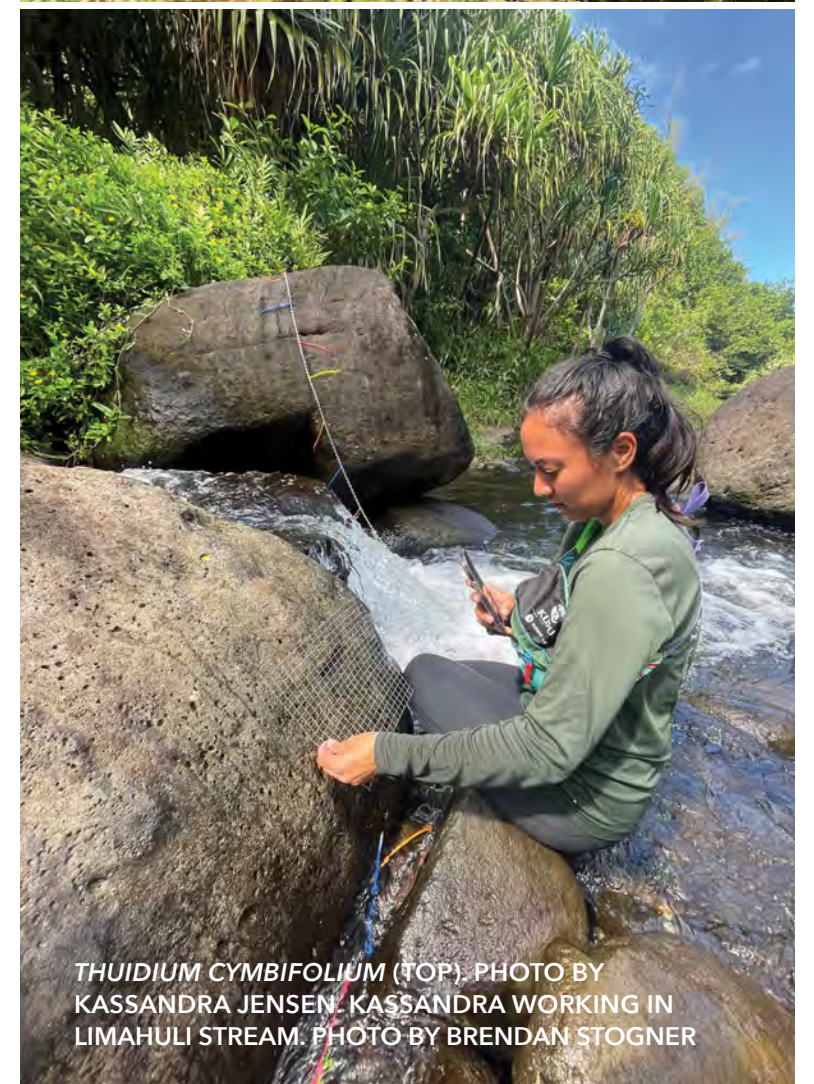
I was drawn to bryophytes by the important but under-appreciated role of Hawaiian mosses. On my first day working at Limahuli Garden and Preserve, I passed a fallen log covered in a vibrant mat of orange, green, and yellow. I realized there was a small but dynamic world that deserved to be explored. This curiosity, fostered by support from my NTBG colleagues, led me to graduate school where I began to study bryology<sup>8</sup>, exploring what drives their abundance and how they connect with native invertebrates and flowering plants.

My field observations have taught me how much there is to learn about bryophyte ecology in Hawai‘i. While bryology is understudied as a whole, the field of bryophyte ecology is even less understood, with only five published studies to date in Hawai‘i. This lack of foundational knowledge highlights the need for updated resources to help researchers and conservationists recognize and understand these plants.

The Manual of Hawaiian Mosses by Edwin B. Bartram was published in 1933 and remains the only comprehensive moss key<sup>9</sup> in use. Until recently, there was no key for liverworts or hornworts in Hawai‘i. Fortunately, today there is a resurgence of interest in these special plants.

NTBG researchers Tim Flynn and Amanda Vernon are working to make bryophytes more accessible to the public. Starting with a field guide, they are showcasing 30 common Hawaiian mosses for a non-specialist audience. Once their guide is published this fall, they will create a tool for identifying moss characteristics, updating the 92-year-old manual to a digital version that will help pair specific moss characteristics with selected traits. Additionally, NTBG has been working to digitize all herbarium collections, including the bryophytes, which can be viewed using the herbarium search directory online.

<sup>8</sup> Study of bryophytes  
<sup>9</sup> A book used to distinguish plants based on observable traits



*THUIDIUM CYMBIFOLIUM* (TOP). PHOTO BY  
KASSANDRA JENSEN. KASSANDRA WORKING IN  
LIMAHULI STREAM. PHOTO BY BRENDAN STOGNER





CLOCKWISE FROM TOP LEFT: MOSS GROWING ON ROCK; *PHILONOTIS TURNERIANA*; A LACEWING AMONG LIVERWORTS; *RACOMITRIUM PRUINOSUM*; A LEAFHOPPER AMONG LIVERWORTS AND MOSS; SPIDER AMONG BRYOPHYTES. PHOTOS BY KEN WOOD





NATIVE PLANTS GROWING OUT OF MOSS IN KANAELE BOG, KAUA'I. PHOTO BY KASSANDRA JENSEN

Private researchers, Dr. Virginia Freire and Dr. Emmet Judziewicz, have been working in Hawai'i over the last several years to explore and research liverworts and hornworts. Through a partnership with NTBG, they have identified many liverworts and hornworts that have been stored in herbaria for years but remain unidentified. Their research has made important contributions, including the identification of both new species and a genus of liverwort and the publication of the first of their multi-volume manual of liverworts.

Over the last five years, NTBG and Bishop Museum have co-hosted multiple moss workshops that have helped educate bryophyte conservationists and enthusiasts. Unfortunately, there is relatively little information about Hawaiian names and uses for bryophytes in institutional literature. At least one moss has a specific name: māhole

mākō pi'i,<sup>10</sup>. The word limu, although more commonly associated with the algae found in the ocean, is the Hawaiian word for bryophytes as well.

There is certainly far more Indigenous knowledge in Hawai'i about bryophytes that could provide insight into their ecological roles and cultural significance, but it remains undocumented in institutional literature. These resilient plants can withstand the harshest of environments and support countless other species. Clearly, we still have much to learn about bryophytes. The more we understand them, the better equipped we will be to steward our environment.

*Kassandra worked with NTBG as a Kupu program member (2020-2022) and as Limahuli Garden and Preserve staff (2021-2023). Currently, she is an independent researcher on Kaua'i.* 🌿

<sup>10</sup> *Thuidium cymbifolium*

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# wish list

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# plant people

EXPLORING PEOPLE'S RELATIONSHIPS WITH PLANTS



PHOTO BY RODRIGO GAYA

## JOHN GEIGER

Growing up in suburban Miami, John Geiger was rarely indoors. Recalling his childhood, John was fascinated by alligators and fish, butterflies, and flowers. Living just 45 minutes away from the pristine wilderness of the Everglades National Park, whenever possible, John took refuge in the sound of wind blowing through the pine trees and sawgrass. The turtles, snakes, and manatees instilled John with a deep appreciation for the wilderness and habitats teeming with life across south Florida.

Today John is a plant ecologist and biology professor at Florida International University. He lives in the house his parents built and still loves to watch wildlife slither, swim, crawl, and fly. John says it is a treat to live so close to the beautiful, diverse wetlands, and while he is passionate about all of Florida's wildlife, on this he is certain, "of course my true passion is plants."

### I understand you live in a Miami suburb with well-manicured lawns but you have a different approach to landscaping. Can you describe it?

My parents built our house on former pine rockland, the original upland habitat in Miami-Dade County. Today, less than two percent remains. I grew up near a preserved upland habitat of hardwood trees whose name comes from Indigenous people who called it *hamaca*. It basically means broadleaf forest. I wanted to duplicate that by creating a little forest around the house. I've planted close to 300 mostly native species in an ordinary size suburban lot.

### What are you growing?

There are standard components of hardwood hammocks like gumbo limbo trees (*Bursera simaruba*) which have beautiful peeling bark. I have a live oak tree which is drop-dead gorgeous and one of the best trees you can plant for wildlife. I also have a very special rare plant called gulf lcaria (*Licaria triandra*) that is found throughout the Caribbean, but in the US it's only in Miami-Dade County. This tree, which I am growing from seeds sprouted by my friend, has started making copious amounts of fruit, producing hundreds of seedlings which I have shared with The Kampong, the International Center for Tropical Botany at The Kampong, and others.

### Do you have a favorite plant?

For my PhD, I studied a morning glory called *Ipomoea microdactyla*. It's a very well-behaved vine with this incredibly gorgeous magenta, scarlet, pinkish reddish flower. The only place you find it in the US is in Miami-Dade County growing in the pine rocklands. It's also in the Bahamas and Cuba but it's extraordinarily rare here.



PHOTO BY JOHN GEIGER

<sup>1</sup> Florida's sawgrass (*Cladium jamaicense*) is actually a sedge, not a true grass  
<sup>2</sup> ICTB at The Kampong is operated as a collaboration between The Kampong and Florida International University.

## plant people

### Which do you prefer, hardwood hammock or pine rockland habitat?

I appreciate having access to both because each offer something different. In hardwood hammocks, I love the trees. I love their shape, their height, and their different leaves. I love the dappled sunlight peeking through the beautiful canopy. In the pine rocklands it's an open canopy – almost full sun to the ground which has close to 200 understory species. I appreciate the diversity of these beautiful, tiny, rare plants.

### Today, with so much focus on computer science and coding, DNA analysis, and other new technologies, as a plant educator, how do you see it affecting student interest in biology, taxonomy, and field work?

It's tough. Since I've been in academia, the number of my peers that really have the passion for plants and ecology seems like it's going down and down. It just breaks my heart. I remind my students – we are not separate from nature and if we destroy the natural world, we no longer have a place.

### Which Florida ecosystem is most threatened by climate change and biodiversity loss?

I think the Everglades is near the top because it's so low-lying. I see places that used to be nothing but sawgrass, are now red mangrove. That tells me the water is not fresh anymore. Saltwater is intruding into the freshwater lens. Pine trees are dying because they don't like salty feet. In places I used to go that never flooded, now there's stretches where it's constantly flooded. I grew up here and I've witnessed the changes so I worry about the Everglades.

### What does The Kampong and ICTB at The Kampong offer that you couldn't find elsewhere?

The Kampong has legacy trees planted by David Fairchild that have great value and could be germplasm we no longer have. We decided to sample the germ plasm from these plants and store it indefinitely. Also, the pollinator garden is extraordinary. The students can use it as a living laboratory and do great research there, cataloguing plant-animal interactions just from a visit to this beautiful garden.



PHOTO BY KATHRYN GEIGER

### What are your thoughts on the ICTB at The Kampong's goal of educating the next generation of botanists?

It's already doing that. The work they're doing there is extraordinary. Every summer Chris Baraloto (director of ICTB at The Kampong) has a group of students from around the world for the tropical botany course. Many great botanists are here and part of this professional, scientific, botanical community that is allied with The Kampong. It's really good to have this deep field of talent and local experts to draw on. Brian Sidoti (The Kampong's director) is using this extensive network of professional scientific and education connections. It's a great opportunity for collaboration.

### Today there is a lot of rhetoric against diversity. From a biologist's perspective, what is your argument in favor of diversity in nature and humans?

Speaking as an ecologist, systems that have a greater diversity of organisms are more resistant, more resilient to disturbances. Their ability to come back is greater. Once you start reducing diversity, your ability to withstand disturbance is reduced. I ask my students, when you have an obstacle in life, do you want to conquer that obstacle? When we have a diversity of us tackling these problems, we're more likely to solve the problem and more likely to recover.





DR. TIFFANY KNIGHT HOLDS A LOULU PALM IN NTBG'S CONSERVATION AND HORTICULTURE CENTER. PHOTO BY ERICA TANIGUCHI

# THE SCIENCE OF SURVIVAL:

## *Rare Plant Recoveries from the Botanical Research Center*

BY DR. TIFFANY KNIGHT,  
DIRECTOR OF SCIENCE & CONSERVATION



ASPLENIUM DIELMANNII FERN.  
PHOTO BY STEVE PERLMAN

In the Garden's Juliet Rice Wichman Botanical Research Center, plant conservation happens every day. Our Science and Conservation team combines field expertise, seed banking, herbarium research, propagation, and restoration to bring some of the world's rarest plants back from the brink. These are stories that span decades, linking past and present: a seed collected long ago, a plant rediscovered after presumed extinction, a species hiding in plain sight.

Each is the result of collaboration, deep knowledge, and unwavering commitment — and each underscores why sustained investment in plant conservation is essential. Without the science, facilities, and people, these plant stories could have ended very differently. Thanks to supporters like you, we can act when the moment is right, ensuring endangered species not only endure, but flourish in their home ecosystems.

I invite you to explore the stories of four extraordinary plants that have a brighter future because of the work supporters like you make possible.





DELISSEA RHYTIDOSPERMA IN NTBG NURSERY. PHOTO BY SEANA WALSH

### FROM SEED VAULT TO VALLEY, HĀHĀ'S RETURN SHOWS WHAT'S POSSIBLE WHEN FORESIGHT MEETS PERSISTENCE.

Perched on slender stalks, hāhā's (*Delissea rhytidisperma*) small rosettes of leaves create an elegant crown beneath which hang clusters of tubular flowers. Like many Hawaiian lobeliads, these flowers fit the curvature of Hawaiian honeycreeper beaks like a glove. And like many Hawaiian lobeliads, hāhā's story is one of both loss and hope. Once, hāhā grew more freely across Kaua'i's valleys and ridges. But over time, grazing animals, invasive plants, hurricanes, and other pressures pushed hāhā to the brink of extinction. In 1977, NTBG president emeritus and Trustee Chipper Wichman collected hāhā seeds from Limahuli Valley. By 2015, research biologist Ken Wood documented hāhā as extinct in the wild – a sobering moment. Yet, because of those earlier collections and the persistence of NTBG's field and seed bank teams, the species was not lost.

Today, nearly 200,000 hāhā seeds, representing 77 unique accessions from different plants and populations, are safeguarded in NTBG's Conservation Seed Bank. This living archive has become the foundation for restoring the species to its home. From these seeds, over 100 plants now thrive in our nursery, and more than 300 have been carefully reintroduced to Limahuli Valley, where they once again take their place in the native ecosystem.

The seed bank's role has gone beyond preservation – it has become a source of knowledge. Research has revealed that hāhā seeds remain viable for at least 18 years, far longer than initially thought. They germinate best at day and night temperatures of 77/59°F (25/15 °C), and current studies are exploring how ice crystallization temperatures influence their storage behavior and longevity. Each discovery adds to a growing body of knowledge that can guide conservation for hāhā and other rare Hawaiian plants.

### DESCRIBING A NEW KĀMAKAHALA SPECIES OPENS THE DOOR TO ITS RECOVERY.

NTBG recently described a new species of kāmakahala, *Geniostoma imadae*. Kāmakahala represent an extraordinary example of adaptive radiation in Hawai'i, with most species found nowhere else in the world. Many are single-island endemics, each adapted to its own unique ridges, valleys, and microclimates. Among Hawai'i's many threatened native plants, they are among the most imperiled with habitat loss, invasive species, and small population sizes placing the majority of kāmakahala on the federal endangered species list.

*Geniostoma imadae* is one of the newest members of this lineage to be formally described. Known from windward ridges and valleys on Kaua'i, it had been collected but remained unnamed for years. Without a formal scientific description, it risked slipping through the cracks of conservation attention. That changed thanks to our herbarium – a collection of more than 96,000 preserved plant specimens documenting over 60 years of botanical exploration across Hawai'i and the greater Pacific. Careful study of herbarium material allowed taxonomists to recognize *Geniostoma imadae* as a distinct species, giving it an official name and opening the door to its protection.

Once we have propagated wild collected seeds, we will outplant them in our gardens. With plants thriving in our conservation collections, we can then move to restore this species in natural habitats. The story of this kāmakahala is a reminder that recognition is often the first step toward recovery, highlighting the critical role of herbaria, where the preserved past becomes the foundation for a species' future.

### FROM LIBRARY SHELVES TO LIVING COLLECTIONS, FA'UTEA'S STORY BRIDGES KNOWLEDGE AND ACTION.

Fa'utea (*Lebronnecia kokioides*) is a rare pink-flowering tree found only on a handful of islands in the Marquesas. This striking hibiscus relative produces red-haired, fuzzy seeds – belying its familial connections with cotton. Fewer than one thousand mature individuals remain, scattered across seven small subpopulations that continue to decline due to habitat loss, invasive species, and grazing by feral cattle and goats. Without focused conservation action, this species faces an uncertain future.

A turning point came through NTBG's library and archives. Home to more than 20,000 volumes – including rare botanical prints, original artwork, field notes, and the *Flora of the Marquesas* – these resources preserve generations of knowledge that guide



(L) GENIOSTOMA IMADAE  
(R) LEBRONNECIA KOKIOIDES  
PHOTOS BY KEN WOOD



present-day action. Using the flora, NTBG botanists identified fa'utea as a priority for conservation and mapped its known range, setting the stage for an ambitious new effort to secure its survival.

With support from the Mohamed bin Zayed Species Conservation Fund, NTBG will conduct targeted surveys on Hiva Oa and Mohotani islands to collect seeds from as many individuals as possible and establish genetically diverse ex situ collections. Seeds will be propagated in NTBG's nursery on Kaua'i, safeguarded in our seed bank, and shared with partners in French Polynesia. These living and stored collections will serve as a genetic safety net for the species, supporting both research and future restoration efforts.



VOLUNTEERING IN THE HERBARIUM.  
PHOTO BY JON LETMAN

## RARE ASPLENium FERNS UNFURL IN VICTORIAN PAGES AND LIVING LANDSCAPES

In NTBG's Sam and Mary Cooke Rare Book Room, among shelves of botanical treasures, lies a quiet record of Hawai'i's mid-19th century plant life — an album of Hawaiian ferns compiled by William Hillebrand. A

<sup>1</sup> Early life stage of a fern

German physician who arrived in the Hawaiian Islands in 1850, Hillebrand served as royal physician and lead doctor at Queen's Hospital, while also building the first formal flora of the Hawaiian Islands, published in 1888. His fern album, acquired in 1998 as part of the Loy McCandless Marks Botanical Library, contains pressed specimens — a Victorian-era keepsake format. Between its pages are common ferns and also rarities, offering a unique snapshot of the species present more than 150 years ago.

Among its most remarkable entries are two *Diellia* ferns — now recognized as part of the genus *Asplenium*: *Asplenium dielmannii* and *Asplenium dielerectum*. When NTBG's herbarium began in 1971, both were believed extinct. Decades later, they were rediscovered in the wild, each with fewer than 50 known individuals. Federally listed as endangered and designated as PEPP (Plant Extinction Prevention Program) species, these ferns now benefit from protective exclosures, active habitat restoration, and close monitoring. In partnership with PEPP, NTBG has grown and outplanted more than 1,200 of these ferns into nearly half a dozen restoration areas. Many more gametophytes<sup>1</sup> and mature plants are safeguarded in our fern lab and nursery.

Other rare and curious finds in Hillebrand's album include *Asplenium varians*, known only from 19th-century collections; *Ctenitis squamigera*, an endangered fern possibly extinct on Kaua'i; and an 1800s specimen of *Selaginella kraussiana*, decades earlier than its first official record for Hawai'i. Together, these pages are a bridge between the botanical past and the conservation present, reminding us how historical records can shape and inspire the work of protecting Hawai'i's most imperiled flora.

## CLOSING THE CIRCLE

These plants have been pulled back from the edge of extinction and preserved through the expertise, commitment, and long-term vision of NTBG. This work is resource-intensive, requiring specialized equipment, decades of field knowledge, and the capacity to act when opportunity strikes. Continued investment in plant conservation ensures we can keep collecting, storing, studying, propagating, and reintroducing species before it's too late. The science we do today determines the living landscapes of tomorrow — and with support, we can write more stories like these. 🌿

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BRIGHAMIA INSIGNIS GROWING OUTSIDE  
NTBG'S BOTANICAL RESEARCH CENTER.  
PHOTO BY JON LETMAN





CONTRIBUTED PHOTOS

# A Family Legacy of Positive Engagement

In the annals of Los Angeles printing and publishing history, the name Harrison Gray Otis Chandler is inextricably linked to the Times-Mirror Company, former publisher of the *Los Angeles Times*. But for his grandchildren, Eliza, Scott, and John, the publishing titan they affectionately call “gramps,” was at his core, a garden and plant enthusiast.

As kids growing up in northern California in the 1970s, siblings Eliza Koeppel, Scott Haskins, and John Haskins fondly recall visiting their grandparents in Los Angeles. Working in his climate-controlled greenhouse, Harrison grew colorful bromeliads and orchids in defiance of Pasadena’s occasional winter chill. Eliza remembers her grandparents’ garden resplendent with orange and avocado trees, two giant oaks, a pool house decorated with 1960s tiki décor, and flowers everywhere.

It was Harrison who introduced his grandchildren to the wonders of the botanical world when he took them to

Allerton Garden on Kaua’i in the 1980s. Decades later, John remembers the majesty of wandering through the garden, enamored with the kind of dense tropical foliage he’d seen Harrison growing at home.

Now adults living in and around the San Francisco Bay area, Eliza, Scott, and John reflect on their family’s decades-long ties to NTBG. Harrison, who after visiting Hawai’i for years became an NTBG Trustee (1975-1985), forged a relationship with the Garden that his wife, Martha continued when she served as a Trustee (1985-1990). This led to their daughter Judy Webb (Eliza, Scott, and John’s mother) carrying on the connection by also becoming a Trustee in 2001 until her passing in February 2024.

It was Judy’s love of the Garden, and her commitment to perpetuate her family’s relationship with NTBG, that inspired her to bequeath a legacy gift totaling \$16.8 million to support the Garden in perpetuity by

designating it for NTBG’s endowments. While Judy’s gift was the largest single donation ever received by NTBG, it wasn’t the first time the family helped the Garden in such a generous manner.

In 1993, the Harrison Chandler Education Center was dedicated at NTBG headquarters and in 2000, the Acacia Laboratory, named for the Acacia Foundation, established by Judy and her family commenced operations. For decades, these vital facilities have been used by scientists and educators, students, volunteers, journalists, botanical artists, cultural practitioners, partner organizations, and members of the community as places to gather, study, conduct research, and exchange ideas and knowledge. These spaces were the embodiment of a commitment to the science, education, and discovery that Judy – and Harrison – loved.

Judy had a contagious passion for life, says her daughter Eliza. She was “always going, always doing,” forever wondering about the world, driven to learn more about science, history, the arts, languages, and fascinated by NTBG’s work. Judy had a sense of wonder for the world and a thirst for knowledge that was unquenchable. With so many varied interests – she loved to swim, travel, read, and learn – once she discovered NTBG, she was hooked.

Her enthusiasm was infectious, her passion inspiring, and her support for NTBG unflagging. Judy forged strong ties with NTBG and passed them on to her children who say that their mother, and Harrison before her, planted the seeds of curiosity that continue to bear fruit to this day.

John, an outdoor enthusiast and avid surfer, recently started learning how to grow bonsai trees. He says that after wandering in the Allerton Garden beneath the same trees and along the same stream he first saw with his grandfather, then many years later with his mom Judy, drove home the importance of continuity in conservation. NTBG’s work, he says, aligns closely with his own conservation values that guide his work as a water quality monitoring scientist for the National Estuarine Research Reserve System.

Scott says that his childhood visits to NTBG inspired him to explore other gardens throughout his travels in Australia, South Africa, Cuba, and England. He respects the hard work required to maintain a well-kept garden and enjoys observing how people express joy when they interact with plant life in a garden.

Through their grandparents and mother, Eliza, Scott, and John all say that it’s the combination of science, conservation, and community they find at NTBG, that feeds their shared sense of kinship with the Garden, making it fun and easy to remain connected.

It’s a relationship Judy’s children cherish and want to share with their own daughters – they have five girls between the three of them. It comes as no surprise, they say, that their own children have taken an interest in growing plants, whether it’s succulents or seedlings in their bedroom or planting a small orchard during the pandemic.



The bequest left by their mother Judy is a significant investment in the future ensuring NTBG continues its work far into the future – a future, Judy’s kids say, they want to be part of. Today, NTBG’s pursuit of science, conservation, and environmental education is more important than ever, says Eliza.

Reflecting on the Garden’s work and knowing their own family’s role in making it happen brings a sense of satisfaction and pride to Judy’s children. “It’s cool to know we have been part of this for a long time,” says Scott. “We’ve grown up with NTBG most of our lives and we want to pass that on to the next generation.”

*Like a seed planted today that flourishes as a plant tomorrow, legacy gifts to NTBG nurture discovery, conservation, and community for generations to come. To explore how your gift can have a lasting impact, please contact Natalie King, Director of Philanthropy, at (808) 762-1499 or [nking@ntbg.org](mailto:nking@ntbg.org).*





Allerton Garden



Kahanu Garden  
& Preserve



Limahuli Garden  
& Preserve



McBryde Garden



The Kampong

## NTBG INTRODUCES NEW BRANDING, LOGOS, AND COLORS

We are excited to share NTBG's updated brand in this issue of *The Bulletin*, a refreshed identity that honors the unique spirit of each of our five gardens while uniting us under a shared look and feel.

Recognizing the need for a brand that could both celebrate the individuality of our gardens and unify NTBG's identity, we began a brand alignment process in early 2024 with Finn Partners on O'ahu. Together with staff, Trustees, and other stakeholders, we engaged in listening sessions and branding exercises that explored our history, values, and vision for the future. The result is a refreshed primary brand and distinct identities that reflect the spirit of our five garden locations while strengthening NTBG as a whole. We are proud to share this new identity with you, including new logos and colors for each garden:

- Allerton Garden is represented by the iconic Moreton Bay figs, the three sculptural trees that grace the Lāwa'i Stream. Purple honors Queen Emma, whose love of the color is reflected in the bougainvillea and spider lilies she cultivated in the Lāwa'i Valley.
- Kahanu Garden & Preserve is represented by hala, a tree both native to the Hawaiian Islands and introduced by Polynesian voyagers. Kahanu preserve protects one of Hawai'i's last hala forests with blue reflecting Kahanu's deep connection to the ocean.

- Limahuli Garden & Preserve is represented by pe'ahi, an endemic fern tied to the biocultural heritage of the valley. The saying "ka pe'ahi 'ala o Hā'ena" – the sweet pe'ahi ferns of Hā'ena – refers to the generosity of the people of Limahuli's ahupua'a. Green embodies the undeniable verdancy of Limahuli.

- McBryde Garden is represented by our cherished 'ālula, a Kaua'i endemic that would likely be extinct today without the decades-long conservation efforts of NTBG and partners. Gold evokes the plant's bright yellow blossoms and sunny hues of Lāwa'i Valley.

- The Kampong is represented by mango, a fruit introduced to the United States by plant explorer Dr. David Fairchild now woven into South Florida's cultural fabric. Its orange speaks to the ripening hues of this "king of fruits".

What remains constant is our iconic breadfruit logo, a symbol of NTBG for more than fifty years. Each new garden logo was crafted in the same style, tying their individuality back to our shared identity. Today, the breadfruit appears in a vibrant color we call 'ulu green, the Hawaiian name for this beloved tree, while our new title font, Alvarata, echoes the curves and lines of the logos. Together, the breadfruit logo and five garden logos create a tropical rainbow – a vivid expression of the diversity of our gardens and the unity of our mission.

## LIMAHULI GARDEN OPENS LIMAOLA CULTURAL ARTS BUILDING

This spring Limahuli Garden opened its newest facility – the Limaola Cultural Arts and Multipurpose Building. The new 2,400 sq. ft. structure provides staff, volunteers, and partners a valuable indoor space to teach, learn, and practice a range of activities. Limaola, which means "life of the hands," has already been used to conduct small classes and discussions, prepare materials for crafts, arts, and biocultural pursuits like making 'olona plant cordage, weaving baskets, making kukui nut oil, botanical illustration, and other plant-related skills. Since opening in April, Limaola has hosted interns, students, and members of the community. The one-story building has two rooms and a multi-function garage built on a concrete pad on a hillside landscaped with ahuwawa, pili grass, and other culturally valued plants. Construction on the steep grade was challenging but the rewards will be reaped for years. Limahuli Garden and Preserve director Lei Wann says, "Limaola is where our arts and cultural practices continue to live in this ahupua'a. In this space we have an opportunity to teach, learn, and perpetuate our traditions."



PHOTO BY LEI WANN

## DIANE RAGONE TO RECEIVE DAVID FAIRCHILD MEDAL FOR PLANT EXPLORATION

NTBG's Breadfruit Institute founder and director emeritus Dr. Diane Ragone has been named the 2024 recipient of the David Fairchild Medal for Plant Exploration. Awarded by NTBG since 1999, the Fairchild Medal recognizes exceptional botanists, horticulturists, and explorers. Over four decades, Diane has traveled to more than 50 Pacific Islands, documenting, collecting, and helping preserve the biocultural knowledge and provenance related to more than 600 individual breadfruit trees. After her first Pacific field trip to Samoa in 1985, she went on to earn a PhD in horticulture from the University of Hawai'i (1991) with her dissertation "Collection, Establishment, and Evaluation of a Breadfruit Germplasm Collection."

In 1989, Diane joined NTBG as program director for the Hawai'i Plant Conservation Center before going onto serve as manager of Kahanu Garden, chair of the plant science department, director of science, horticulture, and conservation, and NTBG's acting director, along with other postings. After she established the Breadfruit Institute as an NTBG program in 2003, she served as director until 2022 when she became director emeritus.

Based on decades of hand-collected plant material throughout Oceania, the Breadfruit Institute has developed and curated a living conservation collection of 150 varieties – more than 300 individual trees – representing the wealth of genetic and horticultural diversity of this important tropical tree, and have contributed significantly to the understanding, conservation, and use of breadfruit in Hawai'i, across the Pacific, in Central America, the Caribbean, and around the world.

Under Diane Ragone's direction, the Breadfruit Institute has grown into a global initiative that has collected, curated, and now manages the conservation collection at Kahanu Garden on Maui and a Regenerative Organic Breadfruit Agroforest demonstration in McBryde Garden on Kaua'i. Among its many endeavors, the Breadfruit Institute has become a center for



PHOTO BY JIM WISEMAN

collecting, preserving, and growing breadfruit germplasm, conducting extensive research and publishing studies, reports, and guides related to micropropagation, ethnobotany, community forests, agroforestry, climate resilience, food security, as well as nutrition and seasonality.

Since 2003, the Breadfruit Institute has initiated dozens of national and international partnerships for research and distribution of trees including collaborations with the Trees That Feed Foundation, Jungle Project, Patagonia Provisions, Ceres Trust, and universities in Hawai'i, British Columbia, Copenhagen, Chicago, and elsewhere. Through these and other partnerships, the Breadfruit Institute has helped distribute nearly 200,000 trees to over 50 countries and territories around the world.

Diane has been recognized by the Society for Economic Botany, the Garden Club of America, the World's Who's Who of Women, and the College of Tropical Agriculture and Human Resources at the University of Hawai'i. As the 23rd recipient of the Fairchild Medal, she was selected by a five-person panel of peers including retired director of horticulture, Royal Botanic Garden Edinburgh, Dr. David Rae who said, "Dr. Ragone epitomizes the spirit and ethos of the Fairchild Medal because of her outstanding fieldwork and commitment in securing breadfruit germplasm."

Past recipients of the Fairchild Medal have included plant scientists, scholars, and other experts in botany and horticulture from the Royal Botanic Gardens, Kew, Arnold Arboretum of Harvard University, New York Botanical Garden, Missouri Botanical Garden, and other leading institutions.

The Fairchild Medal will be presented to Dr. Ragone at The Kampong, NTBG's garden in Miami, on November 14 where she will speak before an invited audience. She will deliver a second public lecture at The Kampong on November 15. Contact 1-305-442-7169 for details.



# an eye on plants

SELECT SPECIES IN FOCUS

## Coco de mer (*Lodoicea maldivica*)

To visit any of NTBG's five gardens is to be surrounded by palm trees. With some 300 members of the Arecaceae (palm family), NTBG's living collections include palms from around the world. Standing out from all the others – growing on their own in an open area of the McBryde Garden – are three *Lodoicea maldivica* palms, commonly known as the double coconut or coco de mer.

Unrelated to the true coconut palm (*Cocos nucifera*), coco de mer is a tree shrouded in mystery and confusingly named for the Maldiv Islands but is, in fact, native to the Seychelles, northeast of Madagascar.

According to ancient lore, sailors claimed that coco de mer “*was borne upon a tree deep under water, which was similar to a cocoanut tree, and was visible in placid bays upon the coast of Sumatra, &c., but that if they sought to dive after it the tree instantly disappeared.*”

NTBG's senior research botanist, Dr. David Lorence, explains that coco de mer were first reported to have washed up on the shores of the Maldives. Known for its curiously shaped seeds, said to be the largest in the plant kingdom, they have been measured at 18 inches in length and can weigh 40 pounds or more.

In 1981, the Pacific Tropical Botanical Garden (NTBG's name until 1988) received 28 coco de mer seeds from a Peace Corps volunteer in the Seychelles. Several were planted at multiple places in the Lāwa'i Valley, two at Limahuli Garden, with fourteen planted in the “Big Valley” area of the Lāwa'i Valley. At the time, it was hoped that they would form a grove of large, handsome specimen palms, visible throughout the valley.

But as David Lorence explains, the Endangered and extremely slow-growing coco de mer may produce just a single brittle, cardboard-like leaf per year. The bilobed seeds, evenly split into two smooth loaves are cleaved in such a way that they have earned the unceremonious nickname the “butt nut.”

Those enormous nuts (technically seeds) fall to the earth where they sit for many months and may eventually

produce a cotyledon stalk (embryonic appendage) which burrows into the earth, leaving the nut on the ground.

While coco de mer are rare in cultivation, NTBG still cares for three in the spot where they were planted over 40 years ago. Of the three, the largest occasionally produces male flowers. A second medium-sized palm is suspected to also be male, while a third has never flowered. Coco de mer is dioecious meaning it produces either male or female flowers.

At The Kampong in Miami, garden staff were gifted two dried coco de mer seeds by a relative of Catherine “Kay” Sweeney, The Kampong's former owner. Cynthia Toledo, education programs manager at The Kampong, has used the seeds as a prop to discuss seed dispersal and the intersection between science, history, and culture. She notes that people are spellbound by the enormous, distinctively shaped seeds.

A 1906 New York Times article about coco de mer, cites historical claims that the nut was so valuable that “*some Kings were reputed to have given a loaded ship for a single nut.*”

According to the Times' fanciful reporting, when the lining of the nut was finely ground and mixed with powdered black, white or red coral, ebony, and stags' horn, the concoction was said to counteract all poisons as well as colic, apoplexy, paralysis, and other ailments.

Carved and ornamented with rare gems, the shell was used to store tobacco, betel, lime and “*whatever else they masticated.*” The palm heart could be eaten, the trunk used as a water trough, the foliage for thatching, and its leaf down for stuffing pillows.

“*For many years attempts to introduce the coco de mer in the conservatories of the European botanical gardens failed invariably,*” the Times article reads.

While the coco de mer remains a treasured part of NTBG's living collections, given the limited success we have had even in the favorable climes of Hawai'i, cultivating this palm, bearer of the world's largest seed, one can argue, is most certainly a tough nut to crack.



PHOTO BY WILLIAM J. BAKER, RBG KEW





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THE LĀWA'I STREAM FLOWING THROUGH ALLERTON GARDEN. READ ABOUT NTBG'S COMMITMENT TO ENSURING A FUTURE WITH BOTANICAL GARDENS ON PAGE 6. PHOTO BY JON LETMAN