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the bulletin

of the National Tropical Botanical Garden

contents

ON THE COVER

NTBG conservation staff rappelling on a sheer cliff face in the Upper Limahuli Preserve. Read about how NTBG controls invasive weeds and predators to preserve native forest on page 12. Photo by Merlin Edmonds.

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.

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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.

Message from the President and CEO

For many of us, 2026 began with an unusually cold winter with weeks of snow and ice. As we welcome spring and warmer days ahead, I am thinking about the Oli Hoʻoulu (chant for growth) that inspires this year's NTBG theme: kupu which means to sprout, grow, germinate, or increase. As a botanical garden, kupu is at the heart of our work, but it also takes on a profound resonance for me.

In 1997, when my journey with NTBG first began, my daughter was a seven-year-old keiki (child) filled with a deep curiosity for nature and science. As I write to you today, I am anticipating the arrival of my first grandchild in April.

Reaching this milestone, thinking about growth, I gaze out at the garden and into the forest with a sharpened perspective. I find myself pondering ecology and the intricate, fragile relationships between the smallest new sprouts and understory of native Hawaiian ferns that provide shelter. That same growth is found in high-priority ecosystems like the Upper Limahuli Preserve here on Kauaʻi where the survival of species hinges on interactions between this fragile environment and the tiny sprouts whose potential for life is supported by our staff working in this remote landscape. You can read about their work on page 12.

The promise of new life is also being preserved through pollen banking, a practice we've undertaken as you'll see explained in a wonderful, whimsically illustrated feature story in this issue of *The Bulletin*.

Conservation is not only a biological endeavor, but a biocultural one as well. You can read about how The Kampong, our garden in Florida, is preserving the past in a new exhibit honoring the legacy of Miami's first female doctor Eleanor Galt Simmons who once lived where our garden now grows. Her story and the exhibit are a celebration of the healing power of plants, the triumph of women in science and academia, and the growth NTBG fosters in plants and people.

In this springtime of renewal, I am thinking about the potential held by our planet's biodiversity – the myriad of life supported by you and your engagement with the Garden. At this critical time, right now we have the best chance to achieve success. By preserving these small forms of life – a seed or a spore, a tiny fern in the forest, a vial of pollen in the lab, or a tray of seedlings, we are cultivating the future, while informed by the past.

The role of the small is critical as we are reminded by the ʻōlelo noʻeau (Hawaiian proverb): O kēia ʻuʻuku e nui ana (This smallness will be big later). This is why we so greatly value all forms of support, no matter how modest. We know that great trees and forests begin as pollen in the wind, and sprouts rising from the forest floor.

With your ongoing support, great things will come. Our gardens will grow, plants will survive, and together, our future can thrive.

Me ke aloha,

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**

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Rebecca J. and William Allen
Sherri and John Crichton
Melissa Draper
Burak Eyilik
Melanie and David Lawrence
Stefan Schauffele
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NTBG'S FIVE-YEAR JOURNEY OF LOOKING TO PLANTING OLI (CHANTS) FOR INSPIRATION CONTINUES IN 2026, YEAR OF THE KUPU (SPROUT), A PHASE OF EMERGENCE AND NEW GROWTH. ILLUSTRATION BY TRESSA HOPPE

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Julia Yarbough
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William Young

BECOME A MEMBER NOW.

A Doctor for All:

Honoring the Life of Dr. Eleanor Galt Simmons at The Kampong

BY JON LETMAN, BULLETIN EDITOR

Strolling beneath the shade of palms and tropical fruit trees, through the dappled light of The Kampong's dense canopy, it is difficult to imagine how the property looked more than a century ago. Long before its previous owner, plant collector and avid gardener Catherine "Kay" Sweeney, gifted her home and garden to the Hawai'i-based Pacific Tropical Botanical Garden[1], the property was rugged pine rockland[2] habitat growing over coastal limestone substrate, typical of the Miami area. Notably, it was also home to Miami-Dade County's first female doctor Eleanor Galt Simmons.

Born in Delaware County, New York in 1854, Eleanor Galt earned her medical degree from the Woman's Medical College of Pennsylvania in 1879. Along with her contemporaries, which included some of the first Black, Indian, and Native American female physicians in the United States, Galt was the embodiment of progress in late 19th century women's rights.

By 1884, Dr. Galt had established a practice serving patients in Elizabeth, New Jersey, Staten Island, and other parts of New York. In addition to her medical practice, she had taken up scientific illustration, producing anatomical drawings of reptiles and amphibians based on specimens provided by the Smithsonian Institution. The year after she married Captain Albion Simmons in 1891, the couple took the unusual step of moving to south Florida which was at the time a remote, difficult to reach, sparsely populated region of the United States.

For centuries, what is today south Florida was the homeland of the Tequesta, Miccosukee, and Seminole people. Florida became a U.S. state in 1845, a century which saw a large influx of immigrants from the Bahamas, Europe, and other parts of the United States. When Dr. Galt Simmons and her husband reached Florida, they settled in a budding community called 'Cocoanut Grove,' which remains one of the oldest continuously inhabited urban areas of south Florida. There, they purchased an eight-acre site for the sum of $4,868 where they built an oolite limestone house which was used as an office and barn for the doctor.

[1] Pacific Tropical Botanical Garden was renamed as National Tropical Botanical Garden in 1988 to reflect its presence in Florida and Hawai'i
[2] Pine rockland is a diverse habitat comprised of low-lying palmettos, slash pines, shrubs, ferns, and grasses growing on oolitic limestone substrate

THE OFFICE AND STABLE OF DR. ELEANOR GALT SIMMONS IS RECOGNIZED AS ONE OF THE OLDEST BUILDINGS STANDING ON ITS ORIGINAL FOUNDATION IN MIAMI-DADE COUNTY. PHOTO BY KAMPONG STAFF

In her adopted homeland, Dr. Galt Simmons treated patients for injuries that included gunshot wounds, bones broken in horse falls, and infectious diseases like dysentery and typhoid. Her practice took her to isolated communities to care for patients using medicines, some based on local plants. Galt Simmons had studied *meteria medica*, the science of using natural ingredients for medicine, so it would not have been out of character for her to bolster her medical knowledge from Indigenous healers and migrant settlers. During her time in Florida, she became best known for her commitment to caring for any patient, regardless of race, class, or gender in an age when doing so was not a given.

In the late 19th century, doctors often prepared their own medicines — a combination of powders, poultices, and tinctures. These treatments included flowers, herbs, and other plant material which were dried and ground into paste and applied topically, mixed with alcohol or vinegar and administered in small doses, or simmered to create an extract to be sipped like tea. Research by the Miccosukee Tribe of Florida suggests that Galt Simmons interacted with tribal members as she traveled in the Everglades and elsewhere.

Following Galt Simmons death on February 6, 1909, the Dade County Medical Association published a "resolution of respect" which lamented her passing, describing her as "one who has labored long and faithfully in her noble calling, and who was never too tired, no storm too fierce to brave, to

SAW PALMETTO *(SERENOA REPENS)* ON KAMPONG GROUNDS. PHOTO BY KAMPONG STAFF

minister to the wants and suffering of others, under difficulties that we might consider impossible and insurmountable."

In 1916, the Galt Simmons property was purchased by renowned botanist and plant explorer David Fairchild and his wife Marian, from which time the property came to be known as The Kampong (a Malay word for 'village' or 'cluster of houses').

In his 1947 book *The World Grows Round My Door*, Fairchild describes a little stone barn on his property, writing, "I felt it must be filled with the romance of somebody's life. And it was. Every time I enter my study here I see a bell-stop of bronze. A tiny spider has made its web over the hole where the push button once was, but the name of "Dr. Galt Simmons," now green with copper oxide, is the key to the life of pioneering romance; to the life of a remarkable woman..."

Fairchild continued, "In this barn she kept her little pony, and on it she rode about the countryside doctoring the settlers, and the Seminoles as well, far

ILLUSTRATIONS BY ELEANOR GALT SIMMONS COURTESY OF HISTORYMIAMI MUSEUM

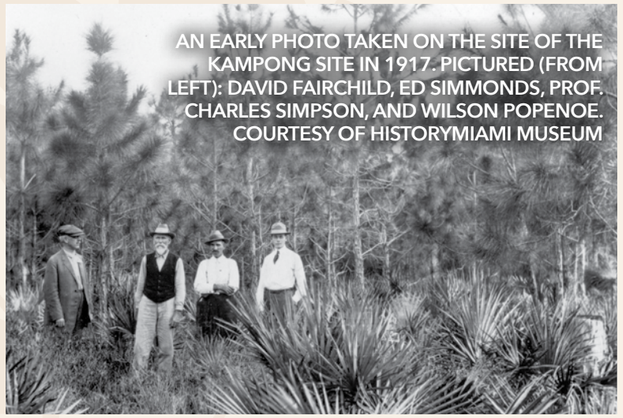
TRAILBRAZERS: (FROM LEFT) **ELIZA ANN GRIER** (1864-1902) WAS BORN INTO SLAVERY IN NORTH CAROLINA. IN 1897 SHE WAS THE FIRST BLACK WOMAN LICENSED TO PRACTICE MEDICINE IN GEORGIA. **ANANDIBAI JOSHEE** (1865-1887) TRAVELED FROM HER NATIVE BOMBAY TO THE U.S. TO COMPLETE MEDICAL SCHOOL IN PENNSYLVANIA AT THE AGE OF 21. **MATILDA ARABELLA EVANS** (1872-1935) EARNED A MEDICAL DEGREE IN PHILADELPHIA AND LATER BECAME THE FIRST AFRICAN AMERICAN WOMAN TO PRACTICE MEDICINE IN SOUTH CAROLINA. **SUSAN LA FLESCHE PICOTTE** (1865-1915) WAS BORN IN NEBRASKA TERRITORY AND IS CELEBRATED AS THE FIRST NATIVE AMERICAN WESTERN-TRAINED PHYSICIAN IN THE UNITED STATES AT AGE 24. PHOTO USED WITH PERMISSION OF LEGACY CENTER ARCHIVES, DREXEL UNIVERSITY

up the coast of Biscayne Bay. Her fame as a surgeon made her well known in places too far away for the pony to carry her, and there she had to go by sailboat."

Fairchild used Galt Simmons's office and stable, adding a second story which became his study. That building is today recognized as one of the oldest structures in its original location in Miami-Dade County. In 2017, it was registered as a Florida Heritage Site and commemorated with a plaque.

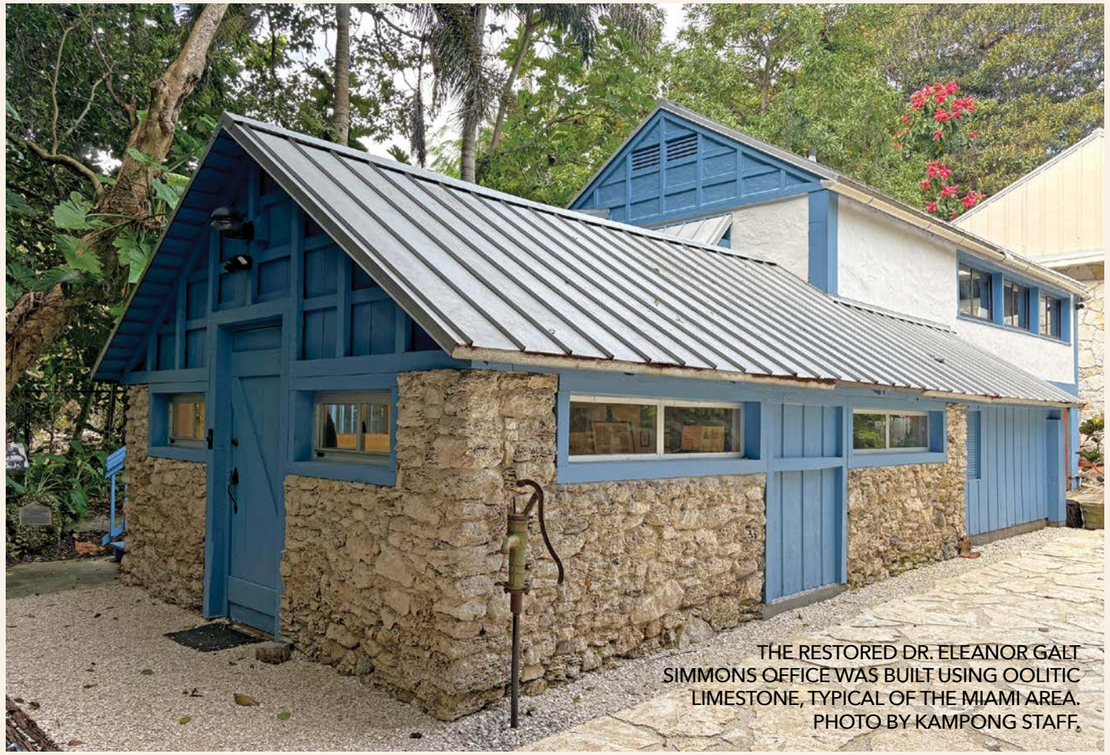
Late last year, The Kampong installed a historic exhibition inside the restored office and stable of Dr. Galt Simmons. Outside the building, NTBG staff have planted a medicinal garden that includes elderberry, saw palmetto *(Serenoa repens)*, and resurrection fern *(Pleopeltis polypodioides)*. Elsewhere grows aloe vera, guava, and Spanish moss—some of which were used medicinally by Florida's Indigenous people for generations.

Inside the office, the exhibit explains how Florida plants such as gumbo-limbo trees *(Bursera simaruba)* and Carolina willow were used to treat a variety of ailments.

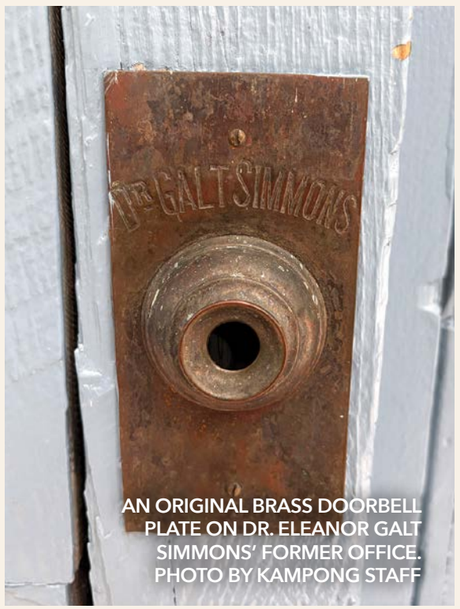


AN EARLY PHOTO TAKEN ON THE SITE OF THE KAMPONG SITE IN 1917. PICTURED (FROM LEFT): DAVID FAIRCHILD, ED SIMMONDS, PROF. CHARLES SIMPSON, AND WILSON POPENOE. COURTESY OF HISTORYMIAMI MUSEUM

A FLORIDA HERITAGE SITE HISTORICAL MARKER RECOGNIZING THE DR. GALT SIMMONS OFFICE AND STABLE. PHOTO BY KAMPONG STAFF



THE RESTORED DR. ELEANOR GALT SIMMONS OFFICE WAS BUILT USING OOLITIC LIMESTONE, TYPICAL OF THE MIAMI AREA. PHOTO BY KAMPONG STAFF.



AN ORIGINAL BRASS DOORBELL PLATE ON DR. ELEANOR GALT SIMMONS' FORMER OFFICE. PHOTO BY KAMPONG STAFF

The exhibit highlights the medicinal traditions of Native cultures as well as Bahamian migrants who have contributed much to Miami's culture and community. Also on display are a selection of books about medicinal plants, early medical training for women in the United States, and the history of Florida. Dr. Galt Simmons's office is available for viewing upon request or on select Saturdays. The exhibit stands as a testament of The Kampong's long and diverse history, and as a serene garden where science, education, history, and culture meld as one.

The Eleanor Galt Simmons Exhibit was made possible with the support of The Rosenberger Family Trust, Baptist Health, and The Villagers, Inc.

READ AND SHARE ONLINE

National Tropical Botanical Garden
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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, 2027. Learn more at: https://www.gcamerica.org/scholarships

THE GARDEN CLUB of AMERICA

wish list

Make a difference today! Your purchased Wish List item will directly meet immediate program needs. Donate online at ntbg.org/support/donate or call Chelsey Aki at (808) 332-7324 Ext. 209. Mahalo for your support!

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Technician work boots - $250
Safety duplication tools and supplies - $1,500

EDUCATION
Education Center - $1,500

KAHANU GARDEN
New water pump - $800
New office chairs - $800

LIMAHULI GARDEN
One set of horticultural tables - $1,500

ALLERTON/MCBRYDE/NURSERY
Echo PB-9010H Backpack gas Blower - $1,400
New hardware for mist house (pipes, nozzles, valves) - $1,000

FACILITIES
80-gallon air compressor - $1,500
Rolling toolbox for specialty tools - $300

SCIENCE CONSERVATION
Subscription to Kew Bulletin to help us stay connected - $1,269
Lightweight backpacking tent for field work - $500

SOUTH SHORE VISITOR CENTER
Wireless headsets - $320
Coolers - $200

THE KAMPONG GARDEN
Bus scholarship for education programs - $1,500
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VOLUNTEER PROGRAM
Lanyards with new NTBG logo - $850
Pruners - $200

To see the complete Wish List, please visit: https://ntbg.org/support/wishlist/

Critical Conservation in the Upper Limahuli Preserve

A Sanctuary at The Edge

BY FRANCES CAFLISCH, CONSERVATION TECHNICIAN II
MERLIN EDMONDS, WEED CONTROL COORDINATOR
JORDAN GUSS, WEED CONTROL TECHNICIAN II
AND CHIEMI NAGLE, PREDATOR CONTROL COORDINATOR

WEATHERPORT IN THE UPPER LIMAHULI PRESERVE. PHOTO BY JORDAN GUSS

The steady hum of the engine intensifies as the Hughes 500 helicopter lifts over the ridge marking the edge of Upper Limahuli Valley. Through the clouds below we can see the complex topography and viridescent canopy of the hanging valley, bordered by precipitous 2,000-foot cliffs. A typical Monday morning commute for the conservation staff of Upper Limahuli Preserve offers breath-taking views of waterfalls, rivers, deep mysterious valleys, and towering peaks as we travel above the island's interior to the verdant north shore of Kaua'i.

Located at the eastern end of Kaua'i's Nāpali coast, the Upper Limahuli Preserve ranges from 1,600-3,330 feet above sea level in the wao akua[1], encompassing 1,068 surface acres of relatively pristine native forest. Home to incredibly rare flora and fauna, Limahuli is one of the most biodiverse valleys in Hawai'i. In 2009, a 3.5-mile long ungulate-proof fence was installed to protect habitat critical for the successful breeding of 'ua'u and 'a'o[2], two critically endangered seabirds which are central to the valley's biodiverse ecosystem. To enhance protection of the preserve, NTBG staff work on two main programs: Predator Control and Weed Control. The goal of the predator control team is to reduce harm from non-native predators such as cats, rats, pigs, and barn owls. The weed control team focuses on stemming the incursion of habitat-destroying plants such as Himalayan ginger, Australian tree fern, and Koster's curse.[3]

[1] Spiritual region inhabited by gods, a place with limited human interaction

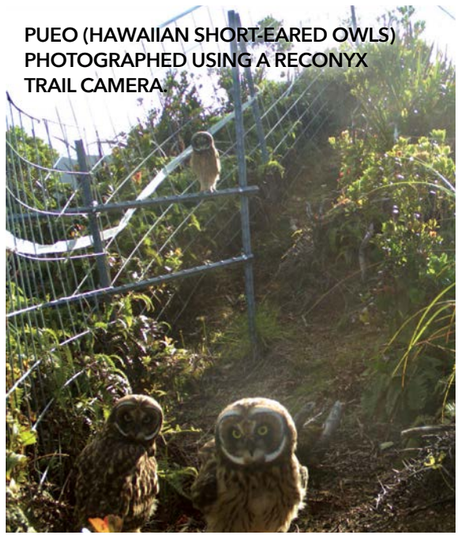
[2] Hawaiian petrel, *Pterodroma sandwichensis* and Newell's shearwater, *Puffinus auricularis newelli*
[3] *Hedychium gardnerianum, Sphaeropteris cooperi,* and *Miconia crenata*

Our pilot banks the helicopter suddenly to account for an unexpected gust of wind and sets the skids down onto the narrow landing zone, the powerful rotor blades sending leaves fluttering wildly. Mist sweeps over the slopes as white caps foam up in the distant sea. We unload our supplies for the week, carefully securing our gear as the helicopter lifts off.

It takes several trips to carry everything up the trail to the WeatherPort, our 16' x 20' home away from home for the next five days. The campsite, constructed in 2010, serves as a refuge from the wet environment, and has all the essentials for comfortable mountain living – solar panels and battery, water catchment, propane stove, and cozy bunk beds.

Over the weekend, cellular trail cameras recorded two feral cats prowling along the fenceline. These motion-activated cameras transmit photos via email, allowing us to monitor traps daily and respond quickly when needed. Constant monitoring of trails and traps is especially crucial during the ʻuaʻu and ʻaʻo nesting season from March through December.

Upper Limahuli Preserve holds one of the world's largest monitored ʻaʻo colonies, however ʻaʻo and ʻuaʻu populations have steadily declined due to habitat loss and predation by introduced species such as feral cats. Though domestic and feral cats are the same species, they differ in impact and behavior. Feral cats are unsocialized, cannot be handled, frequently diseased, and survive in the wild, hunting for food. Cats kill adult seabirds, chicks, and eggs, catastrophically reducing breeding success.



PUEO (HAWAIIAN SHORT-EARED OWLS) PHOTOGRAPHED USING A RECONYX TRAIL CAMERA.

Huddled around our detailed LiDAR[4] map of the preserve we systematically study where and when the cats were sighted to determine a plan. We decide that leghold traps are the best option for this situation. These spring-operated traps consist of rubber-padded jaws which, under tension, will rapidly close around the predator's foot, gripping it firmly. When camouflaged and set directly in the trail, they are very effective for predators that have demonstrated trap-avoidance behavior.

We pack up the traps and gear and set out, splitting into two teams. As we depart, the air is cut by the sharp cry of a pueo[5], freefalling from high above before soundlessly flapping to a glide a few meters overhead, examining us with its piercing golden eyes.

We arrive at one of our most successful and often-used trap sites where the trail along the fence narrows between earthen walls. We drop our packs onto the soft earth with a heavy clanging thud. Using a hand pick, Frances excavates shallow holes in which to nestle the legholds and conceals them with dry leaves, making sure nothing will prevent the jaws from closing. Our goal is to make the area with the traps indistinguishable from the rest of the trail. Other bulky vegetation is added to block access points and funnel cats into the trap site.

Weary from the day's efforts but buoyed by the optimism of freshly set legholds, we flag the site and record our data. In the distance we hear the distinctive fluttering wingbeats of a flock of ʻapapane[6] as they alight upon ʻōhiʻa[7] flowers to feed. We check that our trail cameras are obstruction-free and aimed at the trap site. As we pack our gear and head home, the setting sun's golden glow softens the air and shadows grow long.

Reconvening at the WeatherPort, the teams discuss their leghold sites and place wagers on which traps will be successful. After a hearty communal dinner, we enjoy a few games of *hanafuda*[8], followed by quiet activities like reading, knitting, and stargazing. The evening calm is marked by a veritable symphony of chirping crickets.

On Tuesday morning we perform our daily remote trap check. Seeing that all the traps are still open, we decide to focus on cliffside weed control, one of our most exciting, yet dangerous

[4] Light Detection and Ranging: remote sensing method of measuring variable distance to the Earth
[5] Hawaiian short-eared owl, *Asio flammeus sandwichensis*, endemic subspecies
[6] Hawaiian honeycreeper, *Himatione sanguinea*, endemic
[7] *Metrosideros polymorpha*, the most abundant tree in Hawai'i
[8] Traditional Japanese nature-themed card game

JORDAN GUSS HOLDS AN ʻA'O (NEWELL'S SHEARWATER) CHICK. PHOTO BY MERLIN EDMONDS

UPPER LIMAHULI PRESERVE ON THE NORTH SHORE OF KAUA'I ENCOMPASSES OVER A THOUSAND ACRES OF NATIVE FOREST AND IS HOME TO INCREDIBLY RARE FLORA AND FAUNA. PHOTO BY CHIEMI NAGLE

PU'E (*LOBELIA KAUAENSIS*) IN BLOOM.
PHOTO BY MERLIN EDMONDS

A 3.5 MILE LONG UNGULATE-PROOF FENCE PROTECTS CRITICAL SEABIRD BREEDING HABITAT IN THE UPPER LIMAHULI PRESERVE. PHOTO BY JORDAN GUSS

A TRANSPORT HELICOPTER ON A SMALL LANDING ZONE IN THE UPPER LIMAHULI PRESERVE. PHOTO BY FRANCES CAFLISCH

tasks. We set off down the steep trail carrying our overstuffed packs. Misty wisps of clouds drift across the tops of stately ʻōhiʻa; sparkling ʻōlapa[9] trees dance in the slight breeze, shaking off the morning dew. During a recent drone survey, we spotted a dense area of highly invasive Himalayan ginger on the steep cliffs below our campsite, an area packed with ʻuaʻu and ʻaʻo burrows.

"On rappel!" Jordan yells as he lowers himself slowly over the cliff's edge, boot spikes scrabbling on the slippery basalt, while the rest of us busy ourselves doublechecking each others' knots and anchors, and gathering our tools – herbicide, handsaw, machete, and an iPhone for data collection and photos. We carefully make our way down the vertical slope, picking out invasive plants to treat, guiding each other to targets by shouting directions. The rhythmic *chop-chop-chop* of machetes echoes along the cliffside. Beautiful native plants densely cascade around us: hāpuʻu, hoʻiʻo kula, and ʻamaʻu[10]. We are excited to see delicate shrubs in the Campanulaceae family like ʻōhā wai, hāhā, and ʻōpelu[11].

Upon reaching a patch of ginger, we cut the growing fronds, stack them to one side, clean the rhizomatous root-ball to expose the work area, then proceed to make hundreds of small slices in each root-mass, finishing by carefully spritzing herbicide on all the rhizomes. A data entry is made for each weed kill, and a protective "hale"[12], using the large waxy ginger leaves, is built over the remains of the patch to prevent the rain from washing away our hard work.

In the early afternoon, Chiemi calls out to the group in excitement. While roping down a narrow deeply-shaded gulch, she discovered a new individual of *Melicope quadrangularis*, a critically endangered shrub in the Rutaceae. Known only from the Wahiawa mountains of southern Kauaʻi, this rare alani[13] was discovered in Upper Limahuli Preserve in 2012. While tagging the alluring plant with a POPREF[14] code, we find one solitary fruit low on the stem which we cover with a mesh bag in hopes of collecting for future propagation.

At the end of the day, muddy and exhausted but buzzing from the exciting rare plant discovery, we pack up our gear and hike back to camp. Recapping the day's activities, we are reminded of the significance of removing invasive species in this fragile habitat. Over 25 seabird burrows were spotted throughout the day, some of them new discoveries.

[9] *Cheirodendron platyphyllum*, a native species in the ginseng family
[10] *Cibotium glaucum* and *C. nealiae, Hoiokula sandwicensis, Sadleria cyatheoides* and *S. squarrosa*
[11] *Clermontia fauriei, Cyanea fissa,* and *Lobelia hypoleuca*

[12] Hawaiian word for house or dwelling signifying a sheltered place
[13] Hawaiian name for many species in the genus *Melicope*
[14] Unique identifier for a specific population sample or site within an ecological or genetic database

As the forecast Kona low-pressure system rolls in, the mountains become shrouded in clouds and a light rain begins, expected to last for the remainder of the trip. The crew continues with the tasks begun earlier in the week. Traps are monitored remotely and shockingly, a third cat shows up on camera. Other rodent traplines are checked and there are always more weeds to treat.

On our last morning, as the darkness gives way to the pre-dawn light, we listen to the donkey-like braying of the ʻaʻo and the ethereal cooing of the ʻuaʻu as the last birds head out to sea to hunt for the day. The final morning of a trip can be an apprehensive affair, as weather dictates if we can return home after another difficult work week or if we must stay until the conditions improve. Sunrise reveals that we are indeed socked in by dense clouds. After communicating with the pilot, we go on standby, ready to fly out at a moment's notice. We continue our typical Friday morning routine of packing, cleaning and hauling gear down to the landing zone, albeit with a heightened sense of urgency.

The wao akua eventually grants us a well-timed break in the clouds, just long enough for two extraction flights. As the second flight lifts off and swoops down through the billowing clouds, we catch one last glimpse of the WeatherPort as it disappears in the mist. Following the stream low through the valley, as the helicopter swoops up and over the eastern ridge, Merlin has time to reflect on the importance of the work we do in Upper Limahuli Preserve. Outside our fence, previously pristine native habitat is being steadily inundated by invasive weeds and destroyed by non-native browsing mammals. As native ecosystems face habitat loss, introduced predators, and climate change, it is more important than ever to maintain these puʻuhonua[15], these refugia, as places where irreplaceable endemic species can continue to thrive for future generations.

READ AND SHARE ONLINE

[12] Hawaiian word for "place of refuge" or "sanctuary"

ABOVE: MERLIN EDMONDS BESIDE A PATCH OF INVASIVE HIMALAYAN GINGER. PHOTO BY CHIEMI NAGLE
BELOW: KŌLEA (*MYRSINE LINEARIFOLIA*). PHOTO BY JORDAN GUSS

plant people

EXPLORING PEOPLE'S RELATIONSHIPS WITH PLANTS

PHOTOS BY JON LETMAN

ANNA PALOMINO

Growing up on the outskirts of Kingston, Jamaica, Anna Palomino's grandmother had a garden with a huge grapevine. She recalls her mother and grandmother loved all kinds of plants and grew everything they could – orchids, papayas, mangoes, and other fruit trees.

When she was 16, Anna left home to study at a small college in southern California. She began as an art student but soon switched to horticulture and biology. At age 21, Anna moved to Maui where she began studying agriculture. In those early days, she met experienced plant collector and respected elder Rene Sylva.

Soon, she and Rene were hiking all across Maui, exploring its diverse habitats and collecting plants. In the process, Anna learned much from his deep knowledge of native Hawaiian plants and how to propagate them for restoration. That friendship changed the course of her life, leading her to start Hoʻolawa Farms, one of the first commercial native plant nurseries in Hawaiʻi in the late 1980s which she ran for more than 20 years.

For the past 15 years, she has worked at the State of Hawaiʻi Department of Land and Natural Resources' rare plant facility in upcountry Maui. Today Anna is the senior horticulturist managing the nursery where she specializes in growing plants for restoration sites on Maui and neighboring islands.

After moving to Hawaiʻi in your twenties, how did you develop an affinity for native Hawaiian plants?

I met Rene Silva who was a fisherman and also maintained the Maui Nui Botanical Gardens. As he collaborated with botanists, he became really interested in plants and started to grow native plants for the restoration of Kahoʻolawe island. Rene was my mentor and the one who got me even more interested in plants. I used to have a big four-wheel drive and Rene and I would cruise all over Maui. I did a lot of hiking with him in those days, learning different habitats. He was my mentor. If I hadn't been with him, I wouldn't be doing what I do now.

What exactly do you do now?

I am the senior horticulturist at the state Department of Land and Natural Resources' rare plant facility. I've been there over 15 years.

What are you growing at that facility?

Our priority is growing for the Plant Extinction Prevention program – those plant species with 50 or less individuals left in the wild. We also grow rare and common plants for other restorations around Maui.

When you and I met at the nursery in 2024, you were growing 16 Critically Endangered Ka Palupalu O Kanaloa (*Kanaloa kahoolawensis*) individuals (pictured at right). How are those plants doing now?

They're doing great. We had to actually move them from outside to inside because it's gotten really wet and cold up there during the winter.

How have you succeeded in growing this extremely rare and difficult to grow species?

Seeing where it was last found in the wild helped. I live where there is a big, cultivated plant that was, at one time, the only plant that was alive. I was able to observe it and try different things and if it didn't like it, it would tell me or show me. There was a lot of observation because there really isn't any information about how to grow this plant. It ended up being one of the hardest plants I've ever grown. It's so full of different phases of growth and involved sometimes making mistakes, keeping it too dry and then it would wilt and it would be like, 'oh my gosh!' So it was real trial and error.

Recently, we transplanted the Kanaloa that you saw into a six-by-six foot planter box and she's responded so well. She's the most beautiful I've seen her. She's greened up considerably. I'm really hopeful that she's going to give us more seeds this spring.

In addition to the Ka Palupalu o Kanaloa project, are you collaborating with NTBG or others?

Once in a while I receive rare plants like *Gardenia remyi* [in Hawaiian nānū] which I am growing for Molokaʻi. We also get a lot of material from the Lyon Arboretum seed lab where they do germination tests. They'll bring plant material up to our facility and we grow it out, usually for Maui, Molokaʻi or sometimes Lānaʻi.

The plants in your nursery all appear so healthy. How do you do it?

I look at plants and try to figure out how they grow by really examining their habitat. I love to be out in the field where I can see and feel the plants and what they're feeling. That gives me so much information that I can use in the nursery. I look at it in terms of what I can give the plants to make them most comfortable. Sometimes I do have problems with plants, where I don't think they're happy. So it's just trying lots of observation and sometimes a little experimenting.

Do you have any new plans for this nursery?

We're going to add a fern lab, an insect lab, and a snail lab. There's going to be a lot more going on other than just the small nursery we have now.

There are many aspects to growing plants. Do you have a favorite?

They're all kind of cool, actually. I would say cleaning seeds is interesting to me. It's hard to really pinpoint because a lot of these things are pretty special – like cross-pollinating *Brighamia*, collecting the seeds off the capsules or looking closely at seeds to figure out how best to scarify them. You know, grafting even. I've done a little bit of grafting with *Kokia cookei*. I can't say I have one favorite thing.

Do you have a favorite plant or group of plants?

That's hard too. Whatever I'm working with becomes a favorite, really. Especially if it's a difficult plant to figure out how to grow. They're all so beautiful in all their phases, for example, something with a really tiny flower or the colored hairs on a plant. When you look at it closely, it's just amazing.

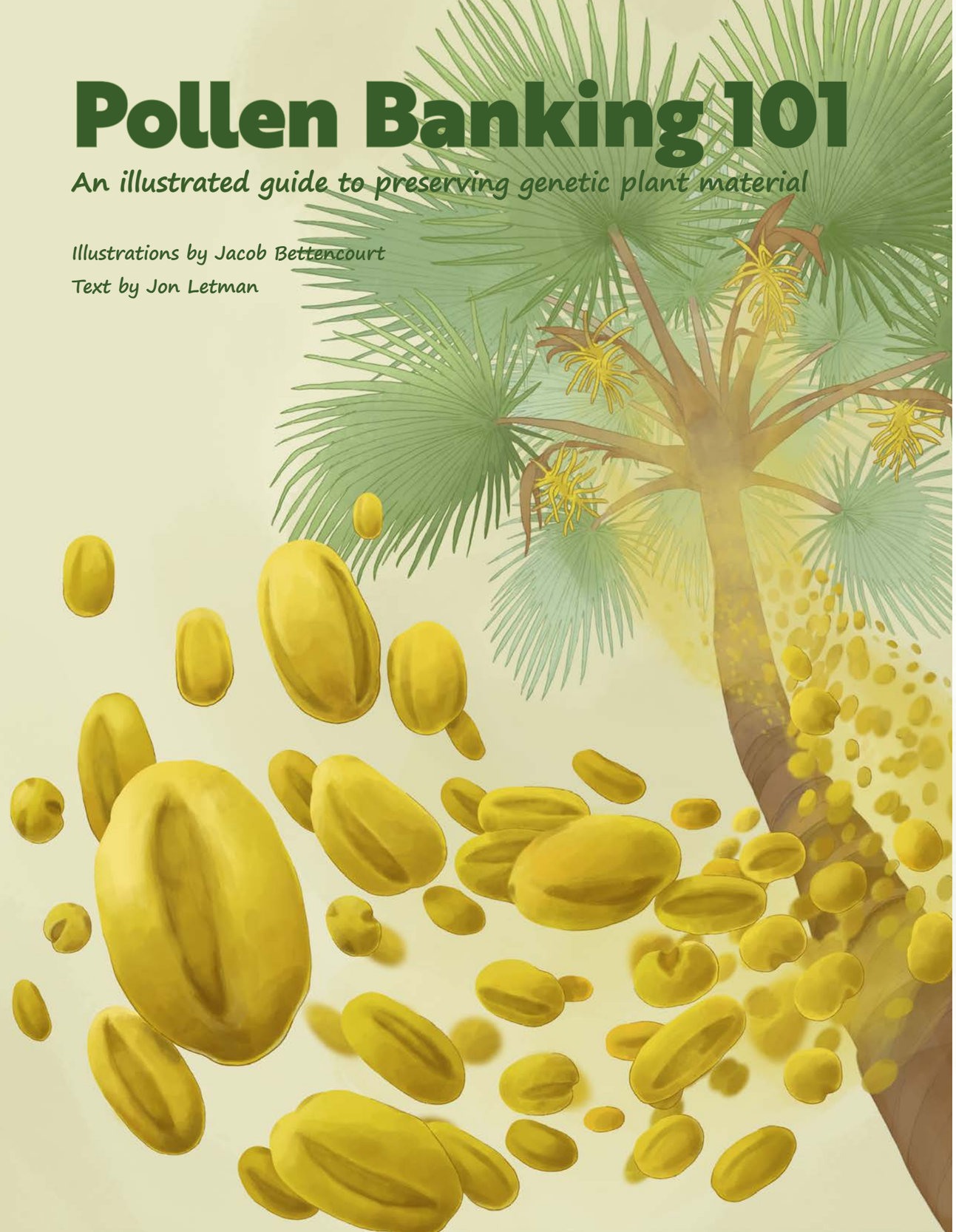
This interview was edited for length and clarity.

Pollen Banking 101

An illustrated guide to preserving genetic plant material

Illustrations by Jacob Bettencourt

Text by Jon Letman



Plant conservation is practiced in two broadly defined settings: **in situ**, meaning in a plant's natural habitat, often described as "in the wild" and **ex situ**, sometimes called "off site," in reference to a controlled or managed setting such as a plant nursery or botanical garden.

One example of **ex situ conservation** is seed banking which involves drying and cooling seeds for later use. NTBG has been banking seeds for more than 40 years, but recently we're investing time and effort in another kind of ex situ conservation — pollen banking — a technique that follows the seed banking model with some significant differences.

Pollen, a plant's microscopic powder-like substance that holds the male reproductive cells, contains half of a plant's unique genetic composition. Banking pollen offers another tool for safeguarding genetic diversity and preventing extinction. The pollen of agricultural crops like corn, wheat, and almonds has been studied for decades, but employing similar techniques for wild plant species is still new and remains an under-utilized conservation practice.

Currently, NTBG is one of the few organizations in the world that is banking pollen. Despite the many challenges to overcome unanswered questions, NTBG scientists recognize the extraordinary opportunities pollen banking presents in protecting endangered species and helping stem the loss of biodiversity.

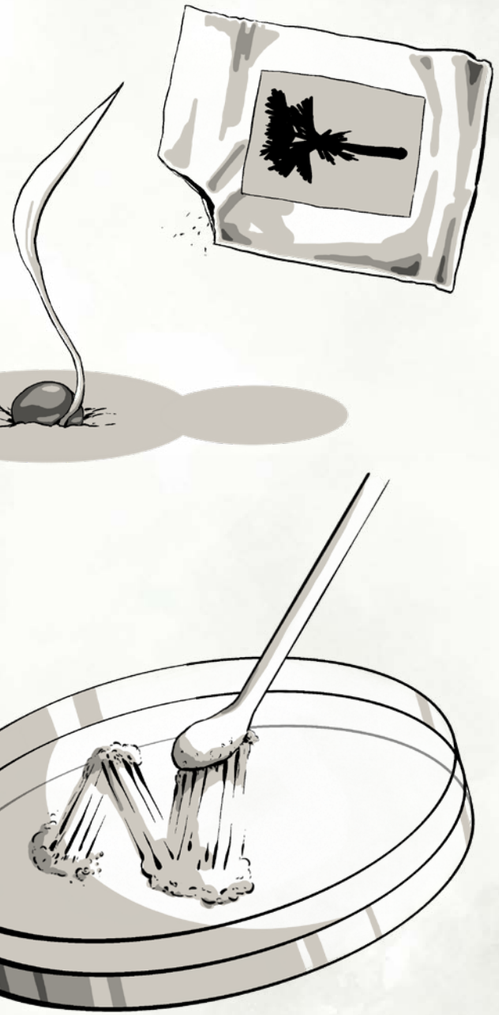
Why bank pollen?

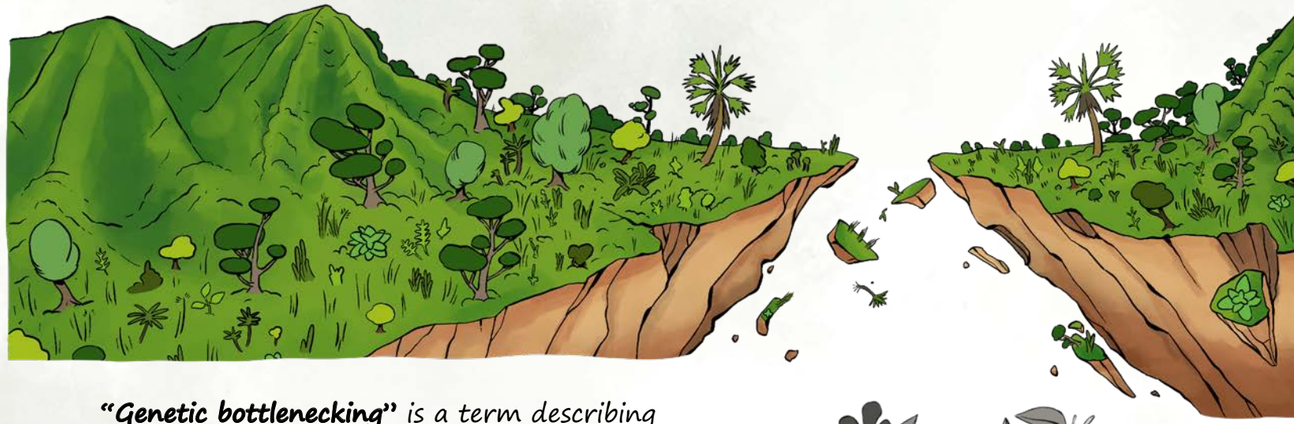
In extreme scenarios, even if the last known individual plant and its seeds are lost, pollen banking allows genetic material to be perpetuated. Increasing threats such as fragmented plant habitats and phenological shifts (i.e. the timing of when a plant blooms) knock plants out of synch with their natural pollinators and with each other. Pollen banking can help bridge the gap between time and space, allowing scientists the opportunity to make strategic crosses and thus perpetuate genetic diversity.

Like seeds, pollen has varying conservation needs. Some pollen can be dried, frozen, and kept in storage for years, others cannot. When seeds are inaccessible, recalcitrant (meaning they cannot be dried and stored in conventional ways), or are exceedingly difficult to germinate, pollen banking offers an alternative means of preserving plant genetics

Because so much remains unknown, NTBG staff and specially trained volunteers are conducting painstaking, time consuming viability trials to learn the best methods for storing different pollen types. Something as seemingly simple as how to extract miniscule amounts of pollen from a flower requires extraordinary patience and focus.

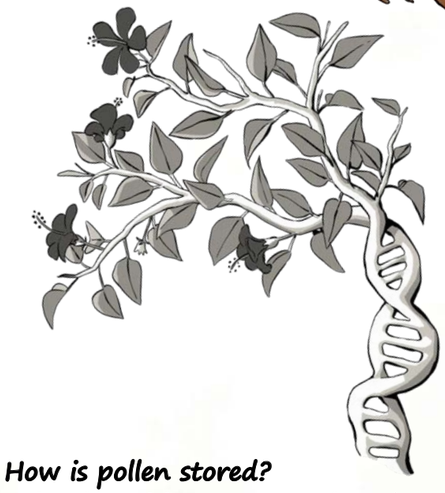
Pollen banking offers botanical institutions the ability to share pollen with partner organizations around the world and make informed conservation decisions about endangered species in a manner similar to how zoo breeding programs preserve and perpetuate animal genetic material using a breeding registry called a stud book.





"Genetic bottlenecking" is a term describing how population loss leads to reduced genetic diversity. This can occur when greatly diminished plant populations are isolated from one another, for example restricted to different valleys, preventing cross pollination and the production of seeds. Pollen banking allows humans to bridge that gap through hand pollination of diverse individuals and populations.

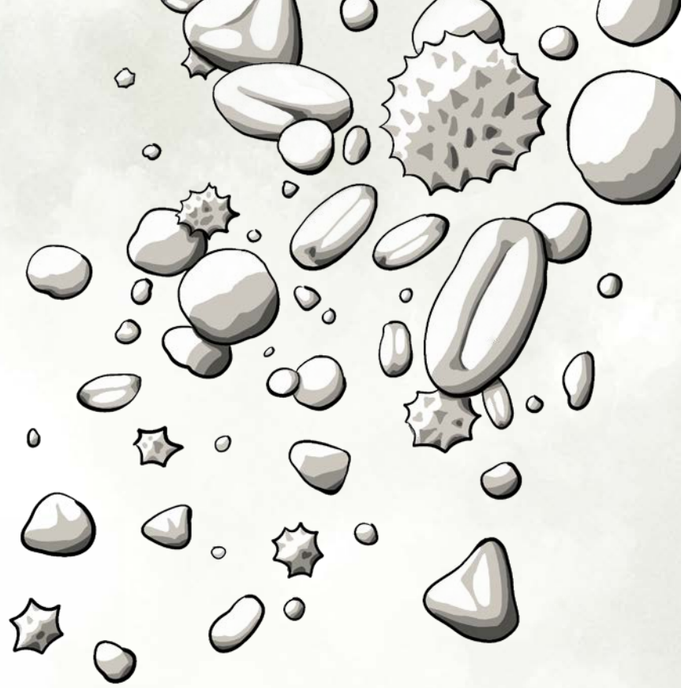
Genetic diversity is important because it helps plants remain resilient to external forces (predation, climate change, habitat degradation, etc.) and less vulnerable to pests and diseases. Deciding which species to target for pollen banking frequently comes down to the availability of grants and other funding or the conservation priorities for a species from partner organizations such as Hawai'i's Plant Extinction Prevention Program.



How is pollen stored?
Scientists visit target species where they collect pollen which is brought back to the lab at NTBG's Botanical Research Center where the pollen samples are checked for initial viability in a nutrient rich agar gel in a petri dish. Pollen is incubated then observed under a microscope.

After 72 hours, dried pollen can be hermetically sealed and stored in a foil packet and deposited in a freezer at minus 18c or minus 80c for storage. Ongoing viability tests are conducted at intervals. Scientists are still studying how viability changes when pollen is first collected and how it is affected by drying and freezing.

NTBG has found that pollen is highly variable. Unlike some Hawaiian plant pollen which dies within hours of being collected — native hibiscus, for example — loulu (Pritchardia palm) viability remains high even after the pollen has been dried and frozen, offering a new conservation technique for a genus whose seeds cannot be conventionally stored.



In partnership with Chicago Botanic Garden, and researchers in Spain, Ecuador, and elsewhere, NTBG is working to improve awareness and understanding of the value of pollen banking. NTBG's seed bank manager Jena Osmani says pollen banking is an effective way to preserve a plant's basic genetic information when we can't store the seeds.

Building on all we have learned so far, NTBG hopes to establish a framework for banking rare and wild plant pollen that will not only shed light on vital conservation methods but also serve as a model for other institutions and places which have high rates of endemism and endangered plants.

NTBG seed bank manager Jena Osmani and botanist Dr. Dustin Wolkis contributed technical details for this story.

READ AND SHARE ONLINE

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 76,000 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.

NOT EVALUATED	DATA DEFICIENT	LEAST CONCERN	NEAR THREATENED	VULNERABLE	ENDANGERED	CRITICALLY ENDANGERED	EXTINCT IN THE WILD	EXTINCT
NE	DD	LC	NT	VU	EN	CR	EW	EX

Species: Lehua maka noe (*Metrosideros polymorpha* var. *pumila*) Myrtaceae

IUCN RED LIST CATEGORY: ENDANGERED (EN)

'Ōhi'a or native Hawaiian *Metrosideros* dominate Hawai'i's mesic and wet forests and serves as one of the most bioculturally important native plants in Hawai'i. On Hawai'i Island, they are among some of the first plants to come up on new lava flows. 'Ōhi'a are a prime example of foundational forest trees essential for native ecosystem function. In Hawai'i, the genus is comprised of 13 endemic taxa among five species (one of the species, *M. polymorpha*, is composed of eight varieties and *M. waialealae*, two varieties). Seven of the 13 taxa are single-island endemics.

Lehua maka noe, or *Metrosideros polymorpha* var. *pumila*, is endemic to middle to high elevation bogs and swamps on Kaua'i, O'ahu, Moloka'i, and Maui. This taxon is a small prostrate shrub less than a meter in height. The flowers are bright red, in stunning contrast to other shades of the surrounding bog or swamp. Although locally common in its habitat, all native 'ōhi'a face numerous threats including Rapid 'Ōhi'a Death (ROD), a fungal disease caused by two different species of fungi that infect the sapwood.

PHOTO BY KEN WOOD

In response to ROD in 2017, a state-wide effort focused on collecting and banking seeds from hundreds of trees for each native 'ōhi'a taxon. NTBG, with support from the Hawai'i Tourism Authority, conducted a project to collect and bank seeds of the four 'ōhi'a taxa that naturally occur on Kaua'i, which includes *M. polymorpha* var. *pumila*. Currently, NTBG's seed bank curates nearly half a million seeds of *M. polymorpha* var. *pumila*, represented by 21 unique accessions of wild origin from Kaua'i, available for future restoration.

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

garden sprouts

News from around the Garden

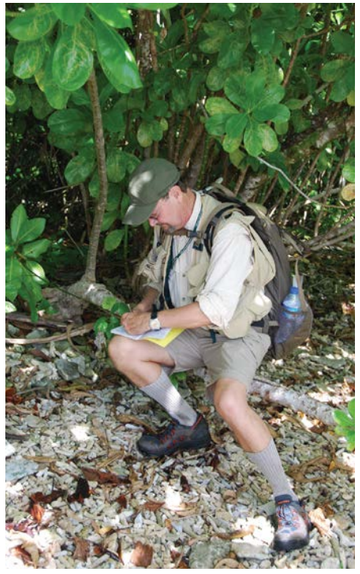


PHOTO BY KEN WOOD

DR. DAVID LORENCE TO RECEIVE JOSÉ CUATRECASAS MEDAL FOR EXCELLENCE IN TROPICAL BOTANY

NTBG senior research botanist Dr. David Lornence has been selected as the 2026 recipient of the José Cuatrecasas Medal for Excellence in Tropical Botany. The Smithsonian Institution's National Museum of Natural History's Department of Botany will present the medal, named for an influential Spanish botanist, to honor Dr. Lorence's significant contributions to advancing tropical botany as a research scientist and plant explorer.

Over nearly four decades since he joined NTBG as a systematic botanist and curator of the PTBG herbarium, Dr. Lorence has been instrumental in guiding scientific research, conservation, and field work throughout Hawai'i and across the Pacific. His career has been marked by important plant discoveries, collections, and taxonomic descriptions of more than 160 taxa representing at least 25 botanical families and two new flowering plant genera (*Kanaloa* and *Glossostipula*). In addition to leading botanical expeditions in Micronesia (Kosrae and Pohnpei), Palau, Samoa, and the Marquesas Islands, he has collected more than 11,000 herbarium specimens.

Dr. Lorence has conducted extensive research on plant species in the Rubiaceae (coffee family), Zingiberales (heliconias, gingers, etc.), Monimiaceae, and other families. He has co-authored and contributed to the publication of the floras of Madagascar, Mexico, Mesoamerica, the Mascarenes, the Marquesas Islands, the Hawaiian Islands, Samoa, and forthcoming flora of Micronesia. The José Cuatrecasas Medal for Excellence in Tropical Botany, first awarded in 2001, will be presented on May 29 at the 23rd National Botanical Symposium in Washington, DC.

NTBG PUBLISHES HAWAIIAN MOSS FIELD GUIDE

NTBG has published a new 100-page field guide to mosses of Hawai'i. *Common Mosses of the Hawaiian Islands* was researched, written, and produced by science and conservation specialist Amanda Vernon and Tim Flynn, curator of the herbarium, with valuable input and assistance from bryologists at Missouri Botanical Garden, Bishop Museum, the California Academy of Sciences, and NTBG staff.

The guide includes 37 specific entities (species) and three genera and was designed to be user-friendly for non-scientists and scientists alike. Selected species include many of the most commonly seen native (endemic and indigenous) and introduced mosses found across the Hawaiian Islands in both human environments and natural habitats. All mosses in the guide are associated with a voucher specimen in NTBG's herbarium.

Each moss entry describes its physical appearance, typical habitat, and tips for distinguishing it from other closely resembling species accompanied by photos taken by Amanda who used a technique called focus stacking to produce sharp, detailed images. Carefully written to be accessible for general users, the guide offers an informative and authoritative introduction to bryology (the study of mosses, hornworts, and liverworts) in Hawai'i.

As avid hikers, Amanda and Tim envisioned a pocket-sized guide that would illuminate the ubiquitous but often overlooked world of mosses. They say that beyond the important ecological role mosses play by capturing and holding moisture and serving as seed beds, mosses are beautiful and remarkably diverse, offering a window into a tiny world that can be explored with a hand lens for those who pause to observe.

ILLUSTRATION BY JACOB BETTENCOURT

Common Mosses of the Hawaiian Islands is available where books are sold on Kaua'i and through NTBG. To order a copy, email science@ntbg.org.

PERPETUATING A LEGACY OF FERN RESEARCH

Last October, the world lost respected botanist Dr. Daniel D. Palmer who contributed greatly to the understanding of ferns and fern allies.

Born in Michigan, long before turning his attention to ferns full-time, Dan was a dermatologist and part-time sustainable timber tree farmer, dividing his time between Michigan and his wife's hometown in Hawai'i. When Dan retired he dove deep into the world of ferns and fern allies such as Lycophytes (clubmosses).

PHOTO BY HEATHER HIGHAM

NTBG research associate Dr. Susan Fawcett, who shared Dan's love of Michigan, Hawai'i, and ferns, said that as a fellow pteridologist (fern specialist), she admired Dan's work reevaluating type specimens on which species names and concepts are based in herbaria across Europe and Asia at a time before digital technology. She says that through his research, Dan resolved decades of confusion over misapplied plant names, greatly contributing to fern taxonomy.

NTBG senior research botanist Dr. David Lorence recalls how he and colleagues went on many fern forays with Dan, exchanging their knowledge of wild plants. He says one of Dan's great contributions was writing a much-needed authoritative, modern field guide and synopsis of Hawaiian ferns and fern allies, updating century-old research. "Dan Palmer's comprehensive book was more than a field guide," says Dave. "It provides [identification] keys and descriptions that resolved many taxonomic issues and clarified species and concepts for this important group of plants in Hawai'i."

Dan's 2003 comprehensive guide *Hawai'i's Ferns and Fern Allies* was based on decades of field work and his extensive research into herbarium collections around the world. His dogged pursuit of foundational plant knowledge has been compared to botanical sleuthing, traveling from Russia and Japan to France, Hawai'i, and elsewhere. Dan also researched and wrote *Michigan Ferns & Lycophytes: A Guide to Species of the Great Lakes Region.*

Dan and his wife Helen stewarded land that is now designated as the Palmer Wood Forest Reserve, part of the Leelanau Conservancy along the shores of Lake Michigan. In addition to donating most of his fern collection to the University of Hawai'i, he donated more than 100 fern specimens to NTBG. Dan's family generously donated his 400+ volume pteridology reference library which is now housed at the Juliet Rice Wichman Botanical Research Center at NTBG headquarters on Kaua'i where it will facilitate fern research for decades to come.

PHOTO BY JON LETMAN

KAHANU GARDEN SUPPORTS MAUI WITH BREADFRUIT

Two and a half years after deadly wildfires devastated Lahaina and other communities on Maui, the recovery is ongoing. Kahanu Garden staff continue to engage with initiatives centered on 'ulu (breadfruit) with the goal of supporting the greater Maui community. These efforts include 'ulu distribution at Lā 'Ulu (Breadfruit Day), hosted by Maui Nui Botanical Garden where staff donated and sold over 150 trees in September 2025. Kahanu Garden is also nurturing five sensitive 'ulu shoots from two historic breadfruit trees that were destroyed in the fires.

As these young 'ulu trees reach a size suitable for outplanting, they will be planted in a new area of Kahanu Garden's collection. In the future, the offspring of these historic trees may provide planting material for future repatriation requests, offering hope to perpetuate these culturally important trees. In 2025, Kahanu Garden donated twenty 'ulu to West Maui through the Pu'u Kukui Watershed Partnership and distributed over 2,500 pounds of breadfruit through community initiatives in support of local food security.

an eye on plants

SELECT SPECIES IN FOCUS

‘Ala‘ala wai nui (*Peperomia kauaiana*)

In the early days of 2026, NTBG science staff and collaborators published a description of a previously unnamed species of *Peperomia* known from just three remote mountain locations on Kaua‘i. This diminutive member of the pepper family (Piperaceae) was first collected by NTBG’s curator of the herbarium Tim Flynn while conducting a botanical survey in 1991.

Tim recalls discovering the plant beneath a dense understory of uluhe fern[1]. At the time, he thought it looked different from other Hawaiian *Peperomia* but was uncertain if it was a new species. Two years later Tim found a second colony of what appeared to be the same species on northeastern Kaua‘i. He began writing a description, but it wasn’t until more than a quarter century later that NTBG research biologist Ken Wood made additional collections in a third location in 2019 and 2020.

Studying this *Peperomia* with its distinctive alternating leaves, different from others with opposing leaves or which grew in whorls, Ken created a dichotomous key which is a tool botanists use to compare and identify closely related species. After many months of careful examination, Ken and his research partners botanists Dr. Susan Fawcett and Dr. Warren Wagner, published their description of *Peperomia kauaiana*, known in Hawaiian as ‘ala‘ala wai nui, a name shared with Hawai‘i’s other 23 species of *Peperomia*.

With more than 1,400 species around the world, *Peperomia* is widely known as a houseplant related to black pepper and kava (awa)[2]. *Peperomia kauaiana* is outstanding for being Kaua‘i’s third single-island endemic in the genus which is itself remarkable for having colonized the Hawaiian Islands following four separate founding introductions, presumably hitchhiking as sticky seeds stuck to bird feet or feathers.

The publication of this new species underscores the value of supporting field collecting and maintaining an international network of herbaria where meticulously curated dried plant specimens are documented, mounted, and preserved as vouchers which catalog botanical life forms for researchers to study decades or even centuries later.

Herbaria are to plants as libraries are to books, essential facilities for studying plants, in particular what are called holotypes – the primary specimen that serves as the best source material of what makes one species unique and different from others. Together with duplicate collections called isotypes and additional specimens preserved as paratypes, these can be shared between institutions and are fundamental to botanical research.

Ken explains that with patience, experience, and access to herbarium collections, naturally occurring variability, including subtle but critical distinctions among different plant groups, can be identified and described. This process is aided with diverse specimens representing plants collected in fruit, flower, or at other life stages.

Ken says, “in the before times, the skies were filled with birds traveling and migrating. Some were caught in storms, then found a patch of land where whatever might have been stuck to their feet or feathers was dropped on the land.” In the case of *Peperomia*, sticky seeds were deposited on four separate occasions.

The identification of another new species, in addition to more than 250 endemic species unique to Kaua‘i demonstrates how the island’s highly variable geography and atmospheric conditions (extreme wind and rain) create conditions in which dense fern growth and pockets of moss create a niche that enables the unlikely survival of tiny seeds that grow and have populated the island with Hawai‘i’s greatest number of single-island endemic species.

But with the introduction of invasive plants and animals, avian malaria, and habitat loss, there has been a decline in bird and plant exchanges. Continuing to support vital field research, making additional collections is important for rare plant restoration and cultivation. Tim suggests that herbaria around the world are filled with untold thousands of yet-to-be-described specimens which he calls “little hidden treasures waiting to be discovered.”

“Until you actually examine the whole group of plants, you might not notice something is really different. But having the chance to go through the collection and look at everything all at once, things that are really different stand out,” Tim says.

“That’s the beauty of the herbarium collections...they’ll always be here. It’s not like a living collection where something dies and it’s gone. Here it dies and it lives forever.”

[1] *Dicranopteris linearis*
[2] *Piper methysticum*

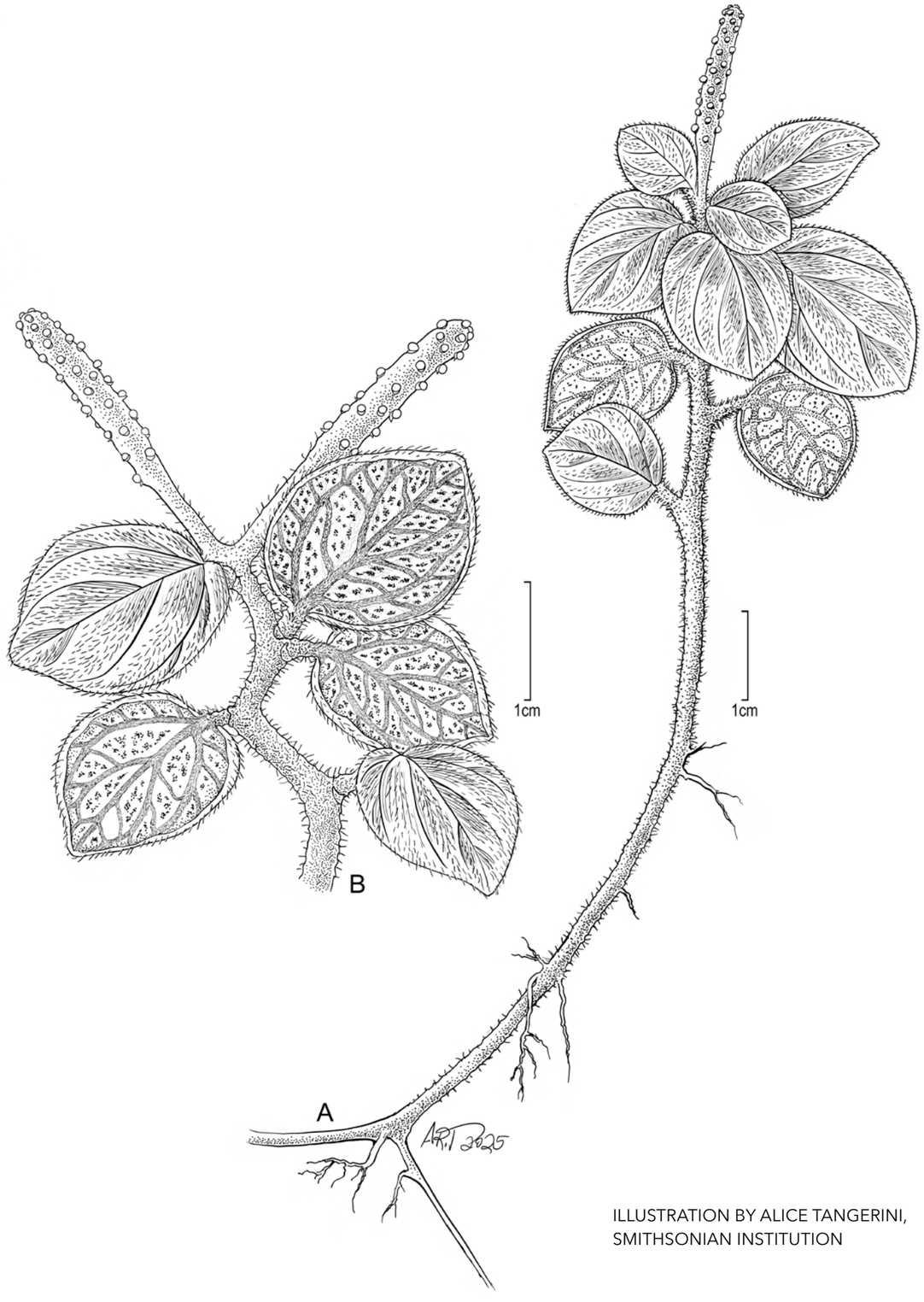


ILLUSTRATION BY ALICE TANGERINI, SMITHSONIAN INSTITUTION

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REDUCE
REUSE
RECYCLE

NTBG STAFF HIKE ALONG A STEEP RIDGELINE WHERE THEY WORK TO CONSERVE CRITICAL NATIVE FOREST HABITAT IN THE UPPER LIMAHULI PRESERVE. READ MORE ON PAGE 12. PHOTO BY JORDAN GUSS