



EST.  
1966



# DUKE LEMUR CENTER

MAGAZINE | 2018  
PREMIERE ISSUE

RARE C-SECTION  
DELIVERY

THE DLC'S  
NEWEST AYE-AYE

BLUE-EYED BLACK LEMURS  
ARRIVE FROM MADAGASCAR

A DAY IN THE LIFE  
OF A PRIMATE TECH

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## ATTENTION ARTISTS:

We'd love to feature your work in our next magazine! To submit your painting, drawing, or photograph for consideration, please email a high-resolution jpg and your contact information to [sara.clark@duke.edu](mailto:sara.clark@duke.edu). We'll select our favorites for inclusion in our next edition (Summer 2019).

Male blue-eyed  
black lemur  
(*Eulemur flavifrons*).  
Artist Mina Milk of  
Fox and Owl Studio  
in Moscow, Russia:  
[instagram.com/  
foxndowl](https://www.instagram.com/foxndowl).



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## EDITORS:

Sara Clark, David Haring, Laura Jones

Comments, feedback, or something  
you'd like to see in our next edition?  
**EMAIL [SARA.CLARK@DUKE.EDU](mailto:SARA.CLARK@DUKE.EDU).**  
We'd love to hear from you!

*Printed on eco-friendly FSC-certified paper*

## ON THE COVER:

Seven-month-old Beatrice, a Coquerel's  
sifaka, "hanging out" in one of the DLC's  
signature Natural Habitat Enclosures.  
*Photo by David Haring.*

# DLC

## LETTER FROM THE DIRECTOR

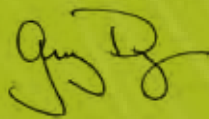
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**ONE OF THE MANY** things I love about working at the Duke Lemur Center is the willingness of the staff to try something new. In this, our inaugural magazine issue, we are exploring a new way to connect with our diverse audience in order to better communicate our mission and raise awareness of the plight of lemurs, the world's most endangered mammals. In the pages that follow you will read about the heroic efforts of our veterinary staff, the collaborative innovation of our research department, the determination of our conservationists, and the endless drive and enormous hearts of our animal care team.

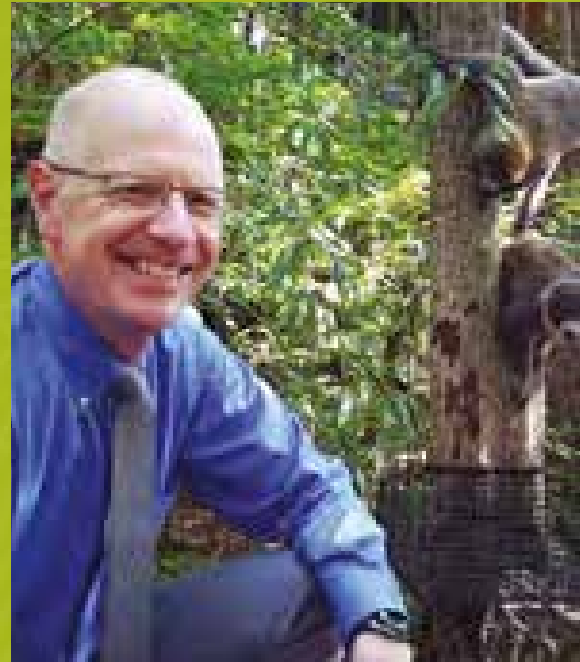
For 52 years, the Duke Lemur Center has led local and global community efforts to protect and study lemurs. We do it for the simple reason that we love lemurs. We are passionately curious about each species; we are emotionally and physically invested in seeing each animal thrive; and we are filled with hope that future generations will know the wonder of these amazing animals.

We also know that we can't do this alone. We are grateful for the support of Duke University's administration and leadership, our thousands of supporters and donors, and the hundreds of dedicated professionals who came before us. Without them our efforts would be muted, our mission simply words on paper. With your support and engagement our voices are amplified, our vision inspired, and our actions empowered.

What we have at the Duke Lemur Center is truly special and I am very proud to be a part of it.



**GREG DYE**  
*Interim Director, Duke Lemur Center*



# ABOUT THE DLC

## MISSION

A world leader in the study, care, and protection of lemurs—Earth's most threatened group of mammals—the Duke Lemur Center is a hub of scientific discovery on the campus of Duke University in Durham, North Carolina.

With nearly 240 animals across 16 species, the DLC houses the world's largest and most diverse population of lemurs outside their native Madagascar.

Our mission is to advance science, scholarship, and biological conservation through interdisciplinary non-invasive research, community-based conservation, and public outreach and education.

## RESEARCH

Curiosity and knowledge prompt discovery. Discovery prompts action. And the more we learn about lemurs, the better we are able to protect them in the wild, care for them in captivity, and engage the public to not only care, but to participate. And how do we discover? Through research!

In 1966, John Buettner-Janusch, a Yale anthropologist, partnered with Duke biologist and Yale alumnus Peter Klopfer to relocate Buettner-Janusch's colony of lemurs from Connecticut to North Carolina. The National Science Foundation provided the funds to build a "living laboratory" where lemurs and their close relatives could be studied intensively and non-invasively. In 1966, the nascent DLC was founded on 80 wooded acres, two miles from the main Duke campus.

Today, what began as a collaboration between two researchers studying the genetic foundations of primate behavior has blossomed into an internationally-acclaimed facility that supports research across a huge variety of disciplines. The DLC is home to nocturnal, diurnal, and cathemeral animals as well as species that encompass a wide range of social systems, modes of locomotion, and dietary preferences. Such variety yields a large and diverse research program, and students and researchers from across campus and around the world travel to the DLC to study topics ranging from brain sciences to biomechanics, One Health disease dynamics, aging, paleontology, genomics, and more. The one thing that all DLC research has in common is that it is non-invasive: we do not allow research that will harm our animals in any way.

◀ On a brisk autumn day in 1984, ring-tailed lemurs huddle together in a "lemur ball" in Natural Habitat Enclosure #2 (eight acres). Photo by David Haring.

## CONSERVATION

Lemurs are found in the wild only in Madagascar, where their habitat has dwindled to only a fraction of what it once was: only about 10% of the original vegetation cover remains. To protect the world's only wild lemurs and the biodiversity they represent, the DLC works "on the ground" with local Malagasy communities to preserve lemurs' natural habitat.

Madagascar is the 10th poorest country in the world, with subsistence agriculture being the primary driver of forest loss. 30 years of conservation experience has taught the DLC that sustainable forest protection in Madagascar is a long-term investment that requires building relationships and earning the trust of the local people. The DLC-SAVA Conservation project relies on a community-based approach to protecting natural forests, using an array of project activities designed to protect the forest and to improve the lives of the Malagasy people.

The DLC also works within a network of other accredited institutions to develop and adhere to Species Survival Plans (SSPs), which use carefully planned conservation breeding programs to create a "genetic safety net" for rare and endangered species such as the aye-aye, sifaka, and blue-eyed black lemur. In partnership with these institutions, we're helping to ensure "the sustainability of a healthy, genetically diverse, and stable" population of lemurs for the long-term future. We're proud to have celebrated more than 3,285 births since our founding in 1966.

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**SAVA REGION:** The DLC's in situ (in the wild) conservation efforts are focused within the SAVA region of Madagascar.



## EDUCATION

Because its research is non-invasive, the DLC is open to the public. More than 32,000 people visit every year to learn about lemurs, science, and conservation. Revenue generated by our public tour program and camps helps fund the Education Department and pay for lemur care, housing, veterinary supplies, and conservation programs in Madagascar. Learn more at [lemur.duke.edu/visit](http://lemur.duke.edu/visit).

In addition, the DLC offers unparalleled educational and research opportunities to students and faculty. Field research internships introduce students to lemur research and data collection, the Director's Fund offers financial support to Duke graduate students pursuing research at the DLC, and classes offered through Duke's Department of Primate Anthropology often include observations of free-ranging lemurs. Our online resources and MicroCT scans of fossils from the DLC's Division of Fossil Primates—available at no charge at [morphosource.com](http://morphosource.com)—are utilized internationally as educational and research resources. 🦋





# NOT JUST ANY BABY

BY SARA CLARK

---

**THE BIRTH OF **RANOMASINA**,  
THE FIRST INFANT BORN  
TO THE FIRST LEMURS  
IMPORTED FROM MADAGASCAR  
TO THE U.S. IN 24 YEARS**

◀ **MAIN PHOTO:** Ranomasina shortly after birth. Blue-eyed black lemurs at the DLC and other institutions worldwide form a genetic safety net for their species. Each new birth helps sustain a healthy and genetically diverse population of blue-eyed black lemurs for the long-term future. *Photo by Sara Clark.*

**INSET PHOTOS:** Velona (left) and Mangamaso (right) were born at Parc Ivoloina, a nonprofit nature center in eastern Madagascar. The Duke Lemur Center and Parc Ivoloina, which managed by the Madagascar Fauna and Flora Group, have been partners since 1987. *Photos by David Haring.*

# A

ll baby lemurs are special. But some, like Ranomasina, are extraordinary.

Baby Ranomasina is the third blue-eyed black lemur—one of the 25 most endangered primates in the world—born at the Duke Lemur Center this season, which brings the total number of her kind in North America to 34. But she is also considered among the most “genetically valuable,” since she is the offspring of the first lemurs imported from Madagascar to the U.S. in 24 years due to strict import and export regulations.

“This is not just any baby,” says Bobby Schopler, a veterinarian at the Duke Lemur Center since 2005. “This is the most important birth in the 13 years I’ve worked here.”

Ranomasina is also unusual because she was delivered via cesarean section, a surgery so rare that since the Duke Lemur Center’s founding in 1966, C-sections have been performed only 15 times.

The infant, whose name means “sea” in Malagasy, is the first offspring of 5-year-old male Mangamaso and 3-year-old female Velona. In 2017, after three years of planning and 60 hours of travel, the pair was relocated from Parc Ivoloïna, a nonprofit nature center in eastern Madagascar, to the Duke Lemur Center in North Carolina—a total distance of about 9,000 miles.

“The success of Mangamaso and Velona’s transfer is the result of a unique international collaboration, three years in the making,” says Andrea Katz, the primary organizer of the ambitious endeavor. “In my 40 years at the Lemur Center, it may have been the most difficult and rewarding thing I’ve ever done.”

The pair’s transfer culminated in a complex negotiation between the Government of Madagascar, Parc Ivoloïna, the American Association of Zoos and Aquariums (AZA) Species Survival Program, and the European AZA Endangered Species Program. As a part of the agreement, the Duke Lemur Center transferred two of its blue-eyed black lemurs

▼ Ranomasina and Velona hours after birth. As for any major procedure involving highly endangered animals, the veterinary staff consulted experts from a variety of specialties. In Ranomasina’s case, information was sought from Elley Schopler, a lactation consultant at The Women’s Birth and Wellness Center in Chapel Hill, NC, who updated the Lemur Center on the latest methods of post-partum care of C-section babies. *Photo by Sara Clark.*

► Ranomasina, a blue-eyed black lemur (*Eulemur flavifrons*) whose name means “sea” in Malagasy, was delivered via cesarean section on April 12, 2018. She is the first offspring of Velona and Mangamaso, the first lemurs imported from Madagascar to the U.S. in 24 years. *Photo by David Haring.*



to France to strengthen the European breeding program. Parc Ivoloïna also received two blue-eyed black lemurs from other facilities in Madagascar to bolster their breeding program.

The dossier of required documentation for Mangamaso and Velona included 19 separate documents: U.S. and Malagasy Convention on International Trade in Endangered Species (CITES) permits; additional authorizations from Madagascar wildlife authorities; veterinary certificates; airline, customs, and freight forwarding documents; and arrangements with the U.S. Centers for Disease Control and Prevention. Lemur Center veterinarian Cathy Williams personally escorted the lemurs on their 60-hour journey from Madagascar to the U.S.

“These exchanges are absolutely critical to the genetic health of all lemurs, and the partnership and cooperation with other institutions that we enjoyed over this long process have been truly

inspiring,” says Anne Yoder, director of the Duke Lemur Center. “It takes a global village to save lemurs, and we are grateful and proud to be part of that village.”

### AN EXTRAORDINARY BABY

Like Ranomasina, her parents were born into a conservation breeding program, with the aim of improving the gene pool of captive members for the critically endangered species. Fewer than 1,000 blue-eyed black lemurs are believed to remain in Madagascar today. In 2015, it was estimated that the species could go extinct in the wild in as little as 11 years.

Only three small populations of blue-eyed black lemurs exist in zoos and conservation facilities around the world: 9 animals in Madagascar, 28 in Europe, and now 34 in the U.S. Prior to the arrival of Mangamaso and Velona, every blue-eyed black lemur in North America descended from seven wild-born





**ONLY THREE** SMALL POPULATIONS OF BLUE-EYED  
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IN MADAGASCAR

**28**  
IN EUROPE

**34**  
IN THE U.S.

# FEWER THAN **1,000** BLUE-EYED BLACK LEMURS ARE BELIEVED TO REMAIN IN MADAGASCAR TODAY.

animals imported by the Duke Lemur Center in 1985 and 1990.

“With the birth of Ranomasina, for the first time since 1990, we have a whole new lineage of blue-eyed black lemurs coming into the North American population,” says Cathy, now curator of animals at the Duke Lemur Center.

While the current captive population of the rare lemurs is healthy, new genetically unrelated individuals like Ranomasina are critical to

grow and sustain it. Greater genetic diversity is linked to better health and immune responses and increased ability to adapt to environmental pressures—crucial factors in the fight to protect this species from extinction.

“The addition of two lemurs genetically unrelated to our current animals is a huge asset to the Lemur Center’s conservation breeding program,” Andrea says. “The more genetic diversity we have, the better we can maintain

our role as a safety net for this species.”

But as crucial as she is to the genetic health and long-term survival of her species, Ranomasina’s own survival was initially uncertain.

Two weeks before her due date, Velona was evaluated by the Lemur Center’s veterinary team, who discovered the infant was in breech position.

“There isn’t a lot of data regarding breech births in lemurs,” says DLC veterinarian Laura Ellsaesser. “In humans, babies in breech position are a concern because they are more likely to become stuck in the birth canal, which can become life-threatening to both the baby and the mom.” “Sometimes in humans, a breech baby does flip and do just fine,” Laura says. “But in lemurs, we just don’t know; so we put Velona on a much more aggressive baby watch.”

David Watts and his adviser Lisa Paciulli of North Carolina State University, who use concealed cameras to study maternal behavior in aye-ayes, contributed some of their equipment to the cause.

“Using David’s and Lisa’s cameras meant that we didn’t disturb her,” explains Laura. “We could watch and, if we saw signs she was having a difficult labor, we could intervene.”

Lemur Center husbandry and veterinary staff watched round-the-clock, but Velona showed no signs of labor. At 130 days’ gestation—past her expected delivery date—veterinarians Laura and Bobby did an ultrasound. The infant was alive but still breech.

“We knew from thirty years of data that any blue-eyed black lemur infants born after 130 days’ gestation were stillborn,” Bobby says. “We were torn between not wanting to do a C-section



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◀ Ranomasina’s parents, Velona and Mangamaso, were born at Parc Ivoloina in Madagascar and imported to the U.S. in 2017. “Because of the continuing pressures of population growth, poverty, and forest habitat destruction, it’s a very real possibility that blue-eyed black lemurs could go extinct in the wild,” says DLC curator Cathy Williams. “If they do, then the whole species’ survival will be based on animals surviving within human care.” *Photo by Peter Larsen.*

► Cathy Williams, pictured at center, with members of the Parc Ivoloina team in Madagascar before transporting Mangamaso and Velona to the Duke Lemur Center.



on a first-time mom, versus possibly losing the baby and the mom in a difficult birth. Ultimately we decided that, all things considered, the lower risk was to deliver the infant via C-section.”

The C-section was performed on April 12, 2018, proceeded smoothly, and resulted in the birth of a healthy little girl weighing just under three ounces. But for mom and infant, the hard part had only just begun.

“She fell asleep without a baby and woke up with one,” says Bobby, who spent the night in the veterinary office to monitor Velona’s behavior toward the infant. Velona’s recognizing and accepting the baby would be crucial to Ranomasina’s survival. If her mother didn’t bond with her, she could have attacked and damaged the tiny infant.

C-section aside, having babies is partly a learned behavior for lemurs and infant mortality is higher in those born to first-time mothers.

“Baby season is fun, but it’s stressful too,” says Primate Technician Becca Newton, Velona’s primary caretaker. “Those first days were critical. A lot could’ve happened, especially since Velona was a first-time mom.”

It took about 24 hours for Velona to adjust to her infant and for the veterinary staff to teach Ranomasina how to nurse. Once she learned, the hormones released during nursing helped further solidify the mother-infant bond, and the animal care team breathed a collective sigh of relief.

“Even though it took a while, Velona formed a tight motherly bond with her baby,” Becca says. “Once it was there, it was there. She’s been a good mom. I’m very pleased, very proud of her.”

Now Ranomasina is thriving. Her dad Mangamaso has been successfully reintroduced to the family group, and the infant has begun nibbling solid food and venturing tentatively

away from Velona—though never far from the safety of mom.

“This female infant has a huge responsibility in front of her,” Bobby says, but for the next 2.5 years she’ll grow and learn from her mother before being paired with a male to start a family of her own.

“It’s really exciting for the staff to be part of this,” says Cathy. “It reinforces why we work here and why we’re so committed to what we do. We’re part of something much larger. Saving these animals is our contribution to making the world a better place for future generations.” 🐼

# DONATE

## CRITICAL NEED: INTENSIVE CARE (ICU) KENNEL FOR VET DEPARTMENT

**THE DUKE LEMUR CENTER'S** veterinary team is unmatched in its knowledge of lemur medicine, but we rely on private donations to help cover the cost of vet care, medicine, and state-of-the-art diagnostic equipment – all of which makes life-saving care for infants like Agatha, Leigh, and Ranomasina possible. Please consider making a donation today in honor of our vets and their amazing care for the DLC's lemurs. The need is critical, as the vet department needs to replace its Intensive Care Unit (ICU)—and a new one costs \$10,000.

An ICU kennel is a vital piece of equipment for the Lemur Center. When an animal is critically ill, it can lose its ability to maintain its temperature or spend precious energy trying to stay warm. A temperature-controlled environment with the ability to supply humidity or nebulized medications can

be the difference between life and death in these situations.

Rejected infants like blue-eyed black lemur Leigh do not have the ability to maintain their body temperature, and one of the first causes of infant mortality is hypothermia. Have you ever heard not to touch a baby animal because its mother will reject it? Actually, what is more critical is a cold infant. Mother birds often lack a sense of smell. They reject cold babies. Slowly warm that very infant and the mother will gladly take it back. The same is true for lemurs.

Other mothers, like first-time mom Velona, may reject infants simply from ignorance. Fortunately Velona ultimately accepted her infant; but had Ranomasina needed to be hand-reared, a warm temperature-controlled ICU kennel for her to nest in would have been essential.



▲ Last August, 18-year-old bamboo lemur, Beeper, developed pneumonia and spent five days on oxygen in the DLC's ICU. Beeper had the distinction of becoming our first lemur to be nebulized for treatment of lung disease, here administered by DLC Primate Technician Mel Simmons with the assistance of Vet Tech Megan Davison. *Photo by David Haring.*

**TO DONATE** toward the purchase of a new ICU kennel and other urgent needs at the DLC:

- 1 Please visit [lemur.duke.edu/donate](http://lemur.duke.edu/donate)
- 2 Click on the **Everything of DLC** donate button.
- 3 After entering the amount of your gift and clicking "Continue to Payment," please click the checkbox to designate your gift in honor of the **DLC veterinary department**.

**Thank you so much. Your gift at any level will make a difference!**

# HOORAY FOR DLC DONORS!

**DID YOU KNOW** that the Duke Lemur Center relies on grants and donations from individuals and businesses to support nearly half of our expenses each year?

While it's true that Duke University provides the cornerstone to our work by funding nearly half of the DLC's daily operational expenses, it is also true that private donations are absolutely vital! Donations ensure that we continue and expand our programs to protect lemurs and their habitat in Madagascar while investing in our programs to engage students and visitors of all ages in scientific discovery, non-invasive research, and conservation initiatives.

## WAYS TO GIVE

To learn more, please visit [lemur.duke.edu/donate](http://lemur.duke.edu/donate) or contact Mary Paisley at (919) 401-7252 or [mary.paisley@duke.edu](mailto:mary.paisley@duke.edu).

**THANK YOU** to everyone who made a donation to the Duke Lemur Center this past year. We couldn't do it without you!

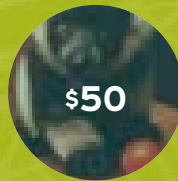
## GIVING OPPORTUNITIES

Lemurs AND humans here at the DLC jump for joy when we receive unrestricted gifts that allow us to address our most pressing needs! Here are just a few examples of ways your unrestricted gifts are invested at the DLC:



**\$30**

A CASE OF YUMMY MEALWORMS



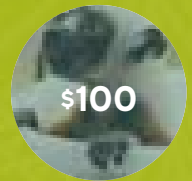
**\$50**

HALF A CASE OF VEGETABLES



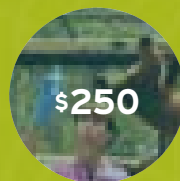
**\$75**

PRENATAL EXAM FOR AN EXPECTANT LEMUR MOM



**\$100**

HEALTHY INFANT CHECK-UP



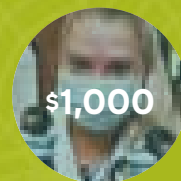
**\$250**

SUPPLIES FOR POSITIVE REINFORCEMENT TRAINING (clickers, whistles, treat bags, goodie pouches)



**\$500**

FEEDS THE ENTIRE COLONY FOR ONE DAY



**\$1,000**

CONTINUING EDUCATION/ PROFESSIONAL DEVELOPMENT CLASSES FOR PRIMATE TECHNICIANS AND VET TECHNICIANS



**\$2,000**

COVER THE COLONY'S ENRICHMENT EXPENSES FOR A FULL MONTH (coconuts, brown paper, dried cranberries, special feeders, wood wool, etc.)



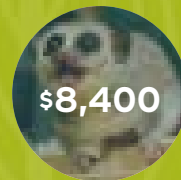
**\$3,000**

FULLY FUNDS EXPENSES FOR THE SUMMER INTERNSHIP PROGRAM (uniforms, training, and supplies needed for 23 interns from across the US)



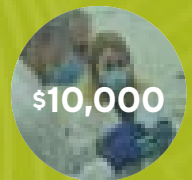
**\$5,000**

TRAVEL COST FOR DLC STAFF TO TRAVEL TO AND FROM MADAGASCAR



**\$8,400**

AVERAGE ANNUAL COST OF CARING FOR A LEMUR AT THE DLC



**\$10,000**

LARGE EQUIPMENT SUCH AS AN INCUBATOR FOR OUR VET TEAM TO PROVIDE SPECIALIZED CARE FOR ILL AND INFANT LEMURS, OR AVERAGE ANNUAL COST TO MAINTAIN ONE OF NINE NATURAL HABITAT ENCLOSURES

[lemur.duke.edu/donate](http://lemur.duke.edu/donate)

We also offer the opportunity for you to designate your gift to the division of your choice: Madagascar Programs, the Division of Fossil Primates, or the Adopt a Lemur Program. We're also happy to work with donors to plan a special focus for significant gifts.



# WELCOME, AGATHA!

THE DLC WELCOMES ITS  
NEWEST AYE-AYE,  
DAUGHTER OF MEDUSA AND POE

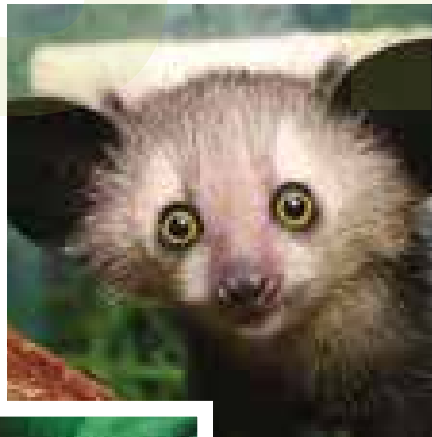
BY SARA CLARK AND DAVID HARING

**L**ast summer, the Duke Lemur Center was thrilled to announce the birth of its newest aye-aye, Agatha! Named after best-selling mystery writer Agatha Christie, the infant is the first aye-aye born at the DLC in six years, and one of only 24 of her kind in the United States.

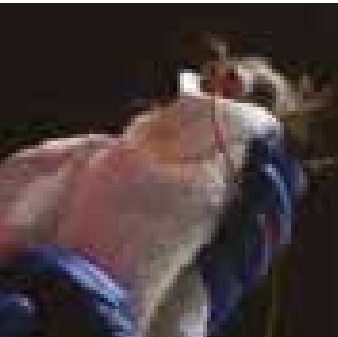
“Agatha is an amazing girl,” says Lemur Center veterinarian and curator Cathy Williams. “She represents the future, and hope for the survival of this rare species here and in Madagascar.”

◀ Photo by David Haring.

▼ **SEPTEMBER 15, 2017**  
Photo by David Haring.



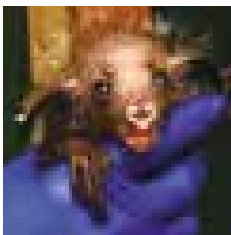
◀ **JUNE 22, 2017**  
Two-week-old Agatha is tube-fed by veterinary technician Cat Ostrowski.  
Photo by Sara Clark.



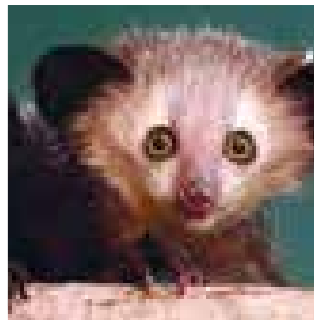
▼ **SEPTEMBER 26, 2017**  
Agatha and Medusa  
Photo by David Haring.



▼ **JUNE 29, 2017**  
Photo by David Haring.



▲ **JULY 12, 2017**  
Photo by David Haring.



◀ **SEPTEMBER 29, 2017**  
Photo by David Haring.

## “A UNIQUE CASE”

Agatha’s birth was discovered on June 7, 2017, at which point she was removed from the nest, weighed and given a quick check by DLC veterinarians. To their dismay, Agatha weighed a mere 74 grams—only two thirds the mean for her species (108g). Only one aye-aye infant had ever survived after being born at a lower birthweight.

It was soon apparent that Agatha was not gaining sufficient nourishment from Medusa and, to keep her from losing even more weight, hand supplementation was implemented. “Agatha was a unique case,” explains Cathy. “She required intervention by the veterinary staff to provide supplemental warmth and formula until she gained enough strength that she could

return to her mom full time.”

Vet tech Megan Davison, on crutches following knee surgery, volunteered for the graveyard shift and fed Agatha every two hours from dusk ‘til dawn. Daytime feedings were managed by Cathy, veterinarian Bobby Schopler, and vet tech Catherine Ostrowski.

During each feeding, the infant was “taco wrapped” in towels like a diminutive Dracula to prevent her spindly-fingered hands from knocking the syringe. Afterward, Agatha was either returned to her mother’s nest or, if her temperature was a bit low, to a cozy incubator in the Vet Lab. Between feedings, a “baby cam” in the vet office was used to monitor mom and baby’s behavior.

By June 25th, Medusa and Agatha had finally bonded to the extent that Medusa could take over 100% of the feeding responsibilities and the Vet Dept eagerly handed mom the reigns to Agatha’s care!

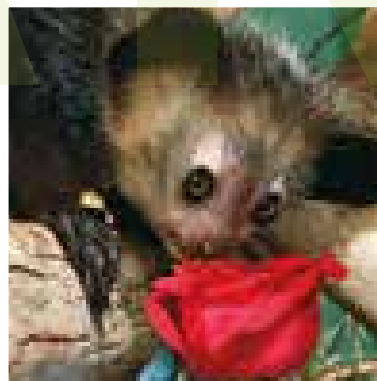
Caring for fragile and endangered animals is never easy. For lemurs, the challenge is compounded by the fact that there are no published books on lemur veterinary medicine. “We’ve learned it all on the ground,” says Cathy. Fortunately, the DLC veterinary staff has vast experience working with lemurs. Cathy has been a veterinarian at the Lemur Center for 21 years, and Bobby for 11 years. “We’ve gained a lot of direct hands-on experience working with lemurs and learning about their specific needs,



**CARING FOR FRAGILE AND ENDANGERED ANIMALS IS NEVER EASY. FOR LEMURS, THE CHALLENGE IS COMPOUNDED BY THE FACT THAT THERE ARE NO PUBLISHED BOOKS ON LEMUR VETERINARY MEDICINE.**

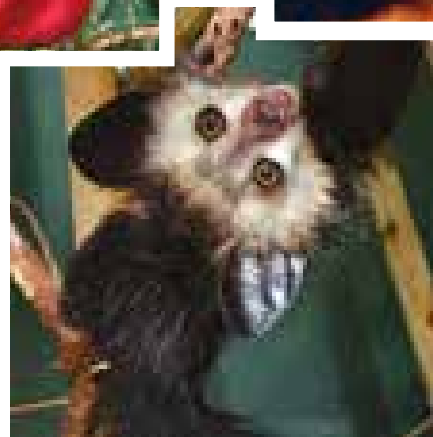
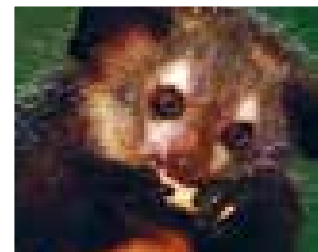


▲ **NOVEMBER 7, 2017**  
Photo by David Haring.

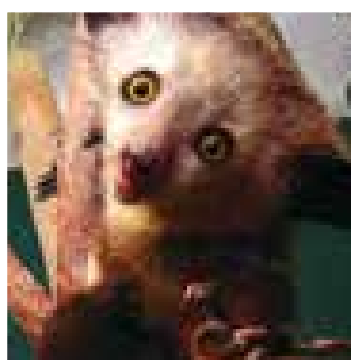


▲ **JANUARY 25, 2018**  
Photo by David Haring.

▼ **JUNE 22, 2018**  
Photo by David Haring.



▲ **DECEMBER 11, 2017**  
Photo by David Haring.



◀ **NOVEMBER 28, 2017**  
Photo by David Haring.

and the species-specific concerns we need to worry about.”

For Agatha, the veterinary team’s long hours and decades’-long experience was rewarded and the big-eared, bright infant is thriving. “She’s becoming more active,” says Steve Coombs, Agatha’s primary technician and 11-year employee of the DLC. “She’s tapping branches. She sleeps with Medusa in the nest box, and the interaction I see is mostly nursing. She’s calm, and Medusa is back to her easygoing self.”

**PERIL... AND HOPE**

Aye-ayes can be found in the wild only on the island of Madagascar. The species is classified as “endangered” by the International Union for

Conservation of Nature (IUCN), as logging, slash-and-burn agriculture, and hunting are suspected to have cut their numbers in half in recent decades.

Due to the destruction of the forest, Cathy explains, “aye-aye numbers continue to decrease. We really don’t know how many are left in the wild, but we do know they are becoming increasingly rare.”

Some villagers in Madagascar believe these lemurs are evil omens and can curse a person by pointing their middle fingers at them; hence many aye-ayes are killed on sight.

In reality, says Cathy, the aye-aye is one of the gentlest lemur species. “They’re not at all aggressive, they’re extremely curious and

energetic, and they’re very intelligent—they learn very quickly.” It’s no coincidence that the Lemur Center’s logo is a bushy-tailed aye-aye. “They’re wonderful animals to work with and wonderful ambassadors not just for the DLC but for Madagascar and for lemurs in general. If people could only understand how unique aye-ayes are, protections for this species would advance dramatically.”

In the meantime, the Duke Lemur Center works diligently to maintain a genetic safety net for aye-ayes in the wild.

“I haven’t been this happy about the birth of a baby primate since my son was born,” says longtime Duke Lemur Center director Anne Yoder. 🐼



A photograph of a female brown lemur carrying an infant on its back, foraging in a natural habitat. The lemur is positioned on the left side of the page, with its body and head visible. The background shows a blurred natural setting with dry grass and a blue sky. The text is overlaid on the right side of the image.

# MADAGASCAR: OF CONSERVATION, CONFLICT, AND COMMUNITY

BY LAURA JONES, COMMUNICATIONS INTERN

**F**or the inhabitants of Madagascar, time is of the essence.

Isolated from parent continent Africa for about 88 million years, this jewel of a country is a world-renowned biodiversity hotspot, with thousands of unique species that can be found nowhere else. But the island is in danger from severe environmental degradation, exacerbated by crushing poverty.

As conservationists at the Duke Lemur Center, Charlie Welch and wife, Andrea Katz, have seen the urgency of the situation firsthand. They have devoted their lives to help save at least some portion of Madagascar's spectacular endangered lemurs and forests—and they definitely have their hands full.

◀ A female brown lemur, carrying an infant, follows her group as they forage alongside the Indian Ocean in the Anjajavy Nature Reserve in northwestern Madagascar.  
*Photo by David Haring.*

## “IF YOU DON’T WORK WITH THE LOCAL COMMUNITIES, WHATEVER YOU TRY TO DO WILL NOT BE SUSTAINABLE.”

ANDREA KATZ

In 2012, an independent conservation initiative, SAVA Conservation (SAVA is an acronym for the major cities of the northeastern region of Madagascar: Sambava, Andapa, Voahery, Antalaha), was spearheaded primarily by Charlie to promote environmental and biodiversity awareness; to support local Malagasy communities; and to develop sustainable practices for the sake of protecting the threatened wildlife.

Because DLC-SAVA is run entirely on grant money and private donations, Charlie and Andrea are continually occupied with securing funding for this essential conservation work.

“We have a team in the SAVA region of three permanent employees,” says Charlie. “I’m in touch with them nearly every day about their work on a myriad of projects in the area.” One project involves a Duke Engineers for International Development team in Madagascar to assist with securing a pipeline system from a groundwater reservoir to a nearby village, thereby assuring the villagers a steady supply of clean drinking water. According to Andrea and Charlie, projects like these, which actively support the Malagasy people, are just as important as the conservation of the lemurs when it comes to prolonging the vitality of natural Madagascar.

Charlie, whose full job title is Conservation Coordinator, does a lot of just that: coordination. He describes himself as a liaison for any collaborations between programs or institutions at Duke (such as the Nicholas School of the Environment and the DukeEngage program) with organizations situated in Madagascar. He also promotes continued in-situ conservation of the pristine, unspoiled habitat comprising what is perhaps the crown jewel of the SAVA region, the magnificent Marojejy National Park.

Meanwhile, Andrea is the Program Manager for Madagascar Conservation Initiatives. Her newest project is to complement Charlie’s work in the SAVA region by working with the Government of Madagascar to develop an ex-situ conservation program for captive lemurs. *In-situ* conservation involves protecting wild lemurs that are still living in their natural habitats in Madagascar (like Marojejy), whereas

*ex-situ* initiatives work with lemur populations living within human care—such as in zoos and conservation centers—across the island.

“Many [of the lemurs] are endangered or critically endangered species,” Andrea says. The animals live in thirteen different parks in Madagascar, most of which are run as for-profit tourism operations.

“They’re holding all of these incredibly genetically valuable lemurs that, with consistent high-quality care, good animal records and managed breeding, could be the lemur populations from which future reintroductions to the wild could occur,” Andrea says. Because certain lemur species’ population numbers are so low in the wild, well-managed captive breeding programs that maintain genetic diversity are an essential component of ensuring these species’ survival. This is why in-situ and ex-situ programs work best when conducted simultaneously.

### COLLABORATIONS BETWEEN THE DLC AND OTHER ORGANIZATIONS

Back in the United States, like-minded captive breeding institutions work under the umbrella of Species Survival Plan programs (SSPs). The SSP programs were created by the Association of Zoos and Aquariums (AZA), with the goal to effectively manage populations of selected species, which might be housed in dozens of zoos, as one population.

Collaboration between the DLC and other AZA-accredited institutions allows for lemurs to be transported, depending on genetic out-breeding needs, across the nation or even across the globe so that the species as a whole will remain healthy and continue to thrive for generations.

“Working with the Government of Madagascar, we’re trying to set up a similar framework of cooperation among the zoos in Madagascar, as well as to improve record systems, overall lemur husbandry, and the ethics of how these zoos acquire and transfer these animals,” Andrea explains. “We want to be sure these zoos are not contributing to the capture of animals from the wild.”

But saving lemurs entails much more than just a handful of dedicated individuals and

a couple of intensive programs. Charlie and Andrea, who were originally sent to Madagascar on the behalf of the DLC, were also involved in the creation of the Madagascar Fauna and Flora Group (MFG), a consortium founded in the late eighties to help rebuild what is now known as the conservation center of Parc Ivoloina.

Charlie explains that DLC-SAVA is “very much modeled on the MFG” and the way he and Andrea worked in the 15 years they lived full time in Madagascar.

Much of the decline in the wild lemur populations can be directly traced back to crushing rates of deforestation on the island. Unlike deforestation in other parts of the tropics, the motives behind Madagascar’s forest loss are more localized. Nearly 80% of the population survives on less than \$1.90 a day, and many Malagasy can survive only by growing meagre crops via slash and burn agriculture. This means that at certain times of the year, on the perimeter of nearly every protected area in Madagascar, villagers are felling trees at the edges of what might well be pristine rainforest to grow crops for themselves and their families.

“People are just trying to make a living—growing enough food to eat, to feed their families. That makes it a complicated conservation problem,” Charlie explains. “For instance, if you were trying to protect forests in Indonesia, your problem would be companies clearing huge swaths of land for palm oil plantations or pulpwood. But in Madagascar, the problem is just local people trying to live off the land.”

### SO WHAT EXACTLY DOES DLC-SAVA DO?

A big focus is in environmental education with Malagasy primary school students. Older students, often those at the local university—Centre Universitaire Régional de la SAVA (CURSA)—are mentored by DLC-SAVA staff.

Madagascar currently has a population of over 25 million. With the population predicted to increase in the upcoming years, the island’s precious forests and biodiversity are even more at risk. Because of this, another DLC-SAVA activity is support of family-planning initiatives

► Building a generation of environmental stewards begins with Madagascar's youth. Here, DLC-SAVA Conservation Coordinator Marina Blanco participates in field trip for schoolchildren to Macolline Reserve.



in Madagascar through collaboration with the British organization Marie Stopes. DLC-SAVA helps provide a platform for Marie Stopes to act on, by sponsoring services that the organization offers throughout the SAVA region, with a particular focus near protected areas.

"We've also been supporting sustainable agriculture as an alternative to slash-and-burn," says Charlie. Many locals implement tavy: a slash-and-burn practice that involves felling an area of forest, burning dried vegetation, growing crops on the land for several years, and then moving on to the next piece of land once the soil becomes depleted of adequate nutrients. Given that Madagascar is overpopulated and that forests take centuries to mature, this practice is unsustainable.

Other organizations that actively work with DLC-SAVA include both governmental and nonprofit entities including Madagascar National Parks, the Madagascar Ministry of the Environment and Ministry of Education, various local authorities, Missouri Botanical Garden, Peace Corps, and the U.S. Embassy in Madagascar.

On their relationship with the Malagasy people, Andrea recalls that the driving factor behind how long it takes to see results is simply time itself. "What we thought was going to be providing technical advice for a few years stretched out to fifteen years of on-the-ground conservation work," Andrea says.

It took years in Madagascar for Charlie and Andrea to feel trusted enough by the local communities and authorities. "It started off being all about the lemurs and the Ivoloina zoo, and then we realized that simply improving care for captive lemurs wasn't going to save the animals and forests of Madagascar," Andrea says. "You need to have an environmental education component, to be able to offer alternatives to destructive agriculture, to work with reforestation... all of those components became a part of a much broader program."

### THE CURRENT OUTLOOK ON MADAGASCAR

The fruits of Charlie's and Andrea's labors are still visible. The conservation programs they helped create not only continue to run today, but they are run by a primarily Malagasy staff—a feat that would have been unheard of back when the couple first entered the field, due to the lack of trained Malagasy conservation professionals.

"If you don't work with the local communities, whatever you try to do will not be sustainable," Andrea says.

For Charlie, seeing the evolution of understanding across the Malagasy population of Madagascar's unique place in the natural world is one of the most rewarding things he has experienced as a conservationist. "There is a much stronger awareness and comprehension about environmental issues in general, and

there now exists a generation of Malagasy researchers, students, biologists and even environmental activists," Charlie says proudly. That is truly a world of difference from the Madagascar of the 1980s.

Despite the arduous efforts of both Charlie and Andrea, there is no hiding that an environmental crisis persists in Madagascar.

"The conservation work that we do in Madagascar—and what other conservation groups do in Madagascar—does make a difference. It just doesn't have the level of impact across the island that we would all like to see," Charlie says.

Of course, these conservation efforts are not entirely made in vain. If they were, protected forests and areas such as Parc Ivoloina and Betampona Reserve would likely be devastated beyond repair at this point. Judging by the remarkable amount of work completed by Charlie and Andrea alone, it becomes more apparent that individuals can make a noticeable impact if they are dedicated and passionate enough.

"It would be so much worse if this work was not going on," Charlie firmly reiterates. "We can't not try." 🐼

FOR MORE IMAGES OF THE DLC'S WORK IN MADAGASCAR, VISIT THE ONLINE VERSION OF OUR MAGAZINE: [LEMUR.DUKE.EDU/MAGAZINE](http://LEMUR.DUKE.EDU/MAGAZINE)

# TLC

## FOR HUSBANDRY STAFF, DAILY CHALLENGES INCLUDE CARING FOR LEMURS NOT JUST PHYSICALLY BUT MENTALLY AND SOCIALLY AS WELL

BY ALLIE BLACKWOOD, DAVID HARING, AND DLC VETERINARY STAFF

**L**emurs are complex social creatures, and few things are more devastating to an infant than being reared in isolation from other lemurs. The story of Leigh, an infant blue-eyed lemur rejected by her mother at just five weeks old, highlights the roles of

the veterinary and husbandry staff in maintaining not only the physical but also the social well-being of the DLC's youngest *E. flavifrons* female.

Not only was Leigh nursed back from the brink of death by the veterinary staff, but her technicians—including Allie Blackwood, whose notes feature below—took extra steps to promote socialization with other lemurs and

the development of “lemur skills” for Leigh’s longterm well-being. Creative housing arrangements also allowed Leigh to maintain visual and olfactory contact with her family throughout her convalescence, while keeping her safe from further injury.

On the next page are the keeper dailies for little Leigh, from her rocky start to her nearly normal lemur present.



# FOR "A TOUGH LITTLE COOKIE"

► Photo by David Haring.

▼ Very young infants don't instinctively know how to eliminate waste on their own. After being fed, Leigh was stimulated (rubbed with a washcloth in the same way her mother would've rubbed her with her tongue), which prompted her to urinate and pass stool. *Photo by Sara Clark.*

► Five-month-old Leigh gives a "high five" to the DLC's photographer a week after being introduced to her new companion, Murphy. *Photo by David Haring.*

## KEEPER DAILIES: THE FRACAS

**16/June/17 Vet Update:** Despite a rough entry into the world via C-section (on 5/11/17), all seemed to be going smoothly for Margret's little girl until Tuesday the 13th, when she was caught in the crossfire in a scuffle between Margret and Margret's older daughter, Hendricks. When the two older lemurs balled up fighting, poor little Leigh took the brunt of the aggressions and received several serious wounds to her mouth and face. Leigh's dad, Tarantino, was not involved in the fracas. The veterinary department did its best to sew up the cuts and lacerations, but Leigh has a cut on her tongue and wounds inside her mouth on the hard pallet that make it hard for her to nurse. Several facial and nasal bones were also broken, making it difficult for her to breathe. She's a tough little cookie, though, despite the trauma! She's being fed formula every two hours 'round the clock and is spending a few hours a day with mom alternating with time in the incubator. She has a steep hill to climb on the road back to

health, but we are taking it one day at a time. Stay tuned.

**23/June/17 Vet Update:** Leigh is a little miracle, a miracle healer that is. It's been just 10 days since she sustained several severe injuries to her face and nasal bones. The wounds have all healed marvelously and she's fully transitioned to solid foods, despite being a mere six weeks old. She's gaining weight well and is off formula entirely. And she is just about the cutest thing EVER! She is staying in the treatment room in a rolling cage next to Margret (having graduated from the incubator) and needs to be weighed and kept well-supplied with fresh soft diet items. Over the past few days, we tried introducing Leigh back to her mom, but Margret simply did not want anything to do with her sweet little girl!

## GIRL MEETS WORLD (IN MIARO)

**30/June/17 Vet Update:** Leigh has moved back to the hustle and bustle of the Miaro

building for (we hope) reintroduction to parents Margret and Tarantino. She is a little startled by all the new neighbors, sounds, activities, and such and is taking some time adjusting from the quiet life in the vet treatment room. She has a new rolling cage, outfitted by her technician with multiple branches, swings, platforms, and comfy stuffed animals for her to snuggle.

**5/July/17** Leigh seems to be adjusting well to life in the rolling cage while her parents mill around outside it. She is drinking water and eating well: gruel is being offered 2-3 times per day, fruit and veggie mixture 2 times. She makes good use of the cage space, utilizing all the branching, perches, nest boxes, and stuffed animals. She's feisty, too—each morning at weighing she has gotten progressively bolder, now trying to jump out of the cage when the door is open! She is still being groomed with a comb and/or toothbrush twice daily by the technician staff, though techs are instructed to "keep their distance" when grooming her. [The only approved non-veterinary human/infant contact is via comb or toothbrush, which helps prevent Leigh from becoming unhealthily imprinted on humans.] She has begun to groom back, either the comb or the stuffed animal on which she is resting. She also seems very interested in watching her parents and even appeared to be attempting to play with Tarantino—bouncing around and pouncing on the cage wire while he sniffed around.

**31/July/17** Leigh was being especially playful today, rolling around with and pouncing on her stuffed animals. Both Tarantino and Margret outside her rolling cage were getting in on the play, too, jumping around and weaving closer and closer to Leigh through the cage mesh. Leigh seemed very responsive to this interaction and was active for longer than I've seen in the past.

**2/Aug/17** Leigh was given access to the larger enclosure in which her rolling cage is located for the first time today (her parents are confined to the enclosure next door). She was very nervous and spent most of the time in the rolling cage







looking out into the larger area. She would occasionally approach the door and curiously poke her head out, but immediately ran back into the corner of her rolling cage.

**6/Aug/17** Leigh was given access to the larger enclosure from her rolling cage again today and is now very relaxed in it, exploring and playfully romping around.

**10/Aug/17** Leigh is now being given several hours of semi-supervised time in the larger enclosure, with free access to come and go from the rolling cage. She is exploring the whole enclosure and seems to be moving around with purpose and greater coordination. Margret and Tarantino have visual access to her during this time (from the enclosure next door). Leigh explores usually for an hour or so and then, having worn herself out, naps in the rolling cage for a bit before waking up and exploring some more.

**15/Aug/17** Leigh was given access to the outdoor section of her enclosure for the first time on her own today. She didn't seem to realize the door was open until a technician stuck her head inside from outside. Then Leigh jumped down onto the ramp and hopped as far as the windowsill. She never came all the way outside.

**22/Aug/17** Leigh came all the way outside today (with a bit of encouragement) and jumped around on the branches for a while. She seemed confused about how to get back inside to the section of her enclosure she's most used to (containing her rolling cage) and began vocalizing. Soon the ruffed lemurs down the hall began making their super loud roaring vocalization, at which point Leigh was scared enough to figure it out on her own and scurried inside, not venturing back out for the rest of the day.

### LESSONS FROM DAD IN "LEMUR THINGS"

**31/Aug/17** The second day of introducing Leigh to her dad, Tarantino, in Leigh's enclosure (she had not had direct physical contact with him since the fateful day of June 16). Today, Margret was left in the adjacent enclosure with visual and auditory access. The intro itself started out much the same as yesterday, with Leigh staying in the rolling cage and Tarantino exploring the enclosure inside and outside. About five minutes in, Leigh ventured out of the rolling cage and Tarantino jumped back inside at the same instant—they landed on the same branch and Leigh began running around, shrieking. Tarantino was his usual laid-back self and was very patient while Leigh settled down and took a nap on a stuffed animal in the rolling

cage. When she woke up, she was much braver and came out to approach Tarantino—it seemed like he didn't know exactly how to interact with her but he was very patient as she jumped around his ankles, slid up next to where he was sitting, and at one point even jumped near him and semi-playfaced.

**5/Sept/17** Intro today again with Leigh and Tarantino. So much calmer today! Leigh did some shrieking initially but was quiet enough and after an hour, she waddled up close to him, wrapped her tail around herself, and nervously began grooming him. He was very calm and though he didn't groom her back, he was patient while she groomed him. He moved slightly and she got scared, running away. The intro lasted about 1 hour 45 minutes and was overall quite positive. Leigh went in her rolling cage to take a nap and Tarantino easily shifted back, where he was received favorably by Margret. A special "Leigh-sized" entrance to the rolling cage has been fashioned, so that she can come and go from the rolling cage into the enclosure whenever she pleases, but Tarantino cannot fit through the entrance to get access to the rolling cage.

**18/Sept/17** Leigh and dad Tarantino are being introduced daily for two hours, with inside and outside access in Leigh's enclosure. Leigh has been pretty quiet and calm, much more confident and brave. She follows Tarantino pretty much wherever he goes and sidles up next to him, tail wrapped around her, to groom him, which she does quite vigorously. He now seems to enjoy these mini grooming sessions, though he never reciprocates. Leigh, by virtue of following Tarantino everywhere, has taken to spending more time outside, and AB often finds her outside on her own first thing in the morning. These intros are not intended to promote long-term bonding or prepare Leigh for companionship with Tarantino and/or, eventually, with Margret (who simply seems too high strung to attempt to introduce to Leigh) but to give her some socialization and "lemur skills" for her upcoming move and introduction to a more permanent companion.



◀ In mid-June, Leigh and Murphy were introduced into the nearly four-acre Natural Habitat Enclosure #3, where they are doing great! Here, Leigh grooms Murphy's chin as the pair take a break from their busy day exploring their new habitat. *Photo by David Haring.*

### BOY MEETS GIRL (EVENTUALLY)

**3/Oct/17** Big change today for Leigh and Murphy, a very handsome 1.5-year-old male living until today in NHE 5 with his family—they were moved into adjacent, but separate, enclosures. The pair is to be kept separate for a week or so, then introduced. Murphy looked stunned and more than a bit surprised to be away from the forest and his parents and little sister. He took some food when AB offered it but otherwise didn't eat much. He did go outside briefly, though he ran into some cobwebs and spent the rest of the afternoon wearing them all over his face! Leigh handled the transition much better—she was bopping around her new enclosure shortly after being moved and ate really well and then explored inside and outside.

**4/Oct/17** Murphy seems to be settling in more. He also was paying more attention to Leigh in the enclosure next-door today, moving along the wire with her and sitting next to where she was sitting. Leigh, meanwhile, seems to continue being totally fine and adaptable. During last check in the evening, it was noted that Leigh was sleeping in a shallow basket hung at top right corner of her enclosure and Murphy was in the corresponding location in the enclosure next door, only about a foot away. This was the first time Leigh had been seen sleeping away from stuffed animals in the rolling cage, and it was a very good sign that the pair just might be compatible when introduced!

**9/Oct/17** Double intros started today (one hour in both the morning and afternoon) for Murphy and Leigh. Leigh's lack of appropriate social skills is very apparent—she seems interested in Murphy but when he approaches she shrieks and runs away. During intros, they both have indoor and outdoor access to the enclosures. Leigh has yet to figure out how to move next door to Murphy's enclosure. In the afternoon, she became more and more agitated as the hour mark approached, unable to settle and lots of shrieking, so the intro was ended. Murphy seems patient and curious.

**10/Oct/17** Another twice-a-day intro between Murphy and Leigh. The morning part of the intro was similar to yesterday's, but in the afternoon Leigh learned how to move next door into Murphy's enclosure and spent some time in there, calmly exploring his area. She sat in his basket for a long stretch and while sitting on the shelf, he approached her until he was sitting on the other edge. She was calm, but the whole time on the shelf together time lasted a mere second before they jumped away. Seems like progress!

**11/Oct/17** Another twice-a-day intro. In the afternoon, there was a craisin on the floor outside of the cage and both became highly focused on it. It seemed good for them to have something that distracted them from each other and they were both on the floor for a while, just a few inches apart. Leigh noticed Murphy was close behind her and was fine with that for a few moments, then suddenly changed her mind and they both leapt away from each other.

**12/Oct/17** Another twice-a-day intro. This morning they were both eating each other's leftover breakfasts and all was calm. Still no contact between the pair, although they each took a nap in the other's baskets. They had about 3 hours together today.

**14/Oct/17** We've decided to leave Leigh and Murphy together for the day, checking often. We separated them for feeding the fruit/veggie part of their diet and put them back together for the chow portion. Leigh is intense about food and slapped Murphy away a number of times, and he respected that (he must have learned from his mom that female blue-eyed lemurs are dominant over males!). They stayed in the same cage as each other most of the day unless Murphy went outside. Since the pair was so calm with each other, we made the momentous decision to leave them together overnight!

**15/Oct/17** Leigh and Murphy spent the night together, and are now to be kept together 24/7 (except for feeding times) and are doing fine! In the afternoon, they were licking food remnants off of the same piece of newspaper with their hands side-by-side and tails crossed!

**17/Oct/17** While watching Leigh and Murphy this afternoon, a volunteer saw Murphy shimmying his way into Leigh's rolling cage (through the Leigh-sized entrance opening) while Leigh was inside. We had not seen this before and were confident that he wouldn't actually fit, but apparently he does if he's motivated! Leigh was calm while he was in there. Tomorrow will remove the rolling cage altogether.

**18/Oct/17** Big news! After lunch, technician Allie "caught" Murphy and Leigh sharing a basket!!! They scattered as soon as they saw her, but it looked like they'd been together for a while napping!

**20/Oct/17** Just did a noon check of Leigh and Murphy: They are snuggled together in a basket, deep in an afternoon nap, an adorable pair! 🐾



# THE WOMAN WHO WALKS *with* LEMURS

BY LAURA JONES, COMMUNICATIONS INTERN

**F**or the primate technicians at the Duke Lemur Center, husbandry is much more than just feeding and cleaning up after the lemurs. As a result, Britt Keith, the Primate Technician Supervisor, is an extremely busy woman.



◀ Britt delivers the day's diet to a free-ranging group of Coquerel's sifaka. Each sifaka group is fed in numerous locations spread as far apart as possible throughout the enclosure. This assures that the less dominant animals will have a chance to eat peacefully, far from the aggressive reach of the dominant female. *Photo by David Haring.*

animal technology. After receiving a two-year degree and teaching there for some time, Britt returned to the University of Florida and received a degree in wildlife ecology. Years later, she received a graduate degree in ecology from the University of Miami.

Apart from schooling, she enjoyed an internship as a teenager at the Bronx Zoo in New York City; worked with apes at the London Zoo; and conducted ten years of biological research in the Florida Everglades.

As a teenager, Britt remembers being fascinated with the internship program at Durrell Wildlife Conservation Trust on the island of Jersey. Despite not being able to participate in the program for financial reasons, she can recall the exact moment she knew she wanted to work with lemurs: "They had this intern who was walking down this path and had about twenty ring-tailed lemurs following behind. And I realized that's what I wanted to do."

Britt and her family (including three school aged children) moved from Miami to North Carolina about twelve years ago. She had heard about the Duke Lemur Center and was encouraged by friends to apply.

"The first time I applied [as a Primate Technician], I was unsuccessful," Britt says. "But another position came open six months later, and I applied for that and I got it."

She was promoted to her current role of Primate Technician Supervisor several years after landing her first job at the DLC. "It's the best way to learn, from that position up," Britt claims.

Visiting Britt's desk in the main building is an integral part of each morning, as all of her technicians gather to speak with her. They update her on the animals they care for, highlighting any changes in health, behavior, or family dynamics that may prove important.

"Everyone has tasks and animals they have to manage. I have to be aware of what [the animals] are doing and why, and if there's something that needs to change," she explains.

Additionally, Britt is in daily contact with the veterinary department. It is imperative for her to be aware of which animals are undergoing medical treatment and why. Detailed

**B**ritt began working at the center over ten years ago, when she joined the husbandry department as Primate Technician. Now supervisor, she spends her days working with the DLC curator, veterinarians, and education staff; ensuring that buildings and other on-site facilities are running properly; and overseeing twelve full-time staff (comprised of two leads and ten technicians) as well as husbandry interns and volunteers.

She visually checks on each of the DLC's 227 animals at least three times per week, with most diurnal lemurs being seen by her every day. That task sometimes proves challenging, given the fact that as many as 61 lemurs free-range within the confines of the DLC's nine Natural

Habitat Enclosures (NHEs), covering 50 acres! "I usually walk seven to ten miles every day before lunch," Britt says.

Long before she began her work at the Lemur Center, Britt's career with animals spanned multiple continents. A native of Scotland who grew up in the jungles of the Bahamas, she "knew wildlife was [her] calling" at an early age.

Although initially interested in becoming a veterinarian, she swiftly changed her mind when she began college.

"Chemistry and I did not agree," Britt recalls. "And I just hated the thought of spaying cats and dogs for the rest of my life, and not working with wildlife."

After completing two years of pre-veterinary schooling at the University of Florida, she went on to the Santa Fe Teaching Zoo, one of only a handful of schools specializing in zoo

and regular updates on every single animal at the DLC are what keeps operations running smoothly.

Such precise and documented care of the lemurs is also crucial for the smooth operation of the DLC's non-invasive research projects, as small changes in the way an animal is cared for might have significant impacts on behavior and hence the quality of data collected by researchers.

Off-site, Britt attends various conferences and conventions about two to three times a year. "I am the Species Survival Plan (SSP) chair for the Coquerel's sifaka (*Propithecus coquereli*)," she says proudly. She is a professional member of the Association of Zoos and Aquariums (AZA) and its suborganization the Prosimian Taxon Advisory Group (PTAG), and holds the vice chair for both the black and white ruffed and red ruffed lemur programs.

When asked what the most rewarding aspect of her job is, Britt's eyes lit up as she declared that was the easiest question to answer: "I work for people who feel exactly the same as I do. That reinforces the fact that one person can make a difference, and that biodiversity on this planet has a future."

Despite rising political tensions and ever-increasing habitat degradation in Madagascar, Britt refuses to believe that conserving lemurs is a lost cause.

"I've seen the most amazing things come about with the smallest pieces of life," she says. "Life is constantly surprising me. Life always finds a way. 🙄"

**"I WORK FOR PEOPLE WHO FEEL EXACTLY THE SAME AS I DO. THAT REINFORCES THE FACT THAT ONE PERSON CAN MAKE A DIFFERENCE, AND THAT BIODIVERSITY ON THIS PLANET HAS A FUTURE." BRITT KEITH**



► During morning rounds, Britt checks over one of the free-ranging sifaka from the Natural Habitat Enclosure #9 group, who is patiently waiting for delivery of morning diet outside the C-wing of AtyAla. Photo by David Haring.

# IN MEMORIAM



## A Celebration of the Life and Work of **DR. GREGG GUNNELL**

What follows is an amalgamation of many sources, most notably Gregg's obituary by Robin Smith, Doug Boyer's memorial service tribute, and scores of remembrances written by Gregg's colleagues and friends.

BY SARA CLARK

n September 20, Lemur Center staff received the heartbreaking news that our colleague and friend, Gregg Gunnell, had died at Duke University Hospital while undergoing treatment for lymphoma.

Known to many as the “Fossil Hunter,” Gregg had spent more than 40 years collecting and studying fossils and had contributed an immense, impactful, and lasting body of research into the evolutionary processes that shaped life on Earth.

As Director of the Division of Fossil Primates, Gregg had set the center on a new trajectory. He updated its facilities, expanded its collection, and profoundly magnified its impact on research and outreach.

“The amount of scholarly outreach and impact that Gregg achieved in his six years at DFP are remarkable,” says Anne Yoder, Director of the Duke Lemur Center from 2007 to 2018.

“He was an exceptionally accomplished scholar, an insightful scientist, and a devoted mentor to students both young and old. But most of all, he was a dear friend and was beloved by every member of the DLC staff. His was a life well-lived, but far too briefly.”

### A LIFELONG LOVE

Gregg fell in love with fossils as a teenager, when his uncle took him to a quarry in Sylvania, Ohio to search for trilobites. “I found a few and that was it,” he reflected in an interview with Duke Today in 2011. “I thought, ‘You can find evidence of life in rocks? This is really cool!’”

After finishing his bachelor’s, master’s, and doctoral degrees at the University of Michigan, Gregg worked for 24 years as coordinator of the vertebrate fossil collections at the University of Michigan Museum of Paleontology.

Over the next four decades he would spend several months a year looking for fossils in far-flung places, including Wyoming, Indonesia, Pakistan, Sumatra, and other locales. Ultimately, his travels to dig sites and museums would take him to 49 states (all but Rhode

## TRIBUTE TO GREGG

**GREGG WAS** the field crew member every field crew needed more of: friendly, humble, generous, pragmatic, always willing to help or teach or put whatever he was doing aside to assist someone else, and absolutely hilarious. Gregg’s sarcastic wit was unparalleled. Often self-deprecating and always entertaining, Gregg could calmly lighten the mood on the hottest, dustiest, most awful fossil-less days in the field. As an added bonus, he could also cook (he was the breakfast cook - a particularly thankless job of getting up before everyone else in the morning to cook for 12 or so cranky people), explain the latest scientific thinking (and a critique of it) on any given fossil species we found, as well as deftly drive the 10-year-old rattle-trap field Suburban through absurdly deep chasms of rock and sand so gently that the 3.5-centimeter ash from his cigarette hanging out the window never once dropped. Gregg was a man of many different wonderful talents, not the least of which was his loyalty to his friends. I will miss him dearly.

LESA DAVIS, NORTHEASTERN ILLINOIS UNIVERSITY

Island) and more than 30 countries.

“He was a field worker to the bone,” recalls Gregg’s former student Doug Boyer, now a faculty member at Duke. “It’s easy to get caught up in abstractions without coming back down to earth to deal with the raw data. But Gregg was all about the hard, often inglorious and dirty, but hugely gratifying work of pulling up relics of past life on earth.”

### AS DIRECTOR OF THE DFP

He joined Duke in 2011 to take the helm of the Duke Lemur Center’s Division of Fossil Primates, a collection that today contains more than 32,000 fossil specimens from Egypt, Madagascar, Colombia, and Wyoming.

“When Elwyn Simons retired, we were in a state of uncertainty as to what would become of the Fossil Division,” remembers Yoder. “Gregg responded almost instantly to the initial vacancy announcement. Knowing him by reputation only at that time—which was bar none—as soon as I saw that he was sincerely interested in the Directorship, I exclaimed out loud: ‘We’re saved!’ And we were.”

As Director of the Division of Fossil Primates, Gregg took the DFP’s vast fossil collection—widely considered one of America’s most important resources for the study of primate evolution—and opened its treasures to the world. Under his leadership, use of the collection increased more than five-fold and the DFP bloomed into a training space for students and scientists.

“He loved that job and the ability to make [the DFP] a more accessible and useful center for science,” recalls Bill Sanders, a University of Michigan paleontologist and Gregg’s friend and collaborator for over 30 years.

“Students and scientists from around the world poured through the doors,” says Yoder.

He also won multiple grants, including one from the National Science Foundation to make 3-D scans of fossils and put them online, thus making them available free of charge to anyone with internet access, without having to travel to Durham.

Well known for his support of undergraduate involvement in research and his patient love of teaching students of all ages, Gregg “supported

my wild ideas for 3-D digitizing museums in the most meaningful way possible: by committing to digitize the Duke fossil collection,” writes Boyer.

He also broadened the collection’s focus from a singular one on anthropoids (humans, apes, monkeys) to a wider approach incorporating the fossil history of lemurs, lorises, and tarsiers. In so doing, the DFP’s main fieldwork focus shifted from Africa to North America. As Gregg himself explained, in his characteristic simple yet elegant prose:

“Many of you may not know this, but between 65 and 45 million years ago, North America was the epicenter of the primate world. During the early and middle Eocene (55 to 45 million years ago), the American West was home to one of the largest and most diverse assemblages of primates anywhere on the planet. Most of these primates would probably look familiar to you if you were to see them in the trees around you today—in fact a large number of them would look very much like the lemurs you see when you visit the DLC. One of the questions we are very interested in answering is whether these North American primates from 50 million years ago actually are the ancestors of today’s lemurs, or whether they simply look like living species but are much more distantly related.”

## TRIBUTE TO GREGG

**WHEREAS MUCH** of Gregg’s early career was focused on primates, in 2000 his research interest shifted to bats. His long-time colleague Thierry Smith, who met Gregg in the field in Bighorn Basin and later at the University of Michigan, recalls:

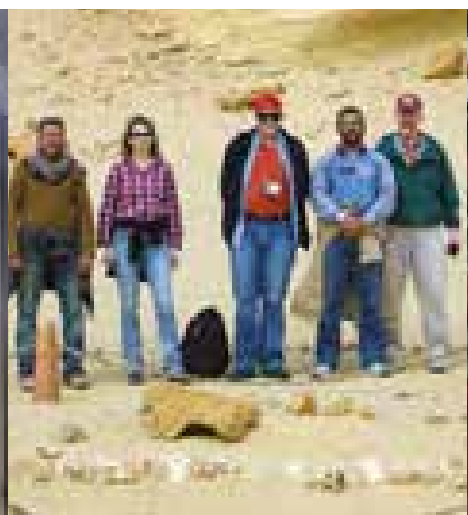
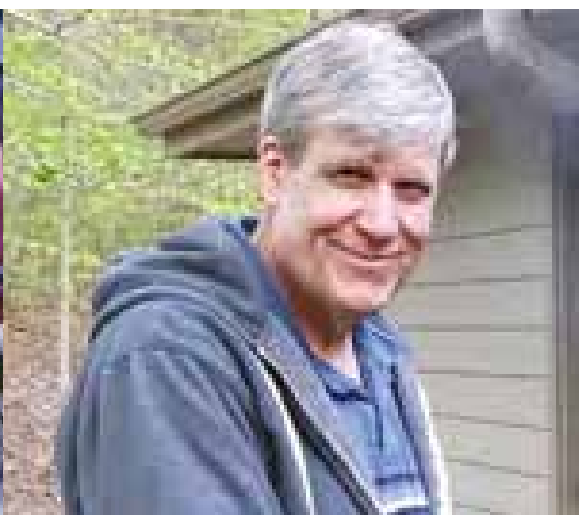
“One day I asked him why he was interested in fossil bats. He told me: ‘because these small mammals interest nobody.’ He always stayed humble, positive, and generous. He was a nature lover and I remember him enjoying the elephants in Kruger Park like a happy child. The most beautiful memory of Gregg was in Belgium when we visited the Pairi Daiza Park, part of the 12th-century Cambron Abbey. In the large underground church crypt, Gregg discovered a colony of flying fox and Egyptian fruitbats that had been installed to impress the visitors. Tens of large bats were flying above our heads in darkness. Patiently, Gregg was waiting for the bats to come close to him so he could feed them small fruit pieces. Finally, he caressed one of them under the eyes of people who were horrified by the idea of being bitten. That day I saw on Gregg’s face, the famous smile that was so typical of him... His love for animals was obvious.”

### “A SCHOLAR AND A GENTLEMAN”

“We could write a very long list of the areas of research to which he made substantial contributions,” says Sanders. “He did his work in a quiet way, but his achievements are as great as any other paleontologist of his generation.”

But more than that, adds Sanders, “I cannot think of another person in my field who is as beloved as Gregg.”

To his colleagues, Gregg was “a great scholar and a gentleman”; “one of the wisest, most selfless human beings I’ve ever met”;





**“THE THRILL OF FINDING A FOSSIL CANNOT BE REPLACED BY ANY OTHER FEELING. AFTER ALL THESE YEARS I STILL GASP AND MY HEART BEATS A LITTLE FASTER WHEN I SEE A ROW OF GLEAMING TEETH OF SOME LONG DEAD ANIMAL SHINING UP AT ME UNDER A NOON DAY SUN. EVEN NOW, AFTER ALL THESE YEARS, THE THRILL REMAINS.”** GREGG GUNNELL

“an amazing collaborator”; “a sounding board”; and “a wonderful friend, mentor, and colleague.” He is remembered for his “famous smile,” loyalty, and generosity; “the emotional comfort and calm one could experience in his presence”; and his “sage advice, always delivered with that spectacular dry sense of humor.”

“Time spent working with him was something I always looked forward to,” remembers John Whitlock of Mount Aloysius College and the Carnegie Museum of Natural History.

“Gregg had no care about awards, personal gain, or fame,” says Sanders. “He did science for the right reasons—for the thrill of discovery and the desire to find things out, to learn about the natural world.”

As Gregg himself said, reflecting on nearly four decades in the field: “The thrill of finding a fossil cannot be replaced by any other feeling. After all these years I still gasp and my heart beats a little faster when I see a row of gleaming teeth of some long dead animal shining up at me under a noon day sun. Even now, even after all of these years the thrill remains.

As one of my close colleagues always reminds me, primates like to pick up shiny objects—why should humans be any different than our primate relatives? 🧐

## TRIBUTE TO GREGG

Here’s a quick story that maybe is only suitable to the people who loved Gregg. He had an amazing sense of humor and very quick wit...

One night at South Pass when cataloging was done, we were all sitting around doing a typical Wyoming evening thing...having a few drinks and watching a violent thunderstorm roll by. With each bolt, of course, people would start counting and proclaim the distance when the thunder clapped.

After one big bolt, a member of the crew passed some gas rather loudly. Without an instant’s hesitation, Gregg shouted “Two miles!”

**BILL BARTELS, ALBION COLLEGE**

LEARN MORE ABOUT THE DLC’S DIVISION OF FOSSIL PRIMATES IN THE ONLINE VERSION OF OUR MAGAZINE: [LEMUR.DUKE.EDU/MAGAZINE](http://LEMUR.DUKE.EDU/MAGAZINE).



# A DAY IN THE LIFE OF A PRIMATE TECHNICIAN

BY LAURA JONES, COMMUNICATIONS INTERN

Julie McKinney, one of the Lemur Center's lead Primate Technicians, begins her job early in the morning, usually with a routine check on the nocturnal aye-eyes.

Julie works quickly and efficiently, cleaning the aye-eyes' enclosure while the animals sleep curled in their nestboxes. Shortly after she finishes, the aye-eyes will awaken. The white light ("daytime") will fade and pale red light ("nighttime") will illuminate the room instead. Because of the structure of their eyes, aye-eyes can't perceive red light nearly as well as we humans can. While the red lights are on, the lemurs can be awake and undisturbed; meanwhile the DLC staff—who can see perfectly well in red light—can observe them non-invasively while they're active.

After finishing with the aye-eyes, Julie takes me to the kitchen, which is filled with the smell of ripe fruits and vegetables. The kitchen is especially busy in the mornings, as techs, volunteers, and husbandry interns prepare the

lemurs' customized daily diets. A master list of precise meal plans for each family group hangs on the wall. After the bowls are filled with the appropriate types and weights of vegetables and fruits—and, for the nocturnal lemurs, protein-rich foods like live mealworms—Julie adds small, nutritionally-complete biscuits to the bowls.

After stacking the bowls neatly into a bucket, we walk to Aty-ala (Malagasy for "forest"), one of the buildings that houses many of the lemurs at the DLC.

Julie stores the bowls in a prep room and heads to Natural Habitat Enclosure (NHE) 6. Today is an exciting day for two Coquerel's sifakas, Beatrice and Eliot, who are being trained to free-range. To free-range at the DLC, a lemur must meet three criteria: she must be healthy; she must come when called; and she must not display any potentially threatening behavior (like biting) toward humans.

The two sifakas are eager to explore the woods around them. One is more wary of the forest than

his companion. As the minutes pass, however, the cautious sifaka gradually becomes more acclimated to forest-life, and engages with his partner in some companionable grooming nestled somewhat precariously at the top of a tree.

Satisfied with the sifakas' foray into free-ranging, Julie leaves NHE 6, heads back to the prep room in Aty-ala, and retrieves the bowls of food. She then begins the process of feeding the various lemur species. Some families require more specialized procedures during feeding, especially if a mother and her infant are involved—as is the case with protective blue-eyed black lemur mom West and her new baby Hamill.

Other lemurs, such as the ring-tailed, red ruffed, and sifaka free-rangers in NHE 9, are easier to feed. Free-ranging lemurs are trained to follow their technicians to the feeding site. The ability to come when called and go where directed are important skills for all free-ranging lemurs to learn. Adverse weather conditions such as sudden thunderstorms or tornado alerts can occur without warning—so it is crucial that the DLC's Primate Technicians can lead free-ranging lemur families to shelter if need be.

By noon, all of the diurnal lemurs should be fed. The first half of a Primate Technician's day is usually comprised of general husbandry duties, whereas the second half includes activities like lemur training and enrichment.\* If two lemurs are due to be introduced (whether for breeding or companionship), first meetings between the animals usually take place later in the day as well.

Although no two days are exactly the same, the general pattern of providing essential care, enrichment, and respect for these complex creatures is set firmly in place. Julie leaves me with a reminder that patience is key when working with these intellectual animals, and I have no problem believing her after seeing first-hand how much time, effort, and sheer dedication go into making sure all the prosimians at the DLC are living a healthy and fulfilled life every single day. 🐼

**\*LEARN MORE ABOUT THE DLC'S ENRICHMENT PROGRAM IN THE ONLINE VERSION OF OUR MAGAZINE: [LEMUR.DUKE.EDU/MAGAZINE](http://LEMUR.DUKE.EDU/MAGAZINE).**



◀ Every day, technicians and volunteers prepare bowls of food catered to the nutritional needs of the individual lemurs. The animals' name tags are placed on their respective bowls.

**WE ASKED** long-time DLC registrar and photographer, David Haring, to share his favorite photo of the year—and this one of Wenceslaus, a Coquerel's sifaka, takes the prize! Here's what David says:

"My favorite is this one of Wenceslaus dangling upside down by one foot, grabbing his knee with one hand and his tail with the other. I was trying to get a photo with an intern and a sifaka or a ring-tailed lemur, when Wenceslaus caught my eye (too high up in tree to pose with a person). I love it because he held the pose only long enough for two shots and I think this one captures the wonderful spontaneous goofiness of a sifaka at play. Although I do wish I had included his entire grasping foot!"





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# WHY LEMURS?

**There are MANY reasons** studying lemurs is important and interesting! Here are some of our favorites:

**The more we learn about lemurs, the better we can work to save them from extinction.** Lemurs are the most endangered group of mammals in the world. By studying the variables that most affect their health, reproduction, and social dynamics, we learn how to most effectively focus our conservation efforts in Madagascar.

**Lemurs, along with lorises and bushbabies, are the most ancestral primates.** They were the first to evolve along the primate lineage—long before monkeys and apes evolved. By studying these early representatives of the primate family tree, we gain tremendous insight into primate evolution. We even learn more about ourselves (since humans are primates) by studying these “living fossils.”

**Lemurs (over 100+ species!) are an extremely diverse taxonomic group and an amazing example of speciation** in response to environmental niches and challenges, and thus are an ideal study system within the field of genetics/genomics.

**Most lemurs live in a female-dominant society—and this is relatively rare in the animal world.** Studying female-dominant primates yields interesting comparisons to male-dominant or co-dominant societies, and also makes possible the study of why female dominance evolved and how. 🦋

▶ Ring-tails and sifakas follow Primate Technician Brittany Canfield into the forest for breakfast. *Photo by David Haring.*

