2014 BIRTH SEASON WRAP-UP FOR DIURNAL LEMURS

BY DAVID HARING

Another diurnal lemur birth season is coming to a close at the DLC, with only one female crowned lemur (Tasherit) still pregnant and yet to deliver. So far this year there have been ten diurnal lemur births: three sifaka infants, all females, born to dams Pia, Rodelinda and Drusilla; twin ring-tailed lemur females born to Sprite; two mongoose lemur males born to Maddie and Carolina; two blue-eyed black lemurs, a male born to West and a female born to Margret; and one crowned lemur male born to Seshat.

Only the crowned lemur infants and one of the mongoose lemur infants are on the tour path, but there are four lemur infants free ranging in NHE9! If for some reason, you can't make it out to the Lemur Center to see any of these adorable infants, here are some interesting facts about this year's births:









Successful births of two blue-eyed lemurs this year mean there have been ten blue-eyed black lemur infants born at the Lemur Center in the past five years! This is definitely good news for a Species Survival Plan (SSP) that had been running on empty for years.

Sprite's female ring-tailed infants represent the sixth set of twins born to her since 2007 (her first infant born in 2006 was a singleton). During this DLC breeding career she has produced 12 females and one male!

Anhotep, Seshat's crowned lemur infant, is her third since she first delivered in 2012 at just two years of age. After a rocky parenting start, Seshat has mellowed into an incredibly laid back, yet excellent mother.

Tasherit, our pregnant crowned lemur female, had a mate, Seker, nearly twenty years old, who sadly died earlier this month. But his genes will live on with their twins born last year and with the new infant due in early July!

This is the first year since 2006 there have been no ruffed lemurs born at the Lemur Center.

The last year there were two or more successful mongoose lemur births at the DLC was 1997!

Mouse lemur birth season has just begun! As of this writing, two females have given birth, with an additional two potentially pregnant. Stay tuned for future updates!



David Haring, Editor & Photographer • Design by Hilliker Designs. This publication was printed using 100% pcw recycled paper, processed chlorine free and with soy ink.



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SUMMER DOLDRUMS? NOT AT THE DLC!!!

BY ANNE YODER, DIRECTOR

"it is a glorious time to see the lemurs in the woods and all of those adorable babies. But when you come for your visit, perhaps you will want to offer a pat on the back for each member of our hard-working staff. They certainly deserve it!

Many of you know that in addition to being Director of the DLC, I have a research lab on campus, and also teach in Duke's undergraduate curriculum. For most of my faculty colleagues, summer is a time of reprieve and renewal; a time when the students leave campus for points around the globe as they either seek adventure or time with their families. Faculty are thus freed to focus on their research, spend time in their labs, and/or enjoy family vacations at the beach or in the mountains. The parking lots on campus are half empty, the quad is quiet, and the library more silent than usual. All is peaceful repose.

Not so at the DLC! Summer is the time when life goes from busy to insanely busy! The parking lot is full to brimming almost every day. Niki Barnett and Chris Smith in our Tours and Education Department are fielding hundreds of emails and phone calls a day as they also organize and lead the (I don't even know how many!) tours around the Center. Erin Ehmke, our Research Manager, is a whirling dervish as she coordinates research projects from faculty and students around the country (many of whom have left their institutional parking spots empty). Meg Dye, our Student Projects Coordinator, is a blur of motion as she coordinates the more than 20 student interns who have come from around the Triangle and across the country to learn about lemur husbandry and/or behavioral research. Andrea Katz, our Colony Curator, hardly knows which way to turn next as baby after baby is born to lemur



after lemur. In fact, just this week saw the arrival of five new mouse lemur babies -three girls and two boys! And Valorie Sterling Cook, our new grants writer and administrator, looks a bit like a circus act as she juggles all the grant submissions going out from across the Center: one from our Data Manager, Sarah Zehr, another from Gregg Gunnell, the Director of the Division of Fossil Primates, and another from yours truly, to be submitted to the NIH in support of our mouse and dwarf lemur colonies.

And let's not even ponder all that the technicians are coping with, as they try to keep the lemurs cool and comfortable in the summer heat (not to mention dealing with the issues of their own thermoregulation!). And certainly, the pace doesn't let up for our veterinarians, or our Business Manager, or our Director of Operations and Administration – or anyone else for that matter. So please do come visit us this summer: it is a glorious time to see the lemurs in the woods and all of those adorable babies. But when you come for your visit, perhaps you will want to offer a pat on the back for each member of our hard-working staff. They certainly deserve it! (And a cool beverage wouldn't hurt :-)

PhD. Director

HOW INFANTS ARE NAMED BY ALLIE BLACKWOOD

At the start of this lemur birth season, Lemur Center technician Allie Blackwood blogged on how the new babies get their names:

"What's in a name? That which we call a rose by any other name would smell as sweet."

Ahh, Shakespeare. Clearly he never worked at the Lemur Center. We here take great pride and much consideration into finding THE perfect name for each animal that lives here. And with 250+ animals, that's a pretty big undertaking.

So how do we start? The first question is "who Sometimes naming schemes, for one reason gets to name the infant?" Each primate technician or another, are changed over the years; perhaps at the center has what we call a "primary section," the pronounceable names have all been used, or which is where the animals that he or she cares the original theme might no longer be deemed for every day of the week live. If someone within a politically correct. Currently, fat-tailed dwarf tech's primary section gives birth, that technician lemurs are named after birds, but the original is responsible for (and honored to be!) choosing theme was New Testament names. Although the infant's name. Moses and Isaac are long gone, a fat-tailed dwarf It's made a tad easier for us because each species lemur named Jonas lives on (at age 29 years!) has a different naming theme. So while there are, wobbling around his enclosure which he shares no doubt, a plethora of fabulous lemur-worthy with a much younger female, Ibis.

names out there, the naming world is not necessarily our oyster.

For example, the blue-eyed black lemurs are named after blue-eyed celebrities. That's why you'll hear us walking around the center saying things like "well, (Robert) Redford just didn't like his broccoli today, but (Ann) Margret ate it all right up!" If you're a fan of the Thor movies, you'll love last year's blue-eyed black boys: Hemsworth and Hiddleston!





The ave-aves, those creatures of the night, are named after witches and wizards and other ghoulish things. Merlin, Poe, Morticia, and Elphaba are among the aye-ayes calling Durham home.

And what about those fun little guys, the mouse lemurs? They all have plant names, so things like herbs, spices, trees, vegetables, and flowers are all fair game. We've got Poblano, Daikon, and Huckleberry to name just a few.

As breeding season will soon be upon us, we here at the center are looking forward to the next batch of names to be chosen. And, of course, waiting for those new personalities to shine through to help us choose the fabulous moniker meant for each new lemur!

JAMES BALOG VISITS LEMUR CENTER BY DAVID HARING



DIVISION OF FOSSIL PRIMATES BY GREGG GUNNELL

During a busy Duke Alumni weekend, Niki called me and asked in her sweetest voice if I could do her a huge favor. I assumed that someone needed a tour, and I was the only available semi-warm body available to give it. Perhaps a visiting substitute keeper from the Toledo Zoo or a former tour guide who worked here for a semester in 1995 was pounding on her door, begging for a lemur fix? But when Niki told me that the famous nature photographer James Balog was at Duke to receive a prestigious LEAF award from the Nicholas School of the Environment, and had called at the last minute for a tour, I nearly fell out of my seat. Give a tour to a brilliant world class nature photographer, working on a high profile project documenting vast expanses of vanishing ice, a result of global warming? No need to twist my arm for that!

A couple of hours later I met Mr. Balog and his wife and daughter at Lemur Landing. Not surprisingly, their schedule was packed and they only had about thirty minutes available to see the DLC. Luckily, I had just been scouting potential free ranging lemur groups to show them, so I whisked them out to NHE 1 where I had seen Rodelinda's sifaka group (with Bertha, Beatrice, Marcus and the adorable three month old Eleanor) feeding on tender maple leaves moments before. We walked

inside the enclosure, and the whole group immediately came bounding over the ground from about fifty yards away giving the Balog's a breathtaking display of terrestrial sifaka locomotion!

The Balog's were most impressed with the spectacular sifaka (and later with an opportunity to meet Styx the ave-ave) and I felt they seemed quite pleased with their time at the Center. This was confirmed a few days later when Bill Chameides. Dean of the School of the Environment, who presented the LEAF award to Balog, reported in his blog: "While I thought Balog enjoyed the ceremony honoring him, it was pretty clear that the highlight of his trip was his tour of the Lemur Center. He apparently especially bonded with one lemur. During his acceptance speech he thanked us for the award but said he wasn't leaving until he was also given a lemur. I'm pretty sure it was tongue and cheek since the very next day they headed off to the airport, to Pennsylvania, to continue to spread the word about climate change, and no one has been reported missing at the Lemur Center ... as far as I know"

HELP SAVE LEMURS! BY NIKI BARNETT

Make an easy online donation through lemur.duke.edu. To help lemurs in Durham, write lemur in the comments. To help lemurs in Madagascar, write SAVA Project in the comments. Every dollar counts! **THANK YOU!**

ANOTHER SUCCESSFUL LEMURPALOOZA!

On the evening of June 6th the Duke Lemur Center held its semi-annual Lemurpalooza. This was our second adoption event and it far surpassed our expectations! The event sold out with over 100 families in attendance. Our wonderful community raised over \$5,000 for the animals at the Duke Lemur Center! Special thanks goes out to all those who attended, along with Fosters Market, WRAL TV and WNCN TV for making this event such a success. For all those who wanted to attend but could not, stayed tuned for the upcoming announcement of our fall event!

Whenever we have visitors at the Division of Fossil Primates, one of the first questions that many people asked is "how do you know where to look for fossils"? As with many things, there isn't an easy and short answer. The truth is fossils are pretty common and can be found in many places around North Carolina and elsewhere in the United States. The trick is finding places to search for the kind of fossils that can answer specific questions about the history of animals and plants that are of interest to researchers. Since we are the DFP, obviously one of the groups we are most interested in is primates - so where should we go to find fossil primates? Perhaps the surest way to guarantee an opportunity to find a fossil primate is to look where they have been found before. This means doing your homework before you go out to look – as paleontologists we follow in the footsteps of those who have gone before us. We read published accounts of previous discoveries to find clues as to where to go look ourselves. As it turns out, despite the fact that no primates naturally occur in the United States today, this was not always the case. During the early and middle Eocene Epoch (56 to 40 million years ago) North America was home to the richest and most diverse primate community living anywhere on Earth. Who first discovered this and how?

One of the consequences of the opening of the American West following the Civil War was the development of geographic and geologic surveys sent out by the federal government to take stock of what belonged to the United States. These surveys not only mapped out the geographic features of the landscape but also mapped the geological structures and sediments that make up our country. These surveys included not only land surveyors and geologists but naturalist as well that collected plants, animals and fossils to send back to the museums and universities in



- the East for classification and study. Among several others, the surveys conducted under the command of Ferdinand Vandiveer Hayden, were among the most important for documenting the existence of fossil primates in North America. Havden's Preliminary Report of the United States Geological Survey of Montana and Portions of Adjacent Territories was published in 1872 with an in-depth
- account of fossil mammals from Wyoming written by Joseph Leidy, a Philadelphia doctor associated with the Academy of Natural Sciences. In his report Leidy detailed the discovery of Omomys carteri (originally named in 1869 by Leidy), Notharctus tenebrosus (named in 1871 by Leidy) and Notharctus robustior. While Leidy didn't know for certain what these animals represented (he thought Omomys was a hedge-hog relative and Notharctus was a carnivore), it turns out that these were the first three fossil primate species described from North America. All three of these primates are best known from the middle Eocene Bridger Formation in southwestern Wyoming and all of them are now well represented, in the case of Omomys carteri by
- thousands of specimens. Even as this is article is being written, a field team from the Division of Fossil Primates and
- Duke's Evolutionary Anthropology Department is in southwestern Wyoming following in the foot-
- steps of F.V. Hayden and Joseph Leidy. We are seeking to find more complete skeletons of Notharctus from the Bridger Formation in order to document as much of this animal's anatomy as possible. Even though Notharctus has been known for nearly 150
- years, there is still much more to discovery about how it lived and where it fits in the primate family tree. Please stay tuned for the results of our summer field season in Wyoming!

GENOME SEQUENCES SHOW HOW LEMURS FIGHT INFECTION

BY ROBIN SMITH

LEMURS HAVE THEIR PORTRAITS TAKEN FOR ENDANGERED SPECIES PHOTO PROJECT BY ROBIN SMITH

This research will likely lead to new methods of disease detection and treatment for *lemurs in captivity, especially* infected animals that show no outward signs of being sick.

In 1999 at the Duke Lemur Center, a young lemur named Eugenius started to get sick. Very sick. He was lethargic, losing weight and suffering from diarrhea. Veterinarians soon pinpointed the cause of his illness: Eugenius tested positive for Cryptosporidium, a microscopic intestinal parasite edition of Molecular Ecology Resources, Duke known to affect people, pets, livestock and wildlife worldwide.

In humans, thousands of cases of Cryptosporidium are reported in the United States alone each year, spread primarily through contaminated water. Since Eugenius was diagnosed in 1999, the parasite has also caused periodic diarrhea outbreaks at the Duke Lemur Center. All of the infected animals are sifakas -- the only lemur species out of 17 at the center known to fall prey to the parasite -- and most of them were under five when they got sick. Despite various efforts to stop the infection, such as quarantining infected individuals and decontaminating their enclosures, more than half of the sifakas living at the center have tested positive at some point. While most animals recover, the pattern has veterinarians puzzled over why the outbreaks persist. Now, thanks to advances in next-generation sequencing



to understanding how these endangered animals fight the infection, and detecting the illness early enough to minimize its spread.

In a study published in the May 29, 2014, researchers Peter Larsen, Ryan Campbell and Anne Yoder used high-throughput sequencing on sifaka blood samples to generate sequence data for more than 150,000 different antibodies -- protective molecules that latch on to bacteria, viruses and other foreign invaders in the body and fight them off before they cause infection.

Traditional sequencing methods can capture only a fraction of the millions of antibodies circulating in the bloodstream at a given time. But now, next-generation sequencing technology is enabling researchers to sequence a much larger portion of the antibody arsenal. The end result is a high-resolution 'snapshot' of antibody diversity that enables researchers to better understand how the immune system responds to stress and infection.

The research is part of a growing field called ecoimmunology, which aims to push the study of immunology beyond lab animals like fruit

Lemurs don't sit still for studio portraits. They sniff the lights. They scent mark the camera lens. They relieve themselves in the middle of the photo shoot. But that doesn't faze National Geographic photographer Joel Sartore, whose latest lemur photos - taken at the Duke Lemur Center - are now available for viewing.

For more than seven years, Sartore has been visiting zoos and captive breeding facilities across the country on a mission to photograph the Earth's endangered animals. Using black and white backgrounds and studio lighting, Sartore is building a photo archive called the Photo Ark.

His goal is to capture as many of the 6000 species held in American zoos and private collections as he can before they disappear. Since he started he has visited over 180 sites and photographed more than 3700 species - some of which are no longer found in the wild.

Sartore photographed a total of six animals One of his first subjects at the Duke Lemur during his visit to Durham. Buckwheat the Center was a blue-eyed black lemur named Presley. mouse lemur, Poots a female blue-eyed black Perched on a stool, Sartore poked his camera lemur, Osprey the fat-tailed dwarf lemur, lens through a three-inch slit in the pop-up tent Iroquois the red-bellied lemur and Beeper the that serves as his portable portrait studio. Fallon bamboo lemur all had a turn under the lights. Owens, the technician caring for Presley, fed him Beeper was dubbed the best poser of the day. a Craisin through the tent's zippered wall to coax "She has a lot of personality packed in a little the lemur away from the camera, which Presley body," said primate technician Bevan Clark. "She was intent on sniffing. was really working it." "My camera gets pooped and peed on a lot,"

Sartore said.

Presley represents one of 17 lemur species at the Duke Lemur Center. Blue-eved black lemurs are one of five lemurs on the "World's 25 most endangered Primates" list for 2012-2014 (redruffed lemurs also made the list).



Lemurs are some of the most threatened animals Sartore has photographed, but they're far from the only animals on his list -- the Photo Ark gallery runs from beetles to rhinos and everything in between.

Each technician who helped out with the shoot received a signed, archival print of the animal they helped with. Check out the end results at bit.ly/1jDlHx4. See more animal portraits and learn how you can support the Photo Ark project at photoark.com/.

INTERN INSANITY! BY DAVID HARING

The third year of the DLC summer internship program got off to a frenetic but fantastic start immediately after Memorial Day. Launched in the summer of 2012, the program has so far hosted 56 interns, mostly undergraduates. This summer, 21 interns will spend ten weeks at the DLC working in one of three different areas (field research, animal husbandry or education). About half the interns are from North Carolina, but the rest have homes scattered around the country, with one even making the long journey from that state most hostile to lemurs: Alaska! Each intern will put in from 15-30 hours a week, doing everything from chopping fruit, hosing cages, harvesting browse, and feeding lemurs; to recording lemur behavior, watching infant development and monitoring animal introductions.

Eight field research interns are working closely with DLC Research Manager Dr. Erin Ehmke, and after some basic training in field research techniques, they immediately began documenting the behavior of free ranging groups of ring-tailed lemurs (Sprites, Liesl's and Dorieus'), Coquerel's sifakas (Drusilla's, Pia's and Rupi's), ruffed lemurs (Kizzy's, and Pyxis') and our only free ranging group of blue-eyed black lemurs(West's).

The 11 husbandry interns will spend their first five weeks working closely with one of our expert Primate Technicians, learning nearly every aspect of that tech's daily routine of animal care. Their final five weeks will then be spent shadowing another Tech, giving the intern an opportunity to learn the intricacies of lemur care for a whole different selection of species and section of the Center. This will allow the interns to get a much better overview of how animal care throughout the entire Lemur Center works, not just one part.

All interns will select a research project to complete during the summer, and then present



the results at the annual intern symposium to be held in August. Several are working on the important project of documenting new and improved methods for enrichment to more productively occupy the time during which a subset of our ave-aves engage in undesirable behavior (mainly pacing and hair plucking).

Other interns are recording and studying the vocalizations of mouse lemurs, as well as the vocalizations of the lemurs living in NHE6 which is near a busy highway (to compare with vocalizations of lemurs living in a quieter forest). Other projects include research on infant development and play behavior in free ranging sifaka, ring-tails and blue-eyed lemurs. One intern is even studying our ancient, blind Sanford's lemur female, Fara, to better learn how she navigates her enclosure, in order that we might design better geriatric habitats in the future. If 32 yr. old Fara could talk, she would surely be flattered that someone is investing so much time on her in her old age!

From ave-ayes to mouse lemurs and from infants to oldsters, the interns have the Lemur Center covered. They are feverishly working to expand their understanding of lemur behavior and husbandry, as well as making the Lemur Center a better place for the animals we are all dedicated to serving.

flies and mice and understand how immune systems function in real-world settings outside the lab.

The next step of the project is to compare blood samples from healthy and sick lemurs, to see if they can identify the specific antibodies that play a role in binding to Cryptosporidium and neutralizing the infection – information that could be key to developing vaccines.

This research will likely lead to new methods of disease detection and treatment for lemurs in captivity, especially infected animals that show no outward signs of being sick. But it will also help researchers monitor the health status of lemurs and other primates living in the wild – simply by screening blood samples for antibody patterns indicating exposure to specific parasites.

That's good news for lemurs in their native home of Madagascar, where lemurs live on the brink of extinction, and where human population growth makes contact with people and inter-species exchange of infectious disease increasingly likely.

CITATION: "Next-generation approaches to advancing eco-immunogenomic research in critically endangered primates," Larsen, P., et al. Molecular Ecology Resources, 2014. http:// onlinelibrary.wiley.com/doi/10.1111/1755-0998.12274/abstract



VOLUNTEER **SPOTLIGHT** MARISSA ACCIANI

Position: I am privileged to be volunteer-

ing with the DLC's veterinary department. I assist the veterinarians and technicians in procedures, as well as perform laboratory analyses and data entry.



How long have you been volunteering: I started in May, 2012 as a data research intern. After a year of observing lemur behavior, I joined the veterinary department to study lemurs from a medical perspective.

What do you do outside of the DLC? I have a part-time job at a histopathology laboratory, where I am able to study animals at the cellular level. My goal is to experience all facets of animal science, and fully understand how they work together.

What is your favorite part of the **DLC?** Lemurs teach me something new every time I work with them. I was amazed to discover their distinct personalities and quirks as a research intern. In the veterinary department, the diversity of cases we encounter always presents me with new insight into their anatomy and physiology. They definitely keep me on my toes.

Favorite species of lemur? I love Coquerel's sifakas. They're beautiful, clever, strong, curious, and all-around impressive primates. And while lemur infants don't count as a species, they're definitely my favorite animals to observe, especially when they begin to explore the world without their moms.

MATCHING GIFTS MEAN NEW SET OF WHEELS FOR SAVA CONSERVATION IN MADAGASCAR BY ROBIN SMITH

The Director of the Duke Lemur Center's SAVA Conservation project, Dr. Erik Patel, will be the first to tell you that driving in Madagascar is not for the faint of heart. Paved roads are rare. Street lights are nonexistent. Torrential rains turn dirt roads to solid mud for many months of the year. Bridges wash out, and just as quickly as they are repaired, seasonal cyclones wipe them out again.

A generous matching gift won't make the road conditions in Madagascar any less rugged, but it will allow members of Duke's SAVA Conversation initiative to get around and manage a growing number of projects more safely, cost-effectively, and with fewer headaches than before.

Thanks to donations from Alexandra and William Anlyan and the charitable organization Virgin Unite, the Duke Lemur Center's three-year-old SAVA Conservation project now has a new Toyota pickup truck.

The few paved roads in northeastern Madagascar -- where the initiative is located -- are better than most. Three to five times a week Erik and project manager, Lanto Andrianandrasana travel from village to village to oversee the project's activities, which range from teacher training and environmental education, to fish farming as an



alternative to the bushmeat trade, to reforestation, family planning and more.

Until now, their main means of getting from site to site was to rent a 4x4. Traveling by bus takes too long -- a trip that might take two hours in a private car can take a whole day in a bush taxi. And with hundreds of pounds of gear often in tow, getting around by bike was out of the question. But car rental fees can add up fast. Due to the poor condition of Madagascar's roads, most rental car companies will only let you rent a car if you also hire one of their drivers. "[It eats up] a huge proportion of our budget -- between \$300 and \$500 USD per week," Patel wrote.

Delays and cancellations are common. "[One time] we actually had to cancel a project because we could not find a driver willing to take us to a remote village near the northwest side of Marojejy National Park. We called three different vehicle owners. Only one of them could be reached by phone despite hours of trying, and he turned us down, saying the only 4x4 he had available was only suitable for good city roads," Patel said.

Safety is an issue too, since the rented vehicles seldom have working seat belts or airbags, and since Patel and his colleagues often find themselves rushing back at the end of the work day and driving at night to avoid a second day's rental fee.

With multiple conservation projects ongoing throughout a several thousand-square mile region, what the program needed more than anything was a vehicle to get from one site to the other.

British business magnate and Virgin Group founder Richard Branson offered to donate approximately half the funds for a vehicle purchase, if DLC could find a match. Alexandra Anlyan and her husband Dr. William Anlyan generously stepped up to provide that match.

William (Bill) Anlyan was chancellor of Duke Medicine from 1964 to 1989. "It was Bill, in his role as a leading Duke administrator, who first decided to invest in a lemur facility at Duke," said Duke Lemur Center director Anne Yoder. "The Duke Lemur Center would not even exist if it were not for his wisdom and foresight."

It's not just SAVA Conservation staff who will benefit from the new truck. The project frequently hosts visiting professors and students from Duke and other universities, so the truck will make working in Madagascar safer and more efficient for others as well.

How to help: 100% of the Duke Lemur Center's conservation efforts in Madagascar are funded by grants and private donations. You can help continue their work of protecting forests and improving the lives of local people in Madagascar. For a list of specific needs and other ways to give please visit http://lemur.duke.edu/protect/donate/.



VOLUNTEER SPOTLIGHT

ALLISON JAILLET

Position: My job is as an educational docent leading tours Sunday mornings.

How long have you been volunteering: I have been volunteering at the DLC for a year, I started last summer after school let out.

Why do you volunteer at the DLC? I started volunteering because I have always enjoyed volunteering, and when I found out I could hang out with lemurs every weekend, I just had to go for it. Now I feel like I'm able to educate others about how to protect and preserve lemurs.

What do you do outside of the **DLC?** Outside of DLC I'm a 6th grade science teacher at Durham School of the Arts.

Favorite Species: Coquerel's sifaka and the black and white ruffed lemur

