



Duke Lemur Center

*To Protect and Learn from Earth's
Most Endangered Primates*

The Duke Lemur Center Case for Support

The Problem:

Preserving Madagascar's Lemurs and Exploring their Scientific Secrets

The island of Madagascar is an evolutionary treasure. Its stunning population of beautiful exotic lemurs, isolated from the rest of the planet for 60 million years, represents an invaluable independent experiment in primate evolution. More than 70 species of lemurs live on Madagascar and nowhere else in the world. They range from the graceful sifaka, which can leap 30 feet to land safely on a thorn-studded tree; to the alien-looking aye-aye, with its batlike ears, eerie gaze and spindly, dexterous fingers.

These lemurs, and the fascinating scientific secrets they carry, are deeply threatened. Human presence in this fragile ecosystem has reduced the lemurs' forest home to only ten percent of its original size. The desperate poverty in Madagascar has driven its 18 million people to depend on slash-and-burn agriculture, ecologically disastrous mining and unrestricted hunting. Such human interference has already robbed the Earth of some of the most extraordinary lemur species. For example, the human-sized lemur *Megaladapis*, a powerful, muscular animal with a rhinoceros-like skull went extinct shortly after humans arrived on the island 2,000 years ago.



The peril to its lemurs places Madagascar as one of the world's most endangered biodiversity hotspots and *the* highest priority for saving primates threatened by extinction. Seventeen lemur species are already on the critically endangered list, and more are sure to follow.

We humans face not only a moral imperative to preserve these extraordinary creatures, but also a scientific imperative. As primates that evolved independently from monkeys, apes and humans, lemurs offer invaluable insights into primate evolution and genetics. From their initial arrival on the island, they have evolved to have an amazing array of shapes, behaviors, physiologies and reproductive systems.

They also possess physiological adaptations that seem almost alien to Earth. For example, the golden bamboo lemur thrives on a diet of bamboo harboring a cyanide concentration lethal to humans. Several lemur species, uniquely among primates, hibernate, raising fascinating questions about their physiology. And the aye aye, the most intelligent lemur species, can formulate sophisticated strategies to gnaw into trees and use their prehensile fingers to fish out grubs. Such extraordinary adaptations illustrate how the loss of any lemur species means the irretrievable loss of scientific knowledge.



The Opportunity:

The Duke Lemur Center, a World-Renowned Refuge, Laboratory and Classroom

The Duke Lemur Center is the world's most important refuge for endangered lemurs and other prosimians. It houses and breeds the world's largest and most diverse colony of lemurs and has the longest experience at maintaining and breeding lemurs of any such facility. Some 200 lemurs, and their relatives lorises and bushbabies, live in the Center's spacious cages and roam its multi-acre outdoor enclosures.

The Center's scientists and staff members continually advance the complex skills needed to maintain these animals' health and enable them to successfully breed. The Center shares this critical knowledge with other zoos and animal centers, improving prosimian care and husbandry worldwide.

Because the Duke Lemur Center is part of one of the world's leading research universities, it has the advantage of the scientific and technical talent to explore these mysteries. The center attracts leading experts from Duke and other institutions in genetics, biomechanics, conservation biology and behavioral ecology. The Center also has the world's leading veterinary staff in prosimian medicine.

These scientists conduct a range of noninvasive research to explore the many scientific questions about lemurs, including

- Σ How do their independently evolved genomes compare to those of monkeys, apes and humans?
- Σ How has their unique evolutionary history determined their behavior? Their physiology? Their movement?
- Σ How have they adapted to specific ecological niches in their homeland?
- Σ How can they best be protected and even restored in Madagascar?
- Σ Does their physiology offer insights that could be useful in understanding and treating human disease?

Also, the Center's long-standing collaborations with Madagascar and its people, uniquely positions the Center to apply its knowledge to not only protect Madagascar's lemurs, but to foster efforts to make that protection economically advantageous to the Malagasy people. Such efforts include Parc Ivoloina, a zoo and environmental education center, developed through the Lemur Center that has proven both an economic and educational success. It has helped teach the Malagasy people about their unique ecological resources, about how to preserve those resources, and about how to make preservation a foundation for economic progress.



The time is ripe for a major international initiative to save Madagascar's lemurs. Forests are still being destroyed at an alarming rate. However, in 2007, the World Heritage Committee named a significant portion of Madagascar's eastern rainforests as one of three new UNESCO World Heritage List sites. This offers hope for a global coordination of captive breeding programs and the protection of Madagascar's remaining natural habitat, which in turn will provide a stable future for these fascinating primates. With such initiatives, the dream may even one day be realized of repopulating captive lemurs back into their native habitat.

Besides a center for research and conservation, the Lemur Center is also an inspiring classroom for students of all ages. Lemurs are among the most effective ambassadors for science. They intrigue children to learn about the world's animals and their habitats. And they lure college students to the joys and intellectual challenges of formulating scientific questions, gathering data to address them and analyzing that data critically to answer them.

The Need:

Support for New Facilities, Leading-Edge Research and Enhanced Conservation

To optimally protect and study lemurs, the Lemur Center must maintain a colony adequate in both size and species number. The number of each species must be large enough to foster natural social structure and age classes. Also, the number must be large enough for scientists to perform statistically significant studies on behavior and physiology. And species diversity of the colony is necessary for both conserving species and to enable scientists to conduct comparative studies among species.

However, the Lemur Center is severely limited in both the amount and quality of space for building an adequate colony, for studying lemurs and for caring for their medical needs. Such lack of space means the Center may miss opportunities to enhance its colony through breeding, importing surplus animals from other facilities and rescue missions to save lemurs threatened by loss of habitat in Madagascar.



Quality space means, for example, constructing flexible indoor/outdoor housing that enables lemurs to be brought inside during cold weather, yet released to roam in outdoor enclosures during warmer periods. The lack of such flexible housing at present means that lemurs normally kept in outdoor enclosures must be brought inside for the entire winter. Also, quality space means the ability to continually enrich the animals' environment by providing ever-changing arrays of toys, structures and feeding apparatus to enhance their mental health.

The Lemur Center also needs support for its continued role as trusted allies and partners in conservation efforts in Madagascar. It is a founding member of the Madagascar Fauna Group, an organization dedicated to preserving Madagascar's wildlife and habitats. The Center also collaborates with local groups in Madagascar to study lemurs in the wild, to protect their habitats, and to provide environmental education and training to encourage wise use of natural resources. Such education is a two-way street: Not only does the Center help train scientists and conservation professional from Madagascar; but Madagascar also serves as a training and research site for students and scientists from the Center and other Duke departments.

How Donors Can Help



Donors to the Duke Lemur Center will join forces not only with the world's leading prosimian facility, but also a renowned research university and the nation's largest federal basic science funding agency.

The National Science Foundation, recognizing the Center's scientific value, has granted some \$1,921,809 from March 2006 to February 2011. That is approximately \$382,069 a year for operating support. NSF has supported the Center since before 1992.

Duke University has recognized the Center's critical conservation, research, and education roles by committing major resources for expanded facilities. The university will spend \$9.6 million to fund two new indoor/outdoor cage complexes, now under construction to house the lemur population comfortably and safely throughout the year—allowing for maximum flexibility to manage free-ranging groups.

To help support new facilities, the Center is asking for \$1 million in private and foundation support for an additional animal housing. These building projects offer donors significant naming opportunities. Each naming opportunity represents a pledged gift to be paid over a five-year period, as follows:

- Σ \$2 million – Name indoor housing building
- Σ \$1 million - Name flexible releasable building
- Σ \$250,000 - Name a building wing (Five opportunities)
- Σ \$100,000 - Name a room (Two current opportunities)
- Σ \$ 10,000 - Name an indoor habitat (140 opportunities)

Each named area will have a brass plaque recording the name of the area and the donor (unless otherwise requested) and the date of the gift.



The Center is also asking for support for additional salaried positions. These include the position of Curator and Operations Manager, formerly the single position of Assistant Director, but expanded to enhance care for the animals. Additional salary support will also fund Ph.D.-level researchers who could contribute their scientific expertise to the Center. By increasing the salary pool by \$105,000, the Center could greatly enhance the care, conservation management, and non-invasive study of the current colony, thereby enhancing the lives of the lemurs and adding to the body of knowledge about them.

The Center also needs an additional \$175,000 in operating costs for 2009-2010. These funds will support Primate Technician salaries, care, housing, feeding, medical treatment, and environment enrichment of these unique and fascinating animals, to staff development, and to our outreach to Madagascar.

The Annual Report will recognize all gifts, unless otherwise requested. Gift/Pledge levels will be noted, unless requested otherwise. Gifts and pledges will be listed as: Up to \$100, \$101-500, \$501-999, \$1,000-4,999, \$5,000-9,999, \$10,000-\$24,999, \$25,000-\$49,999 and \$50,000+.

All gifts to the Duke Lemur Center are tax deductible to the full extent of the law, and they do count toward total Duke University Giving Levels.

Background on the Duke Lemur Center

The Duke Lemur Center's Mission, Vision, and Core Values:

Duke Lemur Center Mission:

- Σ Promote research and understanding of prosimians and their natural habitat as a means of advancing the frontiers of knowledge (Research)
- Σ Contribute to the educational development of future leaders in both national and international scholarship and conservation (Education)
- Σ Improve the human condition in a world in balance by preserving biodiversity via a sustainable approach (Conservation)

Center Vision:

- Σ Serve as a globally recognized leader in prosimian biology in research, education and conservation.
- Σ Inspire and teach students at all educational levels to continue the legacy of leadership in this area.
- Σ Serve as the leading center outside Madagascar for managing and conserving endangered prosimian primates.
- Σ Work in collaboration with the government of Madagascar and other national and international partners to advance protection of wild lemurs and their habitats.

Center Core Values

- Σ Scholarship
- Σ Intellectual growth
- Σ Global diversity
- Σ Conservation
- Σ Collaboration
- Σ Interconnectedness
- Σ Excellence
- Σ Capacity-Building
- Σ Sustainability



History of the Duke Lemur Center

Since 1966, the Duke Lemur Center, formerly the Duke University Primate Center, has been dedicated to the conservation and understanding of prosimian primates. That year, approximately 80 animals were moved from Yale University to Duke, and the Duke Lemur Center was established. The Center has always housed prosimian primates exclusively, including lemurs from Madagascar, lorises from India and Southeast Asia, and galagos from Africa. The Center also maintains an unparalleled collection of fossil primates under the direction of the Director of Fossil Primates Elwyn Simons.

The Center facilities occupy a secluded site in the Duke Forest, located two miles from the main campus of Duke University. The 12,000-square-foot, two-story main building of the Center currently includes staff offices, laboratory space, a small meeting room, animal treatment and surgery rooms, food storage and preparation areas, a staff lounge and animal rooms. Most of the nocturnal animals are housed in the Nocturnal Animal Building (approximately 4,500 square feet), completed in July 1991. In 1974, there were only three outdoor cages, encompassing approximately 2,600 square feet. Today there are 54 outdoor cages, enclosing about 13,000 square feet. Those outdoor cages in contact with the main building were renovated between 1993 and 1997. Other support buildings include a shop, storage shed, and two office trailers.

In addition to conventional roofed outdoor cages, the Center has five Natural Habitat Enclosures (NHEs), multi-acre forest enclosures within Duke Forest. The first NHE was completed in 1981 with funding from the World Wildlife Fund. At the time, this was a novel strategy for housing free-ranging lemurs, but it has since proven an outstanding success in fostering healthy, natural lemur groups. The NHEs also provide exceptional conditions for studying natural-state social behavior in diurnal lemurs and for training students in field research methods. NHE groups are also excellent study groups for evaluating captive lemur “survival skills,” relating to future reintroduction or re-stocking programs.

Thus, over the next decade, three more NHE’s were constructed in the forest around the main facility, and today they encompass approximately 50 acres of forest habitat for groups of several lemur species. A new indoor/outdoor animal facility (5,100 sq. feet) was completed in April 2001 to provide winter housing for NHE groups.



Following a highly favorable university review of the Center in 2003, the Duke University Provost decided to invest \$9.6 million to improve the facilities. Moreover, an international search was initiated to recruit a new Center Director who was both an accomplished scholar in the field of prosimian studies and a talented administrator. Anne Yoder from Yale University agreed to accept the position and assumed the directorship in January 2006.

The Center has also had a long history of conservation-related activities in Madagascar. In the early 1980s, the Center established the first official accords with the government of Madagascar that made the Center the only institution in the Western Hemisphere permitted by the government of Madagascar to receive lemurs for captive breeding, as well as to facilitate field research and conservation biology studies. In the late 1980’s, Center staff were instrumental in creating the Madagascar Fauna Group (MFG), an international consortium of zoological, botanical and research institutions concerned with conserving Malagasy fauna and flora.

The Center partnered with the MFG from 1989-2004 to support full-time Technical Advisors Andrea Katz and Charlie Welch in Madagascar for the Parc Ivoloina and Betampona Reserve projects. The Center’s commitment to these conservation and education collaborations achieved international recognition with the program of re-stocking a small population of black and white ruffed lemurs into Betampona Reserve. The first captive-bred lemurs from the Center were released into Betampona in 1997, following five years of preliminary research and planning.

The Duke Lemur Center Today

The Colony

The vast majority of the Centers more than 200 animals are lemurs, although the center also houses lorises and galagos (bushbabies). The colony includes Twenty-five taxa (24 species and 1 subspecies), including species found nowhere else in captivity. Approximately another 100 animals are on loan at other captive breeding and education facilities. The Center also maintains its excellent collection of fossil primates under the direction of Elwyn Simons, Director of the Division of Fossil Primates.



The Research Program

The Center is foremost a non-invasive research facility devoted to the study of evolutionary primatology. Research at the Center covers a diverse range of topics from systematics to behavior. Specific areas of interest include physiology, biomechanics, and anatomy of living lemurs, as well as husbandry practices necessary for caring for and breeding prosimians. Moreover, the Center supports pilot and complimentary work in the field, particularly work involving the distribution, behavior, ecology and conservation needs of lemurs in Madagascar, as well as capacity-building for Malagasy researchers. Finally, the Center supports projects related to the evolution of the primate lineage through the discovery, description, and analysis of living and fossil primates. The Center welcomes researchers from outside the Duke community and is committed to organismal-type research.

The Education Program

Educational opportunities at the Center are abundant. For example, national and international graduate and undergraduate students conduct studies of feeding adaptations, vocalizations, reproductive behavior, vertical clinging and leaping, genetics, and vision acuity. Many students do field research in Madagascar and often go on to work as primatologists or conservation professionals. Local youth from grades K-12 have the unique opportunity to visit the Center as part of school-sponsored field trips and see these endangered animals. Additionally, as part of our community outreach program, the Center endeavors to educate the public about these special animals. The Center hosts more than 15,000 visitors per year. Guests come from every county in North Carolina, all fifty states and many countries from around the world.



The Conservation Program

The Center has conducted an active conservation program for nearly three decades. In Madagascar, the Center partners with the MFG at Parc Ivoloina. Parc Ivoloina has a small zoo, an environmental education center, and a conservation-training center. Programs focus on capacity-building for Malagasy students of all ages, conservation professionals, and local communities. Practical technical training is provided to promote reforestation, eco-agriculture techniques and ecotourism as alternatives to destructive land use practices.

Also with the MFG, as mentioned earlier, the Center carried out the first re-introduction of captive black and white ruffed lemurs back to the wild at Betampona Reserve in 1997. Ten years later, six surviving offspring have been born to five of the introduced lemurs, including three that bred with wild mates. The re-stocking program has evolved into an important program of conservation research on many different plant and animal species, helping to protect the rainforest at the same time.

The Duke Lemur Center's Personnel

The Duke Lemur Center leadership shares a passion for research, education and conservation, and specifically for saving endangered lemurs and related prosimian primates from extinction. Heading this outstanding group is the new director Anne Yoder, who not only heads the center but directs her own laboratory in the Department of Biology. Before her tenure at Yale, Dr. Yoder taught at Northwestern Medical School, the University of Antananarivo, Madagascar, and Duke University Medical School. She is an internationally renowned evolutionary biologist, whose research interests include the phylogeny and evolution of mammals with an emphasis on the mammals of Madagascar; conservation genetics; historical biogeography and biodiversity of Madagascar; and Old World biogeography.

Working with Dr. Yoder is Dr. Sarah Zehr, who serves as the Research Manager. Dr. Zehr was educated at Columbia University and Harvard University in Anthropology and Biological Anthropology and has nearly 20 years of research experience. Dr. Zehr coordinates the efforts of the more than 35 researchers who conduct studies at the Center.

Complementing Dr. Yoder's and Dr. Zehr's strength in research are Andrea Katz and Charlie Welch, a husband-and-wife team who spent 15 years representing Duke University in Madagascar working in conservation and capacity-building for the Parc Ivoloina and Betampona Reserve programs. For their dedicated work, Ms. Katz and Mr. Welch received the Chevalier de l'Ordre National, or honorary knighthood, from the President of Madagascar, in addition to other awards from regional environmental officials and leaders. Both Ms. Katz and Mr. Welch have served as Center facilitators for Madagascar programs, including assistance for student and volunteer placement with projects in Madagascar. They have led the Center's conservation efforts since returning to the United States in 2004, and both continue to serve on the Board of the MFG. Ms. Katz has recently assumed the position of Center Curator, managing captive breeding programs.



Primate Technician Britt Keith captured the enthusiastic spirit of the Center staff when she said “It is a privilege to work in the presence of these animals.” A team of 11 primate technicians tends the colony, and to the person, each one cares deeply for both the individual animals and for the species with which they work.

The technicians work under the direction of Bill Hess, Senior Technician, who has nearly 20 years of experience overseeing this colony. This long history is complemented by an influx of fresh ideas from Greg Dye, the Center's new Operations Manager, a knowledgeable, dedicated professional with more than 20 years of diverse managerial experience in the zoo and aquarium industries. Mr. Dye brings expertise in problem solving, team building, collection planning, animal training, animal husbandry, public speaking, and staff development. He has additional skills in strategic planning, program development, budgeting, exhibit development and behavioral research.



Veterinary staff is on-site or on-call 24 hours a day/seven days a week. The veterinary staff consists of two certified veterinarians and a vet tech. Cathy Williams, DVM, heads the veterinary staff. She has served the Center animals for 12 years. Bobby Schopler, DVM, also serves the colony at the Center. In addition to his work at the Lemur Center, Dr. Schopler is the founder of Piedmont Wildlife Center, a rehabilitation hospital for wildlife in need of assistance.

David Haring, Registrar and Photographer, and Andrea Katz, Curator interface with other institutions and assure Center's participation in programs for captive prosimian population management, in accordance with the objectives of Species Survival Plans and the Prosimian Taxon Advisory Group, both of which involve international cooperation is assuring that species survival is coordinated globally by experts in the field.

A small outreach and administrative staff of four people support the research and colony management staff. This group includes the Center's first full-time Development Officer, Lari Powell Hatley, who brings more than 10 years experience in communications, marketing, and fund-raising, as well as an addition 10 years in education, and Melissa Dean, Financial Officer, who has more than 20 years experience with Duke, 18 of which have been at the Lemur Center. Eleven work-study students and approximately 50 volunteers also serve to make the Duke Lemur Center run smoothly and efficiently.

The Duke Lemur Center's Financial Resources

Financial Background

The Duke Lemur Center has operated in the black for the last 10 years. The Center receives funding from Duke University, the National Science Foundation, endowments, research fees, grants, and public donations.



Duke University has maintained a strong financial commitment to the Duke Lemur Center since its inception in 1966. The 07/08 fiscal year, the Center's total operating budget was \$2,028,757. The university covered 67% of these costs. Besides the commitment of \$9.6 million for constructing, the Duke Office of the Provost has made a commitment to provide one year's worth of funding equivalent to the annual income from the Center's long-running National Science Foundation Support Grant (17% of the total expenses), in the event that the NSF grant is ever delayed or not funded. The Center is currently in the third year of a five-year grant from the National Science Foundation.

The Center is supported in part by seven endowments, some of which have restrictions. The endowments principal totaled \$1.5 million dollars and the market value was \$5.4 million as of June 30, 2008. DUMAC, LLC, a university-controlled limited liability company, manages Duke University's investment assets.

However, the University recognizes the need to increase outside endowment and operational support, including capital campaigns to continue progress on the facilities upgrade plan. To this end, the University provided funding for the first full-time Advancement Officer dedicated solely to the Duke Lemur Center. Lari Hatley assumed this position in July 2008. Increasing this area of support enhances the Center's autonomy and ability to respond with vision and alacrity to the needs of the colony and the scientists and researchers who work with them.



Accountability

The Duke Lemur Center abides by the bylaws of Duke University. The University's Institutional Animal Care and Use Committee (IACUC) provides oversight for animal care and facilities. In addition, the Association for the Assessment and Accreditation of Laboratory Animal Care (AAALAC) accredits the Center. The Lemur Center also follows the guidelines set by the United States Public Health Service Policy on Humane Care and Use of Laboratory Animals. The Center is inspected annually by the USDA and has complied with all guidelines and regulations without any problems noted since 2003. The Center abides by all state, national, and international laws regulating its animals and programs.

A Future of Progress in Conservation and Research

A top priority at the Duke Lemur Center is to enhance our commitment to assist the government of Madagascar in responding to environmental threats, by promoting field research and conservation action in Madagascar while providing a sustainable captive reservoir for endangered lemurs at the Center. This objective requires long-term sustainability in quality housing, staffing, and medical care for captive populations. It also includes deepened partnerships with Malagasy and international groups and with faculty and scientists to address core issues in lemur conservation and its inter-related issues of land use and management and the empowerment of local populations.



The Center will continue to focus on minimally invasive research seeking to attract additional excellent scientists, top-tier undergraduate and graduate students, and to interest younger students and the community in expanding knowledge and preserving biodiversity. Exceptional research opportunities exist in the developing fields of genomics, proteomics, molecular ecology, reproductive physiology, environmental physiology, wildlife disease ecology, conservation genetics, and more. The more established disciplines of behavior, morphology, cognition, biomechanics, and phylogenetics also will continue to develop in new and exciting directions, often with the incorporation of genetic analytical tools.

Another priority will be the steady restructuring of the colony such that nocturnal animals are restored to levels that represent a variety of species and clades, and several species of diurnal lemurs are managed for natural social structure and reproductive behavior.

Finally, to achieve the judicious colony expansion necessary for the Center to continue as a vibrant leader in conservation, research, and education, the Center will continue its multi-phase building program.