# LEMUR NEWS

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MAY 1993

*The Newsletter of the Madagascar Section of the IUCN/SSC Primate Specialist Group*

*Editor: Roderic B. Mast*
*PSG Chairman: Russell A. Mittermeier*
*PSG Deputy Chairman: William R. Konstant*


## Letter from the Chairman of the Primate Specialist Group

Madagascar is without a doubt the world's highest major primate conservation priority. With very high levels of primate diversity and endemism, and more endangered and vulnerable primates than any other country, Madagascar is fourth on the world list of primate species (in spite of being less than 7% the size of Brazil, the world leader, and roughly one-quarter the size of Indonesia or Zaire, second and third on the world list). The level of primate endemism, usually cited as 29 of 31 species (93.5%) or 48 of 50 taxa (96%), is by far the highest in the world. However, even the two species that occur elsewhere are found only on the nearby Comoros where they were probably introduced from Madagascar, meaning that in biological terms the endemism of lemurs in Madagascar is actually 100%.

At the generic and family levels, Madagascar's diversity is even more striking, with fully five primate families, four of which are endemic, and 14 genera, all of them endemic. Compare this to Brazil, 14 times larger than Madagascar and the richest country on Earth in primate species (69), but with only three families, none of them endemic, and two endemic genera out of 16. Of the 50 lemur taxa recognized for Madagascar, fully 11 are considered endangered and another 23 are believed to be of conservation concern. One entire family (Daubentoniidae) and four genera are considered endangered, a degree of endangerment at higher taxonomic levels that not even Brazil can match and that is of great international concern. Looking at Madagascar's diversity in yet another way, Madagascar alone is home to 13.9% (34/245) of all primate species worldwide, and 23% (14/61) of all primate genera, a great responsibility for any one nation.

Madagascar also demonstrates clearly that primate extinctions are a very real phenomenon and not a figment of the conservationist's imagination. Fully eight genera and at least 15 species of lemur have already gone extinct on this island since the arrival of our own species there less than 2000 years ago and many others could disappear within the

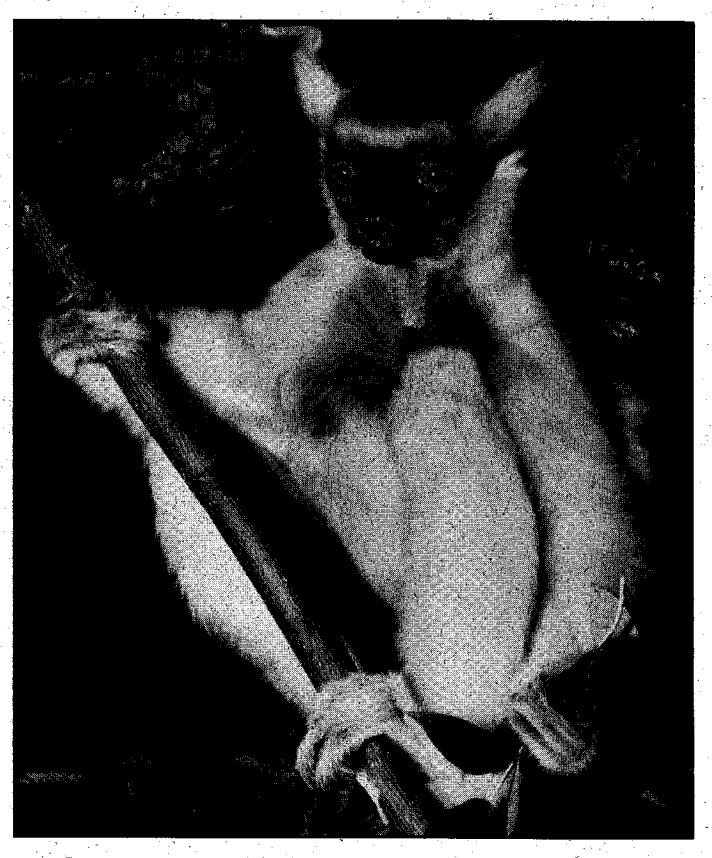

**Figure 1. The golden-crowned sifaka (*Propithecus tattersalli*), is one of a dozen taxa of lemurs given a "highest priority" rating by the IUCN/PSG. See article by David Meyers, page 6. (photo by David Haring)**

next few decades if rapid action is not taken. Today, the major threats to lemurs include deforestation due to slash-and-burn agriculture, logging, burning of dry forests to create cattle pasture and to produce charcoal, hunting for food and live capture for pets.

Another threat is our lack of knowledge. One of the most glaring gaps in our knowledge of lemurs is often the most basic information on geographic distribution and conservation status. In spite of several centuries of observation and collection and more than three decades of research, we still are not clear as to the limits of distribution for most species and have only subjective impressions of conservation status for the majority of lemurs.

The striking cases of two new species being described in the last 10 years, another being rediscovered, and yet another, the aye-aye, previously believed to be highly restricted and nearly extinct and now being found in many different parts of the island, are good indicators of how ignorant we still are. Clearly, much more thorough survey work is needed for all lemurs, with special emphasis on the most endangered. It is hoped that *Lemur News* will encourage further research and add to our knowledge of lemur biology in general. In conjunction with this newsletter, we have also published *Lemurs of Madagascar: An Action Plan for their Conservation* (Mittermeier *et al.*, 1992), which is described here in greater detail by PSG Deputy Chairman, Bill Konstant (see article, page 3).

As a result of the IUCN/SSC Primate Specialist Group meeting in Strasbourg, France in August 1992, the PSG is being reorganized and decentralized to allow for greater efficiency and interaction among members. Part of this restructuring involves the creation of newsletters for each major region, including Asia, Africa, the Neotropics, and Madagascar. Two such newsletters, *Asian Primates* and *Neotropical Primates*, are already in production, and *Lemur News* is the third of these. The IUCN/SSC Primate Specialist Group is pleased to launch this new publication, and we all hope that it will facilitate communication among the world's lemur experts, to provide a rapid outlet for new findings on their ecology, distribution and conservation status, and stimulate further interest in their survival. We look forward to receiving contributions from all of you.

Russell A. Mittermeier
President, Conservation International
and
Chairman, IUCN/SSC Primate Specialist Group

# LETTER FROM THE EDITOR

The format of this inaugural issue of *Lemur News* will set the standard for future numbers. We begin with Announcements: upcoming conferences, job openings and other such brief news bits will appear in this section. Following this we move on to Current Events, where we will highlight news of importance to lemurs and the people who work with them — the contributions by Alison Jolly and Jocelyn Rafidinarivo in this issue provide valuable updates on social and political events in Madagascar, important to all of us who work in the field. From there, it's on to the meat-and-potatoes of conservation, Lemurs in the Wild; we will attempt to address a different critical species in each issue, such as we have here with articles by David Meyers on *Propithecus tattersalli* and by Elwyn Simons on the western aye-aye. The next section provides news on Lemurs in Captivity, where we report on the recent rash in captive aye-aye births, and on several new programs to manage lemurs in captivity. The Current Research Section will also attempt in each issue to highlight important laboratory projects underway, such as Robin Absher's study of mitochondrial DNA in *Eulemur*, featured herein. And lastly, book reviews and recent publications will be an on-going feature of *Lemur News*.

The main function of this newsletter is to bring together the often disparate interests of the captive, field and laboratory scientists working with lemurs, in an effort to create a synergistic force for conserving these unique and beautiful primates. But remember that *Lemur News* will only be as good as its contributors; we need your articles, and we need your comments and criticisms about the newsletter to assure that it meets the needs of its readership. I will look forward to hearing from you all by July 1, 1993 (the deadline for submission of articles for Vol. 1, No. 2) at Conservation International, 1015 18th Street, NW, Washington, DC, phone (202) 973-2216, fax (202) 887-0192, or if you are in Madagascar, you may communicate with me through the staff at CI-Madagascar, Antananarivo, phone 41174.

Special thanks go to all the contributors to this first *Lemur News*, to the Editorial Advisory Board, to David Haring for his photo contributions and to Russ Mittermeier, Bill Konstant, John Carr and Stephen Nash for their valuable assistance.

Roderic B. Mast
Vice President, Conservation International
and
Editor, *Lemur News*

# ANNOUNCEMENTS

## Conference On Nocturnal Prosimians (June, 1993)

An international conference on nocturnal prosimians will be held at Duke University in Durham, North Carolina, USA, June 9-12, 1993. The conference will have eight main sessions: 1) Paleontology and Functional Morphology; 2) Cytogenetics and Chromosomes; 3) Conservation and Captive Breeding; 4) Systematics and Taxonomy; 5) Behavior and Ecology; 6) Social Behavior and Communication; 7) Brain and Behavior; and 8) Reproduction and Development. The 38 invited speakers will give overviews of their disciplines and suggest directions for future research. Participants also are invited to present original communications in poster format. The program includes films, a tour of the Duke University Primate Center, a social, and an evening guest lecture. Dr. Gerald A. Doyle, University of the Witwatersrand, will give the opening lecture and Dr. Robert D. Martin will give a closing overview of the conference. To be placed on the mailing list, contact the Duke University Primate Center (Attention Ms. Melissa Dean), 3705 Erwin Road, Durham, NC 27705, phone (919) 684-2535. fax (919) 490-5394. For further information about the conference program, contact Dr. Kay Izard, (919) 541-6310 or Dr. Lon Alterman, (919) 515-3883.

## Wildlife Management & PHVA Workshop (May, 1994)

A Wildlife Management & Population Habitat and Viability Assessment (PHVA) Workshop is being proposed to be held in Antananarivo, Madagascar in May, 1994. The Workshop will focus on training policy-makers, managers, field biologists, and zoo staff working in Madagascar. It will bring key people together and highlight the importance of identifying priorities and developing strategies for wildlife management on a continuing basis.

The PHVA is one of many programs developed by the IUCN/SSC

Captive Breeding Specialist Group (CBSG). It uses a computer simulation model to estimate the probability of species extinction under different scenarios in order to help managers understand the risks facing small populations and evaluate the likely effectiveness of different management strategies. PHVAs are held in the country of origin, and already have been conducted on some primates, including *Leontopithecus* in Brazil.

In the first part of the Madagascar Workshop, participants will be brought up-to-date on policies and practices being used throughout the world for *in-situ* and *ex-situ* wildlife management. In the second part, PHVAs will be held on four endangered taxa (lemur and reptile), including two primate species listed as highest/high priority in the Lemur Action Plan. The ring-tailed lemur *(Lemur catta)*, found in southern Madagascar, and the ruffed lemur *(Varecia variegata)*, found in the eastern rain forests, both live in habitats which are disappearing rapidly. These species have been well studied, and have large captive populations. PHVAs should focus attention on two highly vulnerable regions of Madagascar, help guide *in-situ* conservation projects currently being planned in these regions, and promote links between field efforts and captive breeding programs.

The Workshop will be organized by the Madagascar Fauna Group, CBSG and Conservation International in conjunction with the Parc Botanique et Zoologique de Tsimbazaza, and the Malagasy Direction des Eaux et Forêts.

Hilary Simons Morland
Madagascar Fauna Group

## 16th Meeting of the American Society of Primatologists (August, 1993)

The 16th meeting of the American Society of Primatologists will be held at the New England Regional Primate Research Center in Sturbridge, MA USA, from August 18-22, 1993. For further information and application materials contact: Andrew J. Petto, New England Regional Primate Research Center, Division of Behavioral Ecology, PO Box 9102, Southborough, MA, USA 01772-9102.

## XXIII International Ethological Conference (September, 1993)

The XXIII International Ethological Conference will be held in Torremolinos, Spain, from September 1-9, 1993. For further information and application materials contact: Secretaria de Congresos Cordoba, C/Cano 3. 1-1, 14001 Cordoba, Spain, or Ana Omedes, General Secretary, Apartado 98033, Barcelona 08080, Spain.

## IUCN/SSC PSG Lemur Action Plan

The IUCN/SSC Primate Specialist Group (PSG) recently published *Lemurs of Madagascar: An Action Plan for their Conservation (1993-1999)*, compiled by Russell A. Mittermeier, William R. Konstant, Martin E. Nicoll and Olivier Langrand (Figure 2). The PSG is made up of close to 200 primate specialists worldwide and is one of nearly 100 Specialist Groups in the World Conservation Union's Species Survival Commission, an international volunteer network of close to 4,800 scientists, field researchers, governmental officers and conservation leaders in 169 countries.

This document targets 30 lemur taxa for conservation action over the next seven years and recommends just over $7 million in projects using these beautiful and unique species as "flagships" for biological inventories, protected area management, and public awareness campaigns, all to increase general interest in conservation within Madagascar and to focus greater international attention on the importance of this country in global efforts to conserve biological diversity.

The list of highest priority taxa includes the aye-aye *(Daubentonia madagascariensis)*, hairy-eared dwarf lemur *(Allocebus trichotis)*, indri *(Indri indri)*, golden bamboo lemur *(Hapalemur aureus)*, greater bamboo lemur *(Hapalemur simus)*, Lac Alaotra gentle lemur *(Hapalemur griseus alaotrensis)*, red ruffed lemur *(Varecia variegata rubra)*, Sclater's lemur *(Eulemur macaco flavifrons)*, silky sifaka *(Propithecus diadema candidus)*, Perrier's sifaka *(Propithecus diadema perrieri)*, Tattersall's sifaka (*Propithecus tattersall;* see Figure 1 and article, page 6) and crowned sifaka *(Propithecus verreauxi coronatus)*.

Anyone wishing to receive a copy of *Lemurs of Madagascar: An Action Plan for their Conservation (1993-1999)* should send a check for $10.00 (made payable to Conservation International) to the Conservation International address printed on the back of this newsletter. The order should be addressed to the attention of Russell Mittermeier.

Bill Konstant
Conservation International

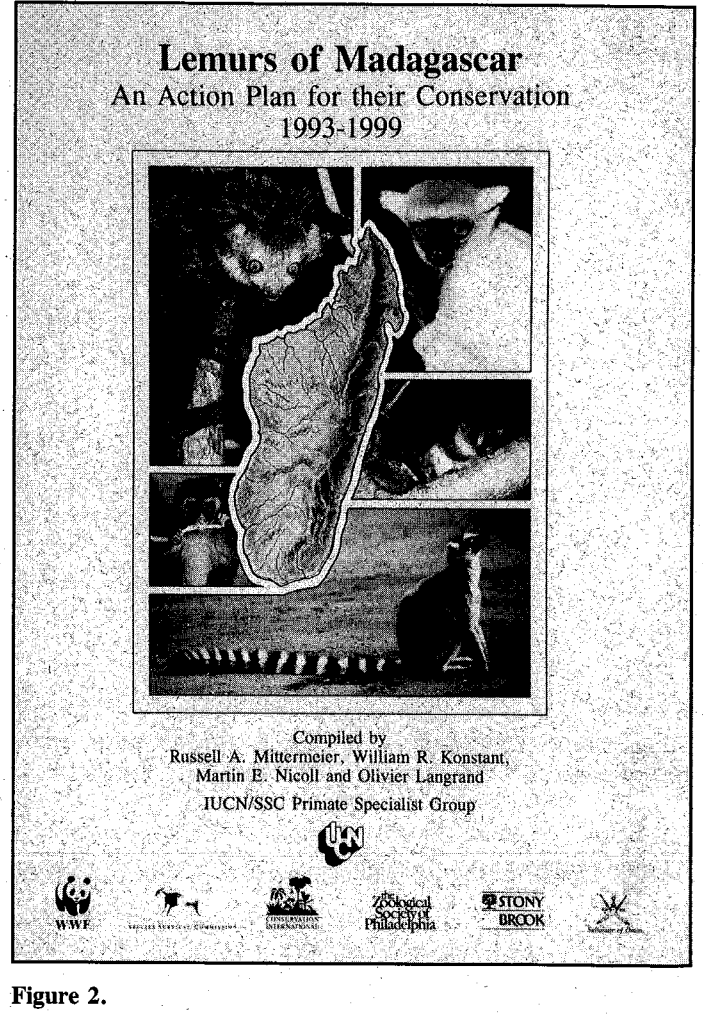


**Figure 2.**

## News From the Parc Botanique Et Zoologique De Tsimbazaza

The Parc Botanique et Zoologique de Tsimbazaza has a new Director. Mr. Albert Randrianjafy, a former chemistry professor at the Université d'Antananarivo, replaced Dr. Voara Randrianasolo as Tsimbazaza Director in May 1992. The primary goals for Tsimbazaza at pres-

ent include increasing its financial autonomy and visibility in the conservation community in Antananarivo, developing strategies to improve and expand its animal collection, and working with WWF to continue their joint conservation education program. The Tsimbazaza staff have been working on these goals with financial and technical assistance from the Madagascar Fauna Group (MFG) and Missouri Botanical Garden (MBG).

In June-August 1992, the MFG worked with Tsimbazaza management and staff to institute a system for charging admission fees for the first time. A ticket office was set up, simple guides were printed, and large maps were posted at key locations. New staff uniforms were provided jointly by the MFG and MBG. Additionally, the MFG and Tsimbazaza provided funds to locally design and produce two new gift items for sale to visitors, t-shirts with a sifaka design and the new Tsimbazaza logo, and note-cards showing scenes of Tsimbazaza. These items were put on sale in the ticket office along with the "Lemurs of Madagascar" poster produced by Wildlife Preservation Trust International and a French-language "conservation comic book" produced by Patryck Voucoulon.

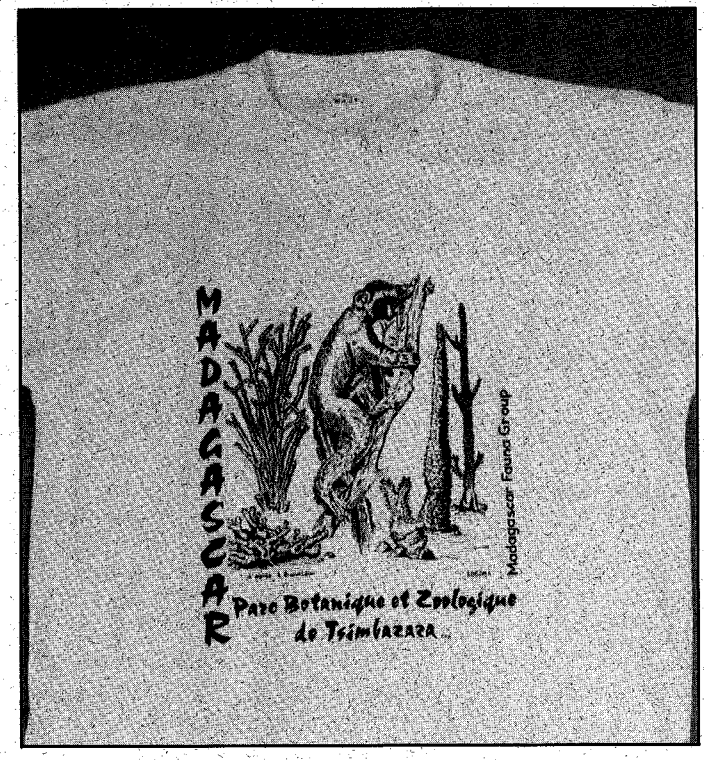


**Figure 3. Sale of PBZT t-shirts and other items has already generated over 7 million FMG in support of the Tsimbazaza Zoo.**

Tsimbazaza opened its ticket-office in October 1992, and sold about one million Malagasy Francs of tickets in just 2 weeks! Gift item sales also have been very successful, bringing in about seven million Malagasy Francs to date. These funds will be used to supplement Tsimbazaza government budget for improvements, basic operating costs and to maintain a constant stock of gift items.

Readers of *Lemur News* are encouraged to visit Parc Tsimbazaza and to purchase a t-shirt, note-card, poster, or comic book when next in Antananarivo.

Hilary Simons Morland
Madagascar Fauna Group

Albert Randrianjafy
Parc Zoologique et Botanique
Tsimbazaza

# Primate Talk: A Discussion Forum for Primatology

The Wisconsin Regional Primate Research Center (WRPRC) at the University of Wisconsin, Madison, USA, hosts PRIMATE TALK, an electronic mail listserver. PRIMATE TALK is an open forum for the discussion of primatology and related subjects. This forum is open to electronic mail users worldwide with an interest in nonhuman primates. Currently there are over 300 members from 15 countries. Subject matter may include, but is not limited to news items, meeting announcements, research issues, information requests, veterinary/husbandry topics, job notices, animal exchange information, book reviews.

People with Internet, BITNET or UUCP addresses can communicate with PRIMATE TALK. Users of other networks should contact the WRPRC. If you are interested in joining PRIMATE TALK, send a message to PRIMATE-TALK-REQUEST@PRIMATE.WISC.EDU stating that you would like to sign on. Messages to the list are sent to PRIMATE-TALK@PRIMATE.WISC.EDU. If you have questions about electronic access to the list, you may call Larry Jacobsen, Head of Library Services at the WRPRC Library, (608) 263-3512, or fax him at (608) 263-4031. You may also write to the WRPRC Library, 1220 Capitol Court, Madison, WI 53715-1299, USA.

# International Directory of Primatology

The Wisconsin Regional Primate Research Center, University of Wisconsin, Madison, publishes the *International Directory of Primatology*. The purpose of the directory is to enhance communications among the many organizations and individuals involved in primate research, conservation and education. It can be used by primatologists as a desk-top working tool or by educators, librarians, students and the general public as a guide to primate programs and information resources.

The directory is divided into five organizational sections and four indices. The organizational sections cover 1) geographically arranged entries for major primate centers, laboratories, educational programs, foundations, conservation organizations and sanctuaries; 2) current field sites with program and contact information; 3) members of groups involved with nonhuman primate population management; 4) professional primate societies; and 5) major information sources in the field. Access to this information is supported by organizational, species, subject and name indexes.

Copies of the 1992 *International Directory of Primatology* (225 pp., spiral bound) are available in the USA for $10 (includes surface postage and handling). To offset mailing costs, the price to other countries is $18 (U.S.). Make checks payable to Wisconsin Regional Primate Research Center. Electronic mail and phone orders are welcome. Send orders to: Larry Jacobsen, IDP Coordinator, Wisconsin Regional Primate Research Center Library, 1220 Capitol Court, Madison, WI 53715-1299, or call for information (fax, phone and E-mail numbers above).

# Madagascar Environmental Program Newsletter

The Madagascar Environment Program Newsletter now in its eighth issue, is published quarterly by the Multi-Donor Secretariat, and was first released in January, 1991. The Multi-Donor Secretariat is hosted by the World Bank in Washington, DC, and is supported by the US Agency for International Development and the World Bank. Articles for the newsletter on subjects related to environmental planning, management and protection as well as on natural resource management issues as they relate to Africa in general are welcome. The newsletter in the future will expand its scope from just Madagascar to provide information on a broad range of African countries engaged in environmental planning and management exercises. For subscriptions or further information,

all correspondence should be addressed to: Albert Michael Greve, Coordinator, Multi-Donor Secretariat, The World Bank, 1818 H Street NW, Washington, DC 20433, phone: (202) 473-4428, fax: (202) 473-5147.

# CURRENT EVENTS

## Drought of the Century

The major news of the south of Madagascar is that we have been having the drought of the century. This has been perhaps the worst drought since 1930-31 when drought followed the extermination of the traditional strain of prickly pear by cochineal insects, which wiped out the traditional famine food. That early famine killed hundreds of people, and caused social disruption as Antandroy migrated from the south to seek work in the sugar cane plantations of Nosy Be. The 1991-1992 famine is leading to social disruption as men migrate in search of work leaving women and children to live on food relief.

The good news is that the relief effort is actually at the scale of the need. The World Food Program (*Programme Alimentaire Mondiale*) is now feeding approximately one million people with a few measures of grain per week. Their logistics have sent trucks labeled PAM across the south bringing food to remote villages. Even so, the towns are swollen with refugees too destitute even to supplement the PAM supplies or who have sold their cooking pots. They are fed by UNICEF International, Catholic and Lutheran missions, International NGOs (non-governmental organizations) and most importantly by SOS South, a Malagasy NGO. In Amboasary, for instance, the Catholic Sisters served 5,000 people a day in October, and SOS another 2,000. The most malnourished children are cared for by UNICEF and by the French NGOs (*Action Internationale Contre la Faim, Medecins sans Frontieres* and *Medecins du Monde*). It is encouraging to know that to a large extent in southern Madagascar the effort is working, and there is no general chaos.

The longer term question is, "What next?" A "High Commission for the South" has been formed, under General Soja, who previously organized the National Referendum on the Constitution, and who grew up in Esira in the Mandrare Valley. General Soja is working with the U.N. Food and Agriculture Organization (FAO) as lead agency. One proposal is the "PAZ" -*Programme Ankisy sy Zavaboahary*, or Children and the Environment. This proposal would use village schools as relief centers while villages re-establish themselves during this wet season, create school gardens and install a new curriculum including health, nutrition, and environment.

What of the lemurs during the drought? At Berenty they seem to be faring remarkably well, with a normal number of infants and one-year-olds. (This has little or nothing to do with bananas. Banana feeding almost stopped when tourism almost stopped in 1991, and is now kept at very low levels.) It raises a real question about why natural forest seems, so far, to be better buffered against the drought than human beings and human agricultural crops. Perhaps we have something to learn?

Alison Jolly
Department of Ecology and
Evolutionary Biology
Princeton University

## Flash — Update on the Drought

Rain has finally fallen in southern Madagascar, including two cyclones, and it appears that harvests will take place in late March. PAM will also cease its food distribution program at the end of March.

Sheila O'Connor
Worldwide Fund for Nature
— Antananarivo

## La Démocratie En Marche à Madagascar

Le Gouvernement de transition à Madagascar vient de mener à bien deux parties de la mission dont il a été investi à la suite des événements de 1991: mettre en place la Illè République. Un référendum pour choisir une nouvelle constitution a été tenu le 19 Août 1992. Le projet de constitution a été adopté par 76% de "oui" contre 24% de "non" et environ 25% d'abstention. Le 25 Novembre 1992, les électeurs sont revenus aux urnes pour choisir le nouveau Président de la République parmi 8 candidats, mais aucun n'a atteint la majorité absolue nécessaire pour être élu au premier tour. Les deux candidats ayant obtenu les meilleurs résultats, M. Albert ZAFY, actuel Président de la Haute Autorité de l'Etat (45.95%) et M. Didier RATSIRAKA, actuel Président de la République seront à nouveau en compétition vers mi-janvier 1993 pour un second tour. Le Président de la République nouvellement élu prendra ses fonctions avant l'étape suivante constituée par les élections législatives vers avril 1993. Pour franchir la dernière étape, la nouvelle Assemblée Nationale investira un nouveau Premier Ministre qui formera son Gouvernement. Ce sera l'étape ultime de la transition vers la Illè République et la fin de la mission et du mandat de l'actuel Premier Ministre M. Guy Willy RAZANAMASY qui n'a pas été candidat aux élections présidentielles.

Jocelyn Rafidinarivo
Embassy of Madagascar,
Washington, DC

## Albert Zafy Proclaimed New President of the Republic of Madagascar

Since submission of the previous article by Jocelyn Rafidinarivo, a new President, Mr. Albert Zafy has been proclaimed by the High Constitutional Court in Madagascar. A letter received by Conservation International from Ambassador Pierrot J. Rajaonarivelo, communicates the official results of the Presidential Elections held on February 10, 1993 and officially proclaimed on March 9, 1993 by the High Constitutional Court in Antananarivo, as follows:

| | |
|---|---|
| Registered voters | 6,282,564 |
| Actual voters | 4,302,663 |
| Blank and void ballots | 157,319 |
| Valid ballots | 4,145,344 |
| Votes for Mr. Albert Zafy | 2,766,704 (66.74%) |
| Votes for Mr. Didier Ratsiraka | 1,378,640 (33.26%) |

In addition, legislative elections are scheduled for June 5, 1993, and the Parliament will elect a new Prime Minister thereafter. A congratulatory message from former President Ratsiraka served as the first official communication to President Albert Zafy upon the occasion of his proclamation.

## Les Indris Donnent L'Alarme

Lors de la visite des membres du Conseil d'Administration de l'ANGAP le 21 Décembre 1992 à Andasibe, une personne mal intentionnée dont l'identité n'a pas été connue a voulu mettre le feu le long de la route qui borde la Réserve des indris. Malheureusement pour lui, les indris (*Indri indri*) inquiétés par la fumée, ont fait un tapage énorme, ce qui a alerté les guides et les responsables de la Réserve qui, par la suite, ont réperé l'origine de ces cris et ont éteint le feu. Cette anecdote nous est citée simplement pour nous transmettre qu'il y a mille et une façon de collaboration entre les guides et les indris pour sauvegarder le site d'Andasibe.

Bienvenu F. Rajaonson
Conservation International-Madagascar

# LEMURS IN THE WILD

## Discovery of the Western Aye-Aye

During late November and early December 1991, I led an expedition to an area of low hills and mountains west of the village of Anjimangirana. This town is located on the main north-south road (National Route 6) about 45 km south of the port city of Antsohihy on the northwest coast of Madagascar (Figure 4). Anjimangirana is also located almost directly east of the southern tip of the bay of Narinda. The row of mountains to the west of Anjimangirana (which means "at the shining sand") is called Manasamody, and the best aye-aye habitat we surveyed lies on the eastern slope of this range of hills.

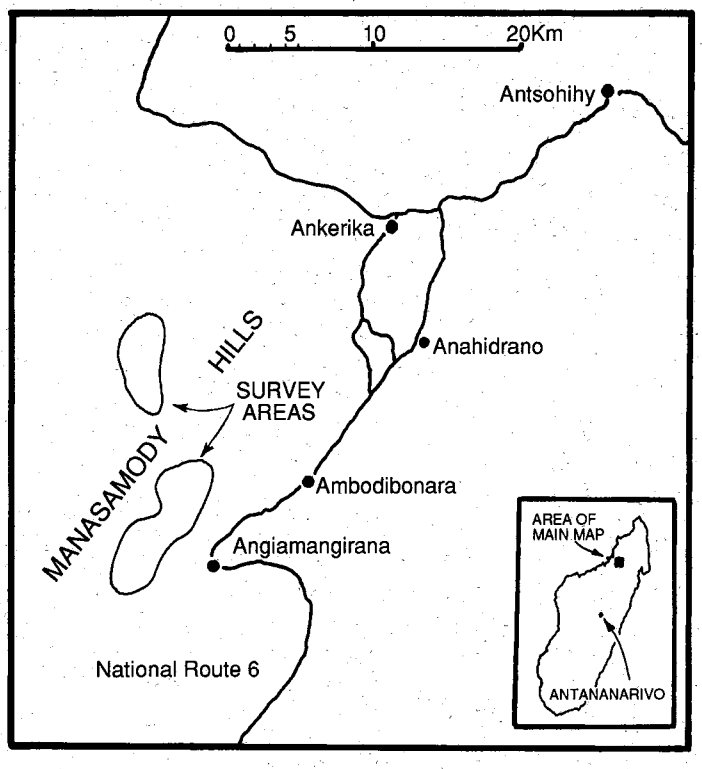


**Figure 4. Map showing the location of western aye-aye habitat in northern Madagascar (map by S.D. Nash based on author's original).**

The present distribution of *Daubentonia madagascarensis* is poorly known. Aye-aye have occasionally been said to occur in the northwest of the island in the vicinity of Amber Mountain, in the Ankarana range, or near it, and southward, but were not known to be locally abundant. In 1990, for instance, I saw an aye-aye tail set up on a pole by villagers on the side of National Route 6, about 8 km north of the bridge at Maromandia in an area where only dry scrub forests are to be seen. Such displays of tails or dead animals are thought to disperse the bad luck caused by an aye-aye's having entered a village.

No area with a demonstrated population of western aye-aye has previously been reported. Our discovery of such a population was made by Gilbert Rakotoarisoa (Curator of Mammals, Parc Tsimbazaza, Tananarive) and myself during our stay at Anjimangirana. It was part of the Duke University Primate Center's mission to add four aye-aye to our captive breeding colony, one pair from the eastern rainforest northwest of Mananara and two females from the west. We had gone to Anjimangirana because a year earlier a female aye-aye from somewhere near there had been donated to Parc Tsimbazaza.

During our expedition in the Manasamody hills we saw 52 aye-aye nests and captured eight animals. Six males — not wanted for our captive colony — were released after sex determination. Although these animals were living several hundred kilometers from the eastern rainforest aye-aye populations, they do not seem to differ in any external morphological or pelage characteristic. It seems probable that the species once ranged across the Sambirano region and down the west coast, past Majunga and on, perhaps as far as the Tsingy of Bemaraha. Clearly the species is now missing from most of this posited former range.

After quarantine at the Yemassee Primate Center in South Carolina our four new aye-aye arrived at Duke in January 1992 and were set up in pairs. Our other three aye-aye, all from the east, had arrived in December 1988 and the summer of 1989, but had not bred in captivity.

Before long, one female, Endora, who came from the newly discovered population west of Anjimangirana began to put on weight. At first, this was thought to be a normal consequence of being brought into captivity. However, on April 5, 1992, she gave birth. This was the first captive birth of an aye-aye on record outside of Madagascar and the surrounding islands. When discovered, the aye-aye infant weighed 136 grams. This infant, "Blue Devil" (see article, page 10) has grown steadily and now weighs about 1,200 grams. After a lengthy period when Blue Devil was quite inactive in the nest he began to explore his environment and gradually became very agile. He now spars with his mother, hangs on her tail and leaps considerable distances. Duke and the Jersey Wildlife Preservation Trust, Channel Islands have an agreement to exchange captive born aye-aye in order to outbreed both groups and set up more captive pairs. The two institutions currently hold 15 aye-aye and the birth of another is expected at Duke.

The newly discovered population of aye-aye in and around Manasamody desperately needs protection. Villagers kill aye-aye when they come near villages or approach people in day time. In this particular region, aye-aye are also sometimes eaten, as are Coquerel's sifaka. We learned of four or five that had been recently killed. Gilbert Rakotoarisoa and I were very kindly invited to stay at the home of the president of the local town council during our expedition. While there, we discussed the need for protecting this unusual population of aye-aye. The president and other elders were willing to do this, as they said there was little need to disturb remaining forests if the flat land around Anjimangirana could be better irrigated. Apparently rain waters tend to run off too rapidly for optimal rice culture. There is a need for low dams or barrages to retain water for later use. The elders agreed that, in exchange for such agricultural assistance, they would be willing to participate in a campaign to more carefully protect the region's aye-aye and other lemurs.

Elwyn Simons
Duke University Primate Center

## Conservation Status of the Golden-Crowned Sifaka, *Propithecus tattersalli*

The golden-crowned sifaka (Figure 1) was first seen by Ian Tattersall in 1974 in dry forest near Daraina in northeastern Madagascar (Tattersall, 1982). Fourteen years later, after animals were brought into captivity by the Duke University Primate Center, this sifaka was described as a new species, *Propithecus tattersalli* (Simons 1988).

From information gathered during the capture missions, Simons had suggested that the total population of this species might be as low as two hundred individuals. In this note, I present unpublished information concerning the distribution and abundance of *P. tattersalli.* This information was gathered during distributional surveys in September and October, 1989 and as part of my dissertation research conducted from November 1989 through March 1991 in the region of Daraina in northeastern Madagascar (Figure 5).

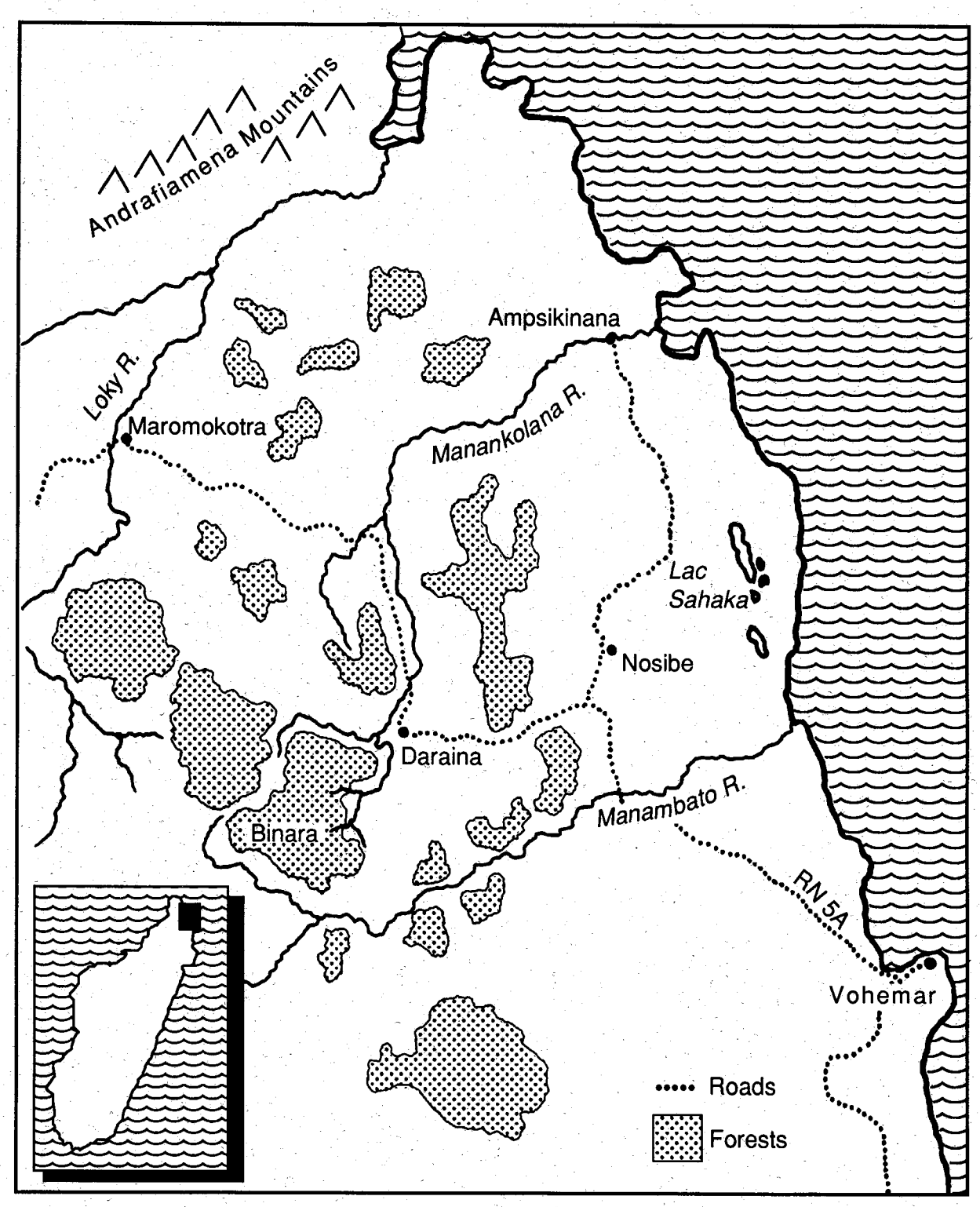


**Figure 5. Map showing the location of golden-crowned sifaka (*Propithecus tattersalli*) habitat in northern Madagascar. (map by S.D. Nash based on author's original)**

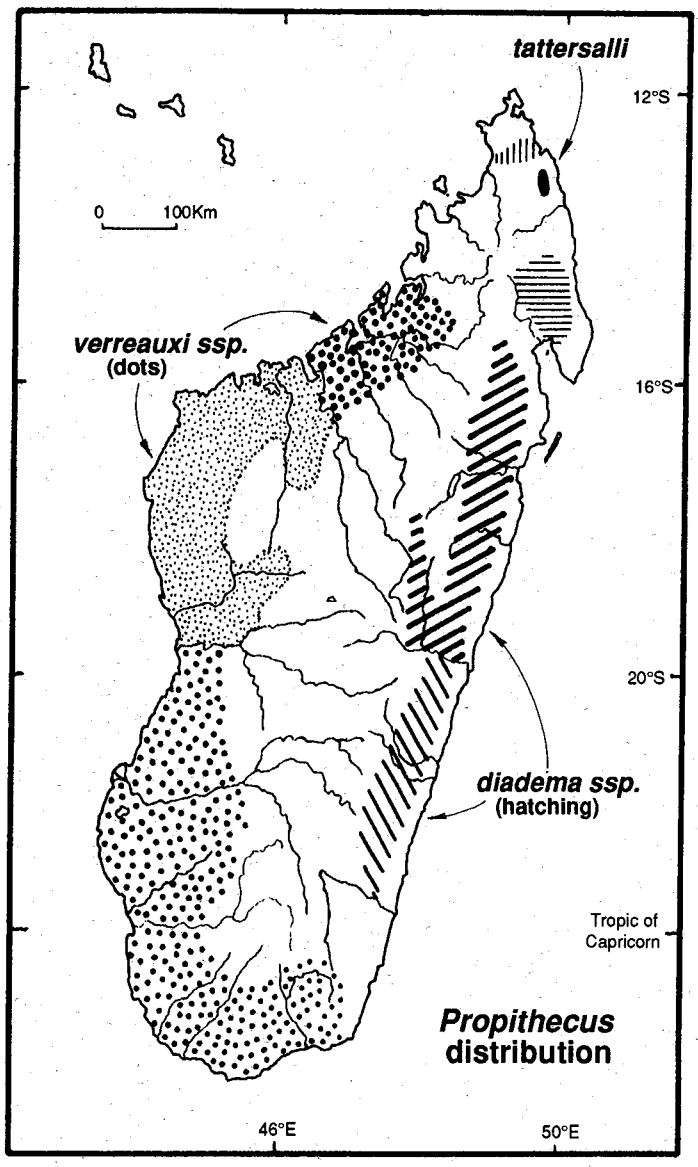


**Figure 6. Map of Madagascar showing the distribution of *Propithecus* species. (map by S.D. Nash)**

The golden-crowned sifaka occured in nearly all forest patches between the Loky and Manambato Rivers in northeastern Madagascar. Although it is certain that no populations are found north of the Loky River, where the black sifaka (*P. diadema perrieri*) occurs, very restricted populations may exist south of the Manambato River. The forest types where golden-crowned sifaka were found included forests which were more than 50% deciduous to 90% evergreen (Binara and Antsahabe). In the driest large forest patch in the region, Amboditsitondroina, this species was not seen and it was reported to be very rare.

From 12 months of intensive study of groups of *P. tattersalli* in three forest study sites, the following basic information was determined. Average group size, including dependent offspring, was between five and six individuals. Home ranges were found to vary seasonally from 6 to 12 ha., and were not related to group size. From group-specific density estimates of two groups in each forest study site, which took into consideration home range overlap by dividing the area of overlap by the number of groups that share it, the population density of *P. tattersalli* was found to vary from 60 to 70 individuals per km$^2$. These estimates were remarkably similar in all three forests.

Most forests in the region are isolated patches and are under slight pressure from either logging or agriculture. The largest connected series of forested patches is the Binara-Antsahabe mountains together with Amboditsitondroina. I have estimated that of the 16,800 ha of forest, only about 10,000 ha would be suitable habitat for this species. Therefore, we would estimate that about 6,000 golden-crowned sifakas live in these forests. At Bobaukora, where the density was close to 70 individuals per km$^2$, about 2,500 ha of connected forest exists. This population is estimated to be about 1750. The second largest forest in the region is about 4,000 ha and has a population of about 2400 golden-crowned sifaka. Other smaller patches contain anywhere from 100 animals to over one thousand. A estimate of the total known population would be 8,000 to 10,000 individuals.

It is extremely important to note that these estimates are total population numbers and not the effective population size, which I estimate to be much less than half the total population size for any given year. Infant mortality is high and a microfilarial parasite occurs in about 60% of all individuals in the three populations studied to date (Garell and Meyers, in prep.). Although this blood parasite has not been shown to adversely affect healthy individuals, it may be a problem in the future. While these numbers are relatively high, it must be noted that the last remaining habitat for this species is small, highly fragmented and extremely vulnerable to anthropogenic disturbance given its non-protected status. Hence, regardless of numbers, the conservation status of *P. tattersalli* should be considered "highest priority" as is indicated in *Lemurs of Madagascar: An Action Plan For their Conservation.*

The main conservation concerns of the golden-crowned sifaka include 1) the lack of protected areas, 2) the genetic isolation of populations, 3) loss and degradation of habitat, and 4) the presence of gold in the area that is apparently already attracting small and large scale mining interests. Fortunately, the regional beliefs include a *fady* (taboo) against killing sifaka. Hunting is not a problem at present but were this to change, the species could go extinct in less than a decade since they are easy to find and not generally wary of humans. A classification plan was submitted to the Water and Forest Service (SPEF) at Antsiranana and the Department of Water and Forests by the author in 1990. The plan included the classification of Binara-Antsahabe, as well as Bobankora, as Special Reserves. Other areas would be classified as Classified Forests with certain restrictions concerning damage to the canopy. The plan was initially accepted and action had begun prior to the strikes and political unrest during 1991. Unfortunately, the plan to enhance the protected status of *P. tattersalli* has recently been rejected. Plans are underway to continue conservation activities in the region, and inquiries should be sent to Roderic Mast at Conservation International in Washington, or D. Meyers at Duke University.

David M. Meyers
Duke University

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# News From Ranomafana National Park

This year nocturnal lemurs are a priority. Researchers at this integrated conservation and sustained development project have observed some interesting predatory behavior in the park. Louise Martin has observed a boa (*Sanzinia madagascariensis*) preying upon *Cheirogaleus major* and Liz Balko has observed a hawk (*Polyboroides radiata*) eating a male

*Avahi laniger. Daubentonia madagascariensis* has been sighted several times in the vicinity of the research cabin.

The Ranomafana National Park Museum & Conservation Education center was formally inaugurated on December 19, 1992. The event was attended by the USAID Director, the Minister of the Department of Water and Forests, the US Ambassador to Madagascar and other notables.

To increase awareness of rainforest ecology and the importance of integrated conservation and sustained development projects, the Ranomafana National Park Project issued its first calendar. The full-color photographs were taken by wildlife photographer David Haring (see photos, this issue) and depict the people and unique wildlife in and around the park. The calendar is available from the Institute for the Conservation of Tropical Environments (ICTE), SUNY at Stony Brook, SBS Bldg., 5th Floor, Stony Brook, NY 11794-4364. A $6.00 donation is requested. Six of the calendar photographs are also available as postcards from ICTE, and a $6.00 donation is requested for a packet of six postcards.

Pat Wright
ICTE
SUNY at Stony Brook

# LEMURS IN CAPTIVITY

## A New Studbook for the Aye-Aye

The aye-aye is arguably the most important primate to be taken into captivity in recent years. Its conservation importance, taxonomic importance, aberration in many aspects of its biology, lack of knowledge of its ecology, and the fact that until recently it had not been bred in captivity all make this species both high priority and high profile.

For this reason, we considered that the establishment of a studbook for the species should go hand in hand with current efforts to establish a self-sustaining captive population. In this way, we can monitor the growth of the captive population from the outset. The Jersey Wildlife Preservation Trust (JWPT) recently successfully petitioned the International Union of Directors of Zoological Gardens (IUDZG) and CBSG for the studbook. The studbook will provide a database that will allow prospective pairings to be made which will take the genetics of the population into account. The priority for the captive breeding programme must be rapid expansion of the population (if aye-aye reproductive rates allow), maximizing the genetic contribution of all the wild-caught founders. The studbook database will be used for genetic and demographic assessment of the population in the future. It is also planned for the studbook to include a section of papers pertaining to husbandry, reproduction, conservation and research both in the wild and in captivity. For more information contact: J.B. Carroll, Curator of Mammals, Jersey Wildlife Preservation Trust, Les Augrés Manor, Trinity, Jersey, Channel Islands, UK, phone: (44) 534-864-666, fax: (44) 534-856161.

## The North American Captive Breeding Program for Lemurs

The IUCN's *Lemurs of Madagascar: An Action Plan for their Conservation* recommends an eight-pronged approach to the conservation of the Malagasy lemurs. Among the projects being recommended are species distribution and census surveys, behavioral, ecological, and genetic research, expansion of the protected reserve system, and captive breeding programs. Today, it is well recognized that captive breeding programs play an important role in the global effort to preserve biodiversity through public education, research, and the maintenance of a reserve population for restocking the wild. The following is a brief description of the North American program.

Over the past decade, North American zoos, under the auspices of the American Association of Zoological Parks and Aquariums (AAZPA), have worked together to develop scientifically-based cooperative breeding programs called Species Survival Plans (SSPs). The SSP is a breeding program which manages the many small populations of an endangered species scattered throughout North American zoos as one population based on genetic, demographic and sociobiological considerations. Because the number of animal species that can benefit from a captive breeding program exceeds the actual captive space available, SSP programs are planned to preserve genetic fitness at the minimum population size possible in order to optimize space utilization.

Data required for the genetic and demographic analysis of the SSP population is contained within a studbook, which is a genealogical record of that species in captivity. Following the computerized analysis of the population, the SSP issues recommendations concerning the transfer of individuals among institutions to form genetically appropriate pairs, as well as recommendations pertaining to which pairs should breed in a given year. Importance is also placed on the sociobiological needs of the species, and thus recommendations are made that promote the formation of a social environment that facilitates learning and the expression of species-typical behavior.

Recently, the zoo community has gone a step further with the development of Taxon Advisory Groups (TAG). The charge of the TAG is to develop regional collection plans that set species priorities, make recommendations for additional studbooks and SSPs, collate, interpret, and disseminate husbandry information, and interface with other conservation/scientific bodies to share information and resources in order to accomplish conservation goals. The Prosimian Advisory Group was formed two years ago.

Currently there are 16 species of lemurs held in North American collections. Two of those species, *Varecia variegata (variegata* and *rubra)*, and *Eulemur macaco (macaco* and *flavirons)* are managed through SSPs. Regional studbooks have been initiated for *E. fulvus* (five subspecies in North America: *fulvus, rufus, albifrons, collaris, sanfordi*), *Lemur catta, Propithecus verreauxi (verreauxi* and *coquereli), Propithecus tattersalli, Microcebus murinus, Mirza coquereli,* and *Cheirogaleus medius.* Population data for the remaining species are maintained in informal studbooks (several of these species have international studbooks). Due to the complexity of the populations, ring-tailed lemur and brown lemur studbooks will take another one to two years to complete. However, the genetic and demographic profile of most of the other populations are understood to the point that sensible breeding/management recommendations can be made. The current challenge is to get a good handle on the available lemur space and subsequently provide direction regarding the appropriation of that space for the high priority species.

It is clear that many of the lemur species, whose captive populations are dispersed over several countries, should be managed at a global level. With the foundation of a solid database, the Prosimian TAG can now work towards that end with its regional counterparts, the Madagascar Fauna Group, CBSG, and other conservation organizations.

Ingrid Porton, Chair
AAZPA Prosimian Advisory Group

# First Captive-bred Aye-Aye Born in America

The first U.S. captive bred aye-aye (*Daubentonia madagascariensis*) was born at the Duke University Primate Center on October 23, 1992 (Figure 7). It is a male, named Goblin, weighing a healthy 108 grams. Gestation was 170 days. This birth increases the number of aye-aye at the Duke Primate Center to nine, the world's largest captive population. There are six at the Jersey Wildlife Preservation Trust in the United Kingdom, two at Ivoloina Zoo, one at Park Tsimbazaza, and two at the Vincennes Zoo in Paris.

Goblin is the second aye-aye born at the Duke University Primate Center. A male named Blue Devil, born on April 5, 1992, was the first aye-aye born in captivity. Blue Devil, however, was conceived in the wild. Blue Devil now weighs more than 1,200 grams and is almost half

**Figure 7a and b. Goblin, the first American captive-bred aye-aye (*Daubentonia madagascariensis*) was born on October 23, 1992 at the Duke Primate Center. Above, Goblin on the day of his birth. Below, Goblin aged between 4 and 5 months. (photos by David Haring)**

grown. The first aye-aye conceived in captivity was born in early September, 1992, at the Jersey Wildlife Preservation Trust.

These births represent an exciting opportunity to understand more about this rare and endangered primate. Daily observations at the Duke Primate Center have provided considerable information. Several days before giving birth, the mothers built nests and then delivered their babies in the nests. Blue Devil spent most of his first month in the nest and was not well coordinated when he did leave the nest. Both infants produced a characteristic "eep" vocalization when they became anxious. Their mothers usually responded to this vocalization by picking the infants up and carrying them in their mouths. The infant was positioned just in back of the mother's large incisors. Both infants gave an open-mouthed lunge at any large object that was not their mother appearing at the nest opening.

Dr. Carl Erickson (Duke University Psychology Department) and his students are studying the behavioral development of the Duke Primate Center's aye-aye. Dr. Erickson is particularly interested in determining how the aye-aye use their sonar ability and elongated third finger to locate hidden insect larvae. His observations suggest that these prosimians use echolocation or a cutaneous sense to detect cavities.

Kenneth E. Glander
Duke University Primate Center

# *Propithecus* Studbook in Preparation

The Duke University Primate Center (DUPC) has recently been granted approval by IUCN/SSC and IUDZG to establish an international studbook for captive *Propithecus* (sifakas). Sifakas are diurnal, leaf-eating indriids of which there are three species: *Propithecus verreauxi* (with four subspecies) found in the dry forests of the west and south of Madagascar, *Propithecus diadema* (also with four subspecies) from the much wetter forests of the east, and *Propithecus tattersalli* which oc-

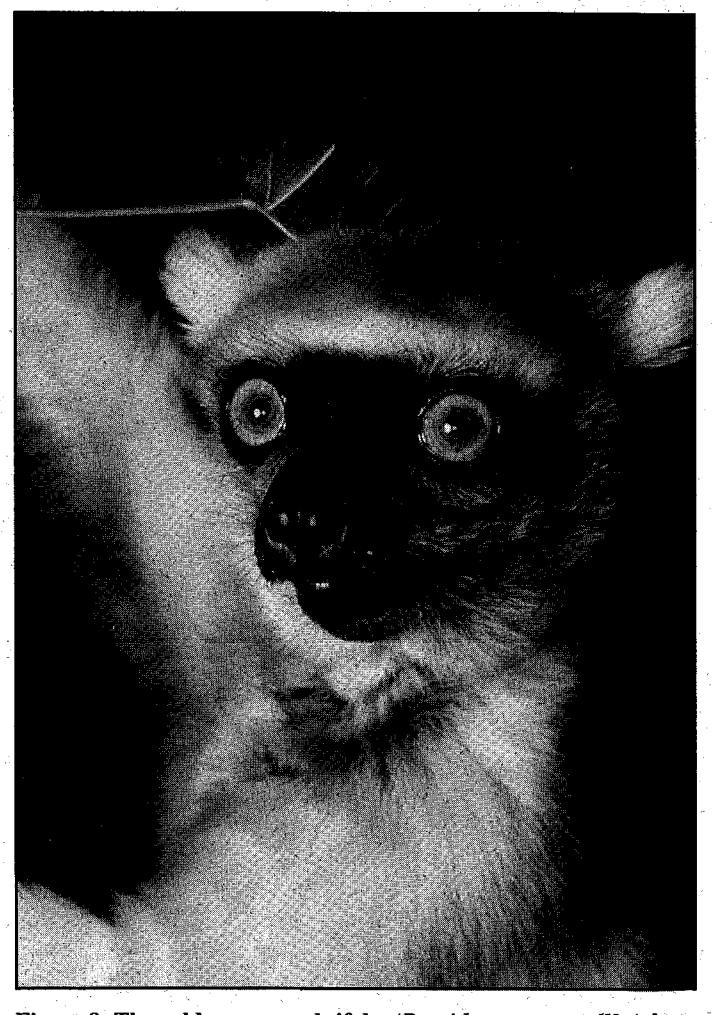


**Figure 8. The golden-crowned sifaka (*Propithecus tattersalli*) (photo by David Haring)**

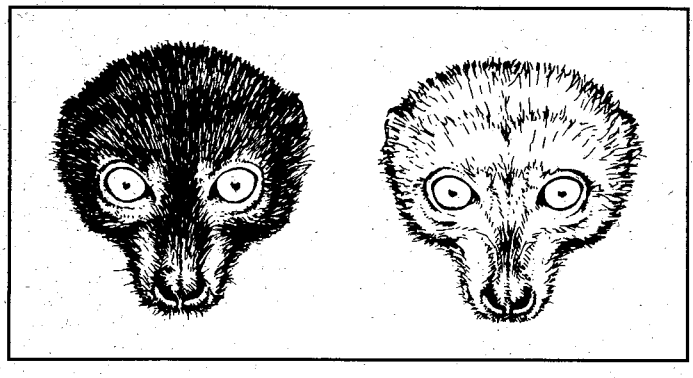
curs only in a tiny, fragmented range in the north (see article, page 6).

The function of a studbook is to collect and record biographical information on each captive individual of a given species in order to effectively monitor and manage captive populations. However, only four institutions worldwide house sifakas (total captive population = 22 animals of five different taxa), as this is a genus that has proven difficult to maintain in captivity due to its specialized dietary needs. Currently, the DUPC maintains *P. tattersalli* and *P. v. coquereli,* and plans to acquire two pairs of *P. diadema diadema* (a species never successfully maintained in captivity) in the summer of 1993. Other institutions housing sifakas include the Vincennes Zoo in Paris which maintains a lone female *P. v. coronatus,* the Los Angeles Zoo with three *P. v. verreauxi* (including a juvenile born there last spring), and Parc Tsimbazaza in Madagascar which holds one *P. v. verreauxi* and one *P. v. coquereli.*

The fragile status of sifaka populations in the wild, and the urgent need to establish healthy captive breeding colonies, was underscored in the *Lemurs of Madagascar: An Action Plan for their Conservation* published recently by the IUCN/SSC Primate Specialist Group. This report assigned a highest priority rating for conservation action to *P. tattersalli* and *P. v. coronatus,* and a priority rating for *P. d. diadema* and *P. v. coquereli.* Unfortunately the DUPC's colony of 15 (7.8) *P. v. coquereli* (over 50% of which are captive born) is the only viable breeding colony of sifakas in the world.

David Haring
Duke University Primate Center

# CURRENT RESEARCH



## Mitochondrial DNA Sequence Variation Among *Eulemur* Species

It appears that various taxa in the genus *Eulemur* represent different stages in the speciation process. In the current taxonomy, the genus *Eulemur* is divided into five species: *coronatus, rubriventer, mongoz, catta, macaco* and *fulvus.* The most widely distributed species, *Eulemur fulvus,* has seven subspecies: *fulvus, rufus, sanfordi, mayottensis, albifrons, collaris* and *albocollaris.*

The subspecies of *E. fulvus* occur in allopatric ranges that form a ring around the island of Madagascar. The other *Eulemur* species have limited ranges that do not overlap with one another. However, in total, their distributions coincide with the wide ranging *E. fulvus,* with each species' range overlapping that of one of the *E. fulvus* subspecies. So, within the limited geographic area of Madagascar, in a single genus, we have two different evolutionary scenarios: *E. fulvus* has remained a single widespread species, while the other taxa in the genus have undergone speciation and occupy discrete, limited ranges that overlap those of the *E. fulvus* subspecies. These two very different outcomes of *Eulemur* evolutionary history and their geographical structure present a rare opportunity to assess the applicability of current speciation models to primate cladogenic evolution.

I am in the process of quantifying mitochondrial DNA sequence variation 1) within populations; 2) among conspecific populations; and 3) among the species in the genus *Eulemur.* Cladistic analysis of these data should allow characterization of the evolutionary relationships among these taxa. Once the phylogenetic relationships are confirmed, I want to examine the levels of differentiation that have occurred both before speciation and after.

In addition to the primary evolutionary questions addressed above, this research may have important conservation implications. The determination of a taxonomy which properly summarizes the evolutionary genetic relationships of the populations and species involved has proven to be critical for proper decisions in endangered species management.

Robin Absher
American Museum of Natural History

# REVIEWS

## Madagascar: A Natural History, By Ken Preston-Mafham

A first glance through Preston-Mafham's book, *Madagascar: A Natural History* (Figure 10), is enough to stir the interest of any natural historian, inquisitive child or professional biologist. The wealth of photographs

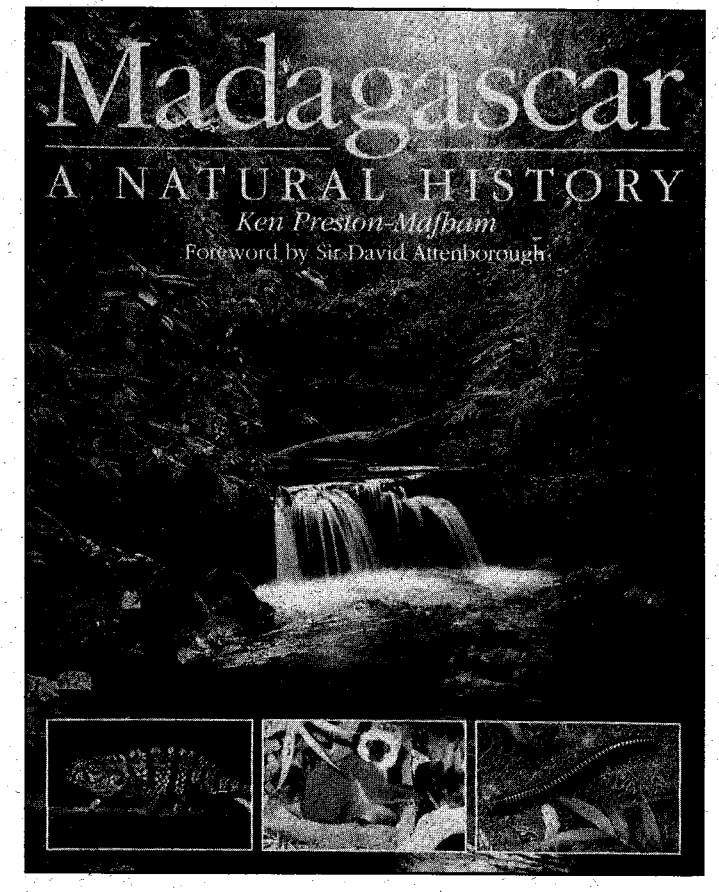



**Figure 10.**

admirably reflects the continuous stream of biological curiosities that can be found along the forest path in Madagascar. Many photos are exceptional (including numerous lemurs). As a photographic sight-seeing tour of Madagascar's biological diversuty, the book is highly recommended.

The book is divided into eight chapters, the first concerning the physical background and the final chapter covering protected areas. The chapter on the flora covers succulent plants in noteworthy detail including separate sections on Apocynaceae, Didiereaceae, Euphorbiaceae, and Liliaceae. The next chapter on invertebrates exemplifies the diversity of Madagascar's beautiful and often cryptic spiders and insects. The chapter on reptiles is equally excellent, and although some species are naturally quite photogenic (the green boa, and *Uroplatus fimbriatus*), others are difficult to capture on film and here Preston-Mafham has done a great job.

As the book continues and moves into more familiar territory (to me), I began to note various deficiencies, however. The chapter on birds lacked the eye-grabbing photos of the earlier chapters. Also, I found it very curious that not a word was mentioned concerning Langrand's field guide (1990, Yale University Press) in the text or in the bibliography.

The chapter entitled "Mammals other than Lemurs" follows the chapter on birds and is notably and unfortunately short. The chapter on the lemurs was long, as would be expected, and contained what I would call "cute natural history stories" interspersed with real science. Predictably, the most colorful descriptions and photos came from the ring-tailed lemur. Additionally, the author seemed to have had much success on Nosy Mangabe, and the book includes excellent photos and stories of the black-and-white ruffed lemur and the white-fronted lemur (*Eulemur fulvus albifrons*). Other noteworthy photos include one of *Microcebus rufus,* and a series on Verreaux's sifaka (*Propithecus verreauxi verreauxi*). Notably missing is a photo of the golden-crowned sifaka (*P. tattersalli*), the most recently described species of lemur.

Some of the information on lemur natural history was slightly dated and, although it likely came from Petter *et al.* (1977) and Tattersall (1982), neither reference was mentioned in the bibliography. On the other hand, some information was very recent and again the author did not credit the researchers responsible. I suspect that in a book such as this it was inappropriate to detail credit for research even though one person may have provided all the basic information for a specific species (such as D.J. Overdorff for *Eulemur rubriventer*). I feel the book would have been greatly improved by including some recognition of recent field work. Furthermore, perhaps two pages of bibliography (instead of one-third of a page) would have been more appropriate and might have added some reference value to the book. The author was very inconsistent in where he gave credit. For example, he accurately cited Ian Tattersall for the synonymy of *P. diadema holomelas* with *P.d. edwardsi,* but failed to mention Patricia Wright's name when discussing her work; "the only subspecies (of *P. diadema*) that has been studied at any length is *P.d. edwardsi* . . . the subject of a long-running research project *by teams from Duke University* . . . " (p. 184, my italics). The project had been conducted since its inception in 1986 under Dr. Wright.

The inconsistencies mentioned above, considered together with the loose mixing of casual observation and results from vigorous scientific studies, forces me to conclude with a word of caution. Ken Preston-Mafham's book *Madagascar: A Natural History* although stimulating and beautiful in many ways described above, has its limitations. I suggest the reader take the natural history stories with a grain of salt, do not expect references, and do not expect a complete natural history of Madagascar. With hard work and much luck I imagine that the biological splendors of Madagascar will continue to provide us with new species and new wonders of natural history for decades to come. The task of gathering what information is known and forging it into a comprehensive photographic survey is formidable. Preston-Mafham has made a remarkable effort and produced a book that gives the reader an intriguing tour of a biological wonderland. All considering, it is a good introduction to the depth of Madagascar's biological diversity.

David Meyers
Duke University

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**Figure 11. The aye-aye (*Daubentonia madagascariensis*) (drawing by S.D. Nash)**

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