

# Magical Madagascar's Multiplying Mammals



Our campsite for the 2007 Field School.

Deep in the humid forests of Madagascar, we sat in the dark waiting for bats to fly into our mist nets. We were about to abandon our post for the night when a Malagasy student emerged from the dense forest carrying a tiny furry creature with enormous eyes, long tail and delicate fingers. The animal had become tangled in another mistnet. "Goodman's mouse lemur", proclaimed my companion, Steve Goodman (the Chicago Field Museum's Field Biologist stationed in Madagascar), casually, "recently described from one locality, nearby."

Such is the rate of discovery of new species in Madagascar that this newly described species of lemur was hardly surprising (see chart below for plots of species' discoveries of different groups of mammals in Madagascar). Thanks largely to two decades of intensive biological surveys by Dr Steve Goodman and his Malagasy collaborators and students from Association Vahatra (a conservation NGO formed by Steve) and University of



Sarah Downs, MSc student from UKZN, learns how to skin mammals from Steve Goodman during a Field School.

Antananarivo, new species of mammals (as well as birds, reptiles, frogs and others) are being described at a steady rate. To take frogs as an example, 100% of species are endemic (found nowhere else in the world), 233 species have been described, with at least 150 remaining to be described. For bats, from just 28 species recognized in 1995, the number has now reached 46 and is still rising. What is most remarkable about Madagascar's flora and fauna is its extremely high endemism. Apart from introduced rats and shrews, all Madagascar's terrestrial mammals – its lemurs, tenrecs and rodents of the subfamily Nesomyinae - are endemic.

Most of Madagascar's bat species are endemic. Some species previously thought to occur in both Africa and Madagascar have been shown to be unique endemic species on Madagascar. For example, populations identified as little free-tailed bats (*Chaerephon pumilus*) on Madagascar are genetically unrelated to African *C. pumilus*, and remain to be described as a new species endemic to Madagascar (Goodman *et al.* in press). Likewise, the lesser long-fingered bat (*Miniopterus fraterculus*), thought previously to occur in Africa and Madagascar, was shown in fact to comprise two unrelated species in Madagascar, *M. sororculus* from the Central Highlands and *M. petersoni* from southeastern lowland forests (Goodman *et al.* 2007a, 2008). Currently, several new endemic species of long-fingered bats are being described from the west and north of Madagascar. This island even boasts its own endemic bat family, Myzopodidae, sucker-footed bats. Until recently thought to consist of just one species, in 2007 Goodman and his colleagues (Goodman *et al.* 2007b) discovered that the family actually comprises two distinct species from western and eastern Madagascar. Far from being extremely rare, his team discovered these bats were common, roosting abundantly in the leaves of *Ravenala madagascariensis*, the beautiful Traveller's Palm of the Family Strelitziaceae.

For me as a mammalogist, it was highly rewarding to join Steve Goodman for three field seasons in Madagascar, in October 2007, October 2008 and December 2009. This collaboration emanated from a three year project funded by the Volkswagen Foundation (not to be confused with the car company!) which has as its main aim, the training of Malagasy and South African biologists. At the same time, Steve, Prof Jenny Lamb from UKZN and I, along with several



Above: Goodman's mouse lemur.

Below: Two families of hedge-hog-like tenrecs (*Hemicentetes sp.*)



postgraduate students, are collaborating on a study of the evolution and molecular systematics of African and Malagasy free-tailed bats (Family Molossidae) and we are also undertaking a survey of the chromosomes of Madagascar's bats, tenrecs and nesomyine rodents. The bat chromosome work will involve 'chromosome painting' molecular studies undertaken in the lab of collaborator Dr Victor Rambau of Stellenbosch University and this work will form an integral part of the PhD of Museum Intern, Leigh Richards. Hopefully, this technique may shed light on the relationships of Madagascar's sucker-footed bats to other families of bats, as previous studies have left this in some doubt.

So far, seven South African students (including the Museum's Mammal Technician, Anita Rautenbach) have participated in two 'Field Schools' in Madagascar in 2007 and 2008. These Field Schools are not for the faint-hearted! Because of the paucity of roads in Madagascar, and because so much of Madagascar's forests have been destroyed (only 8% remains), we hike for some hours from the nearest road, aided by porters, to reach our remote field sites. Under the direction of the legendary camp manager, 'Ladada', tarpaulins, 'lab



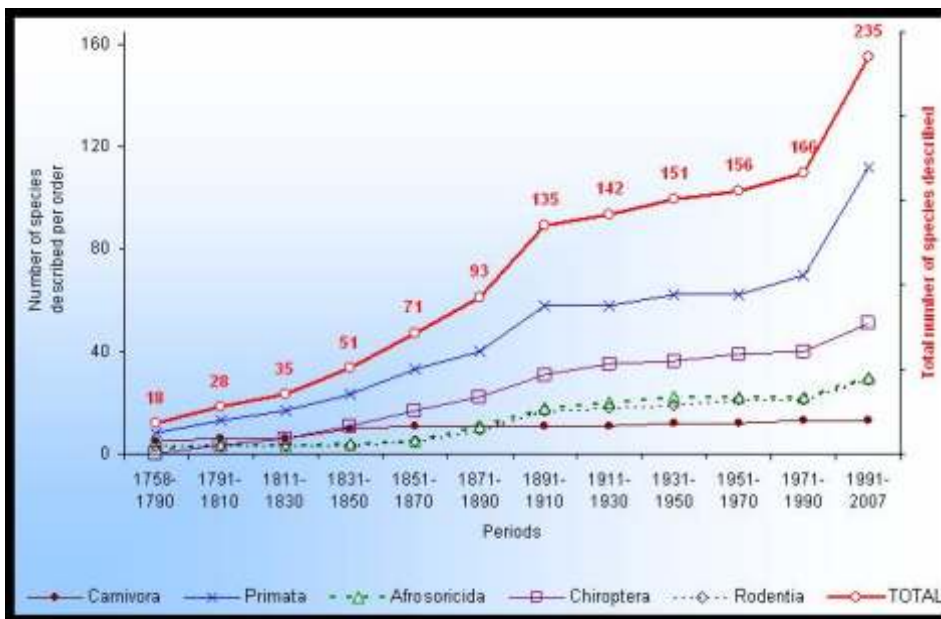
*Paddies in the central plateau of Madagascar.*



*Durban Natural Science Museum's Anita Rautenbach admires a colourful chameleon during the October 2008 Madagascar Field School.*



*Leigh Richards (left) and Fanja Ratriomomanarivo (right), PhD students from South Africa (UKZN) and Madagascar (University of Antananarivo) respectively.*



*Plot showing rate of species discovery of different orders of mammals.*

benches', dining and cooking areas, long-drop toilets and bathing areas are constructed along a convenient stream and the field school participants set up their tents in carefully designated areas in the forest. Then begins a week of non-stop work, setting up and checking pitfall-trap lines (30 buckets set in three lines of ten), rodent traps, mistnets (for birds by day and bats by night) and harp traps to catch all manner of vertebrates. Every day is full of surprises! Sexy lemurs, colourful birds, reptiles and insects and a bewildering variety of tenrecs, most shrew-like, some mole-like and others hedgehog-like were caught. During the 2007 Field School we were terrorized by biting horseflies. During the 2008 Field School, it rained solidly for six days and we were plagued by leeches! But the haunting whale-like songs of the sifaka lemur more than made up for it. These field schools have gone a long way to transforming some of Durban's 'lab rat' university students into true field biologists!

My three visits to Madagascar also involved giving lectures to staff and students at the University of Antananarivo, as well as making extended road trips across Madagascar to collect data and samples (for DNA, chromosomes and echolocation calls) from bats from known roost sites. In 2007, we drove for two days from the capital, Antananarivo to the town of Toliara in the extreme southwest, whilst in 2008 we traveled to Mahajanga on the west coast. In 2009 we flew from Antananarivo to Diego in the extreme north and from there drove to the famous Ankarana Forest. This forest is known for having the highest primate densities (i.e. of lemurs) in the world. Thus, between 2007 and the end of 2009, we had covered a south-north transect of Madagascar, obtaining chromosomal samples of most of Madagascar's bats. These cross-country trips afforded wonderful opportunities to observe Madagascar's diverse and surprising landscapes. The prevalence of rice paddies is a reminder of Madagascar's oriental origins (the earliest Malagasy inhabitants probably came from Borneo!). The rugged central highlands are mostly deforested. In the south, we encountered the strange spiny thickets, punctuated with magnificent baobabs. In the west we encountered dry forest, quite different from the humid forests of eastern Madagascar. In the forests of Ankarana in the north we saw spectacular jagged limestone outcrops, known as 'Tsingy' - these formations were featured in *National Geographic* magazine in November 2009.



To obtain chromosomal preparations involved operating a manual centrifuge in our bush lab!

Madagascar's annual rainfall varies from almost 2m in the north to less than 500mm in the south. It is a spectacular island of contrasts and bizarre creatures that must be experienced by nature-lovers! Working with Steve Goodman and his talented and friendly Malagasy students and colleagues, one realizes that the Age of Discovery is far from over! More important perhaps, is the race to save what still remains of one of the world's biodiversity hotspots.

In March 2009, Steve and some of his colleagues and students visited Durban to undergo training in molecular methods (under Prof Jenny Lamb at UKZN) and ecological modeling. This 'Laboratory School' seemed to be as rewarding for the Malagasies as their field schools have been for us South Africans! Late, in September 2009, two Malagasy students attended a workshop on acoustic monitoring of bats, hosted by BatsKZN and held at Sudwala caves in Mpumalanga (pic). Hopefully the VW Project will be just the beginning of greater and ongoing scientific collaboration between South Africans and our island neighbours.

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All Photographs by Dr. Peter Taylor

## Movements of the Museum's Mammalogist!



From 8-14 November, Peter Taylor and Museum Volunteer Kate Richardson attended the final workshop of the three-year "Ecorat" Project (Development of Ecologically-Based Rodent Management for the Southern African Region), which was held at Etosha pan in Namibia (group photo above).

The aim of the ECORAT project ([www.nri.org/ecorat](http://www.nri.org/ecorat)) is to strengthen the generation of appropriate, cost-effective and sustainable rodent pest management technologies and strategies for small-scale farming communities in the SADC region. Along with others in Namibia, South Africa, Swaziland and Tanzania, the DNSM is a major partner in this project, responsible for taxonomy and identification of some 1000 rodent specimens received during the project (>700 of which are deposited in the DNSM's Mammal Collection).

Dr Taylor also headed a Work Package on Capacity Building aimed at creating a generation of scientists-in-training in SADC countries. A total of 34 interns was trained during the project, attending some 22 workshops, meetings and training sessions. A final project report will be submitted early in 2010, but delegates to the Etosha workshop concluded that most of the expected targets were met. The 19 delegates at the Etosha meeting found time to view not just Etosha's spectacular large mammals but also, appropriately



enough, a few of southern Africa's endemic rodents including the ground squirrel and tree rat (pictured below left).

One of the Project Advisors, leading international expert on rodents in agriculture, Dr Grant Singleton (Head of the International Rice Research Institute, IRRI in the Philippines) elected to visit Durban and the DNSM following the workshop. Hosted by Dr Taylor, he viewed the Cato Crest settlement (pictured above) which was the subject of an earlier DNSM project on rodent-borne diseases, as well as the Museum's displays and Research Centre and he took time to meet the Acting Director of Libraries and Heritage (Guy Redman) and to sign the DNSM's Wall of Excellence (pictured below).



Peter Taylor explores Sudwala Caves with Malagasy researchers Beza (right) and Amyot (left) during a training workshop on bat detectors held in September 2009.

South Africa