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A Natural History of the Brown Mouse Lemur

Sylvia Atsalis

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A Natural History of the Brown Mouse Lemur

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PRIMATE FIELD STUDIES

Many of us who conduct field studies on wild primates have witnessed a decline in the venues available to publish monographic treatments of our work. As researchers we have few choices other than to publish short technical articles on discrete aspects of our work in professional journals. Also in vogue are popular expositions, often written by nonscientists. To counter this trend, we have begun this series. **Primate Field Studies** is a venue both for publishing the full complement of findings of long-term studies and for making our work accessible to a wider readership. Interested readers need not wait for atomized parts of long-term studies to be published in widely scattered journals; students need not navigate the technical literature to bring together a body of scholarship better served by being offered as a cohesive whole. We are interested in developing monographs based on single- or multi-species studies. If you wish to develop a monograph, we encourage you to contact one of the series editors.

About the Editors:

Robert W. Sussman (Ph.D. Duke University) is currently Professor of Anthropology and Environmental Science at Washington University, St. Louis, Missouri, and past Editor-in-Chief of *American Anthropologist,* the flagship journal of the American Anthropological Association. His research focuses on the ecology, behavior, evolution, and conservation of nonhuman and human primates, and he has worked in Costa Rica, Guyana, Panama, Madagascar, and Mauritius. He is the author of numerous scientific publications, including *Biological Basis of Human Behavior*, Prentice Hall (1999), *Primate Ecology and Social Structure* (two volumes), Pearson Custom Publishing (2003), and *The Origin and Nature of Sociality*, Aldine de Gruyter (2004).

Natalie Vasey (Ph.D. Washington University) is currently Assistant Professor of Anthropology at Portland State University in Portland, Oregon. Her work explores the behavioral ecology, life history adaptations, and evolution of primates, with a focus on the endangered and recently extinct primates of Madagascar. She has presented her research at international venues and published in leading scientific journals. She is dedicated to educating students and the public-at-large about the lifestyles and conservation status of our closest relatives in the Animal Kingdom.

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Sylvia Atsalis, Ph.D.
Lincoln Park Zoo

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Dedicated to Eric C. Johnstone and in memory of John Atsalis and Warren Kinzey, for their generosity and inspiration

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Preface

Students of primate behavior often begin their research already devoted to a particular species. Gorillas, chimpanzees and bonobos are common interests, but I have also known colleagues with a fondness for capuchins, colobus, or baboons. If there was any predilection on my part, it was a penchant for the unusual, and a tendency for taking up a challenge. I did not start out loving mouse lemurs. When I began my studies in biological anthropology, my intention was to study the evolution of social behavior. Typically, a study of this nature involves focusing on species that live in social groups in which social interactions are common and visible. Yet, I ended up spending many months following animals that were often not much wider than the leaves behind which they hid, and to whose social interactions I rarely was privy.

In Ranomafana National Park (RNP), mouse lemurs followed the rhythms of the forest. With the rains came the seasonal banquet of fruits and insects. Mouse lemurs gorged themselves into rotund spheres. I called them *little bulls*, their necks were so puffy with fat. As the rains slackened, fat mouse lemurs sank into a deep sleep, until the shortening of the night whispered that it was time to mate. Testicles, normally shrunken, inflated to the size of small walnuts, and the sealed sexual skin of the females split bloody open to receive eager mates. There was boisterous chatter among the boughs and branches, and wild chases. A few months later, all was quiet as the forest transformed into a nursery where mouse lemur nests were filled with many, tiny, scrawny, grey infants. Within two months, the young, already grown and sporting the bright reddish-brown fur of adults, were initiated into the life cycle. In the rainforest, I discovered, trees and mouse lemurs kept flawless time.

There were other lessons, too, that I learned from the Malagasy forest and its people; to be patient, to know that to be still in observation may be more valuable than to measure, define, and determine. More importantly,

I learned that the jungle's trees and the mouse lemurs kept flawless time . . . without me.

I remembered the lessons of the rainforest when I was desperate to escape the claustrophobia of drenched vegetation, when cyclones destroyed the rickety bridges that crossed the rivers surrounding the study area, our contacts to provisions and humanity. Yet I was rarely alone in the forest, although most fellow researchers and friends would leave eventually, while I remained to finish my long-term research project. The night before their departure there would be festivities and extra food, and parting gifts of old t-shirts, worn-out socks, an extra pair of field pants, moldy books, a few good batteries. I took the old t-shirts with gratitude, and when I left, I passed them on to my field guides. I have a picture of the youngest, Le Jean, wearing the one with a funny crayola likeness of the Eiffel Tower. Next to him stands another trusted guide, Jean-Marie, his father, wrapped to the neck with what looks like a gingham tablecloth, a traditional Malagasy dress. I will never forget these and the other RNP guides, who were instrumental to the completion of my dissertation research. They always wore so proudly the full regalia of raingear that I had brought for them.

Since my stay at RNP, the research station has been dramatically modernized, but at the time, amenities were simple. We lived in tents, water was carried from the Namorona River that ran adjacent to the site, we relied on candles and flashlights for light, food was cooked over a gas ring, or for larger meals, in a huge soot-covered kettle over burning wood, and bathing was often done by warming a little water in a kettle. I am glad to have known forest life in its basic essentials.

For the experience of living in Madagascar, the satisfaction of completing a challenging doctoral thesis, and the opportunity to write this monograph, I have a cadre of people to thank. Among them, I maintain feelings of immense gratitude towards my late doctoral advisor, Warren Kinzey, who, even while facing an abrupt decline in his health, stood by me, a rock of support. I also thank my second advisor, Eric Delson, for his always judicious insights. He continues to be a source of support and I am grateful for his periodic advice. My advisory committee, John Oates, Sara Stinson, Patricia Wright, and Bob Sussman, offered invaluable comments for improvements on the dissertation and much needed encouragement when the times got tough.

Bob Sussman and Natalie Vasey should be congratulated for envisioning the brilliant idea of this series of monographs, and I thank Bob Martin and other anonymous reviewers for comments that greatly improved this volume.

While in Madagascar, as well as before and after, I am forever grateful for the camaraderie, support, and research help offered so generously by Dan and Liz Turk, Louise Martin, Chia Tan, Ny Yamashita, Susan Foxman, Liz Balko, Julien Stark, Jörg Ganzhorn, Jutta Schmid, Peter Kappeler,

Annie Singer, Amy Gabrion, Sarah Willis, Eleanor Sterling, Leanne Nash, Hilary Morland, Martine Perret, Petter Walsh, Joe and Katie Gonder, Marian Dagosto, Brian Shea, Matt Ravosa, Larry Cochard, Kashka Kubdzela, Lorna Profant, Wendy Dirks, and Steve Lindquist. For support while writing my dissertation and later this monograph, I also thank my family, Anna, Gus and Mary Atsalis, as well as Todd Schaner, and Nancy and John Johnstone.

The Malagasy Government, the Department of Water and Forests, Benjamin Andrianamihaja, and the staff of Ranomafana National Park, made my research possible. The cabin managers, Jeanette and Aimée, made the cabin cozy and functional, while my Malagasy colleagues, Jean-Claude and Tina provided their unconditional friendship. Without the tireless work of my team of field guides, my research would have been much more restricted in scope; it is impossible to be thankful enough for the efforts of Raliva Pierre, Jean-Marie, Rakotoniaina Jean, Ratalata François, Rajeriarison Emile, and the late Rakotonirina Georges.

My friend and colleague Larissa Swedell informed me of the monograph field series and answered many questions. Richard Cambell provided invaluable statistical advice. Librarian and friend, Courtney Lavery, provided invaluable reference services (and a patient ear) that expedited exponentially the writing of the monograph. Kara Nuss was instrumental in completing the onerous task of compiling the reference list. Comments from Sue Margulis and Mark Domke improved the manuscript. I thank The Chicago Zoological Society (Brookfield Zoo) and Lincoln Park Zoo for logistical support. The research was made possible by generous support of the National Science Foundation, the National Geographic Society, Wenner-Gren Anthropological Association, and Sigma Xi.

Lastly, I thank my late father, John Atsalis, for teaching me to hold nature, beauty, and truth in the highest esteem, and my husband, Eric Johnstone, who sustains me daily with his magnanimous spirit, his generous support, his patience, and his clever wit that keeps me laughing—without him the writing of this monograph would not have been possible.

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A Natural History of the Brown Mouse Lemur

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CHAPTER

1

Mouse Lemurs: The World's Smallest Primates

Mammals can be spectacular in many ways, perhaps none more strikingly so than in the large sizes they can reach. The African bush elephant, the largest living land mammal, can weigh an impressive seven tons and stands a massive twelve-feet high. Large, conspicuous mammals attract both public and research interest. They are often elevated to flagship status and can be impressive ambassadors for national conservation efforts. Yet most mammals lack impressiveness of size. The great majority measure less than one foot, and their inconspicuousness is often compounded by cryptic and nocturnal habits. Even among primates, which typically are neither small nor nocturnal, there are species that combine these traits. Mouse lemurs, which weigh approximately 25–110 g, are the world's smallest living primates (Atsalis et al., 1996; Zimmermann et al., 1998; Rasoloarison et al., 2000; Yoder et al., 2000). Small size and nocturnal activity make these and other nocturnal primates fascinating but also a challenge to study. Indeed, for most of primate research history, the study of nocturnal species has been relatively sporadic. In the past, each published paper was a major contribution to our understanding of a lifestyle uncommon within the visually dominated diurnal primate world but not uncommon among mammals at large (e.g., Charles-Dominique, 1971, 1972; Martin, 1973; Petter, 1977, 1978; Charles-Dominique and Petter, 1980; Hladik et al., 1980; Pagès, 1980; Clark, 1985; Harcourt and Nash, 1986a). More recently, noteworthy research findings have advanced considerably our understanding of nocturnal primate behavior and ecology. The application of new or refined technology, such as radiotelemetry, microchips,

Microcebus rufus, the brown mouse lemur, in Ranomafana National Park.

and genetic analyses, has led to research breakthroughs. The pioneering and curious spirit of research biologists has been the driving force behind our growing understanding of the nocturnal primate world in all its diversity, but underlying the goals and aspirations of scientific research may be a sense of urgency as habitat destruction threatens wildlife worldwide.

Are nocturnal primates destined to go "from obscurity to extinction," as Martin (1995) so succinctly wondered? Perhaps this sad fate will be avoided because even as extinction threatens many primates, long-term studies on nocturnal species are leading the way to transforming our understanding of the order. Advances in our knowledge of nocturnal primates are especially significant on the island of Madagascar, where approximately 60% of primate species are nocturnal. Nevertheless, the fear that the world may lose species to extinction—not only nocturnal lemurs but also other species that comprise Madagascar's rich natural world—before we discover or become familiar with them is a realistic one. The island's central plateaus are largely devoid of forest, possibly as a result of anthropogenic activities since occupation took place approximately two thousand years ago (Wright and Rakotoarisoa, 2003). Today, although approximately 90% of the island's animals live in forests (Dufils, 2003), only small pockets of forests remain hugging the coastal line (Smith, 1997).

In recent years, the island has drawn the interest of biologists keen to discover its unique flora and fauna. Madagascar may be poor in diversity

of diurnal mammals (Goodman et al., 2003) and birds (Hawkins and Goodman, 2003), but it is rich in reptiles (Raxworthy, 2003) and amphibians (Glaw and Vences, 2003). Notably, 84% of all land vertebrates there are endemic (Goodman and Benstead, 2005). For those interested in primate behavior, Madagascar boasts intriguing attractions: the country ranks among the highest in the world in primate diversity (Mittermeier et al., 1994); all primates on the island are found nowhere else; and the majority of them, like most of Madagascar's mammals, are nocturnal (Martin, 1972a). Lemurs are the best-known animals of Madagascar's wildlife, attracting worldwide scientific and ecotourist attention to the island's unique biodiversity. Lemurs are used as indicators of ecological monitoring, and their presence has been an important factor behind the creation of numerous protected areas on the island (Durbin, 1999). The distinctiveness of Madagascar's flora and fauna, particularly the lemurs, was one of the deciding factors that attracted me to do my doctoral research there. Many other researchers have been similarly captivated, and the wealth of recent research on the island has been excellently compiled and summarized in an ambitious reference tome, *The Natural History of Madagascar* (Goodman and Benstead, 2003).

In Madagascar, I became part of a cohort of scientists eager to understand the lives of nocturnal primates. My study is now one of many that paint a broad picture of previously unsuspected variety and complexity within the world of nocturnal primates. Many colleagues old and new continue to make important contributions to nocturnal primate ecology and social behavior. In this monograph, I pay tribute to their continued efforts while presenting my own research on the brown mouse lemur *Microcebus rufus,* in Ranomafana National Park (RNP), a block of lush rainforest in the southeastern part of the island. During the seventeen months of my field study, I collected data on many aspects of the brown mouse lemur's biology. Some aspects were studied more comprehensively than others, but in total the research focused on establishing the important events that mark the annual life cycle of mouse lemurs at RNP. In this chapter, I present some initial background information on mouse lemurs and the family to which they belong, the Cheirogaleidae. Some of these varied topics will be developed further in chapters to follow. My hope is that the readers of this volume will find mouse lemurs as exciting as I did when I first stepped into the rainforest of Ranomafana's national park.

THE CHEIROGALEIDAE

Mouse lemurs are strepsirrhines—that is, they belong to the suborder of primates called the Strepsirrhini, which also includes the other Malagasy lemurs, the galagos (bushbabies) of sub-Saharan Africa, and the lorises of