

# An Introduction to Mating, Birthing and Rearing Systems of Nocturnal Prosimians

Sharon Gursky<sup>a, b</sup> K.A.I. Nekaris<sup>b</sup>

<sup>a</sup> Texas A&M University, Department of Anthropology, College Station, Tex., USA;

<sup>b</sup> Nocturnal Primate Research Group, Department of Anthropology, School of Social Sciences and Law, Oxford Brookes University, Oxford, UK

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## Key Words

Primates · Strepsirrhini · Prosimians · Reproduction · Life history

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Primatologists have been studying mating, birth and parental care patterns of primates for several decades. These studies have demonstrated a tremendous amount of variation in how primates mate, how often they give birth, the number of offspring they deliver annually and throughout their lifetime and how long they nurse and transport their young [Harvey et al., 1987; Clutton-Brock, 1991; Dixon, 1998]. Early on, the consideration of the prosimian primates in the study of these life history variables was recognised as important for understanding the ontogenesis of primate reproduction and social behaviour in general [Klopfer and Boskoff, 1979; Van Horn and Gray Eaton, 1979]. The 1980s, however, saw a reduction in the number of detailed field studies related to prosimian reproduction, and research became directed towards the larger diurnal species. To some extent, the prosimian primates have not been as thoroughly studied because of their nocturnal and cryptic habits, as well as their much smaller body size, making it difficult to observe detailed aspects of their life histories. In addition, misinterpretation of earlier studies has led to a common assumption by primatologists that nocturnal prosimians are neglectful parents that park their infants in the forest and return to them at dawn [Harvey et al., 1987].

In recent years, however, new technological breakthroughs such as night-scopes and radiotelemetry, among others, have allowed scientists to observe these primates using systematic sampling techniques [Gursky, 1998, 2003; Atsalis, 2000; Nekaris, 2001, 2003; Pullen et al., 2000; Radespiel, 2000; Sterling et al., 2000; Bearder et al., 2003; Radespiel et al., 2002]. These recent studies are also due to the

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Sharon Gursky, Department of Anthropology  
Texas A&M University, TAMU 4352  
College Station, TX 77843-4352 (USA)  
Tel. +1 979 862 8462, Fax +1 979 845 4070  
E-Mail [gursky@tamu.edu](mailto:gursky@tamu.edu)

tremendous perseverance among this new group of scientists who have renewed the initial view that it is important to study the variation present in the nocturnal prosimian primates if we are to ever make broad correlations concerning ecology and behaviour. Furthermore, the dire conservation status of many nocturnal prosimian species has made knowledge of their reproductive strategies vital for their management in captivity [Martin, 1995], a need echoed even in the earliest studies [Klopfer and Boskoff, 1979].

Most of the papers in this issue were part of a symposium entitled 'Mating, Birth and Parental Care in Nocturnal Prosimians' that was held at the 19th International Primatological Society meeting in Beijing, China, in 2002. They address the similarities and differences in mating, birth and parenting within a broad sample of nocturnal species from four prosimian families that have recently been intensively studied. The data from this symposium clearly show that the parental care systems and mating systems within nocturnal prosimians are more complex than previously thought.

Fietz and Dausmann in a study of the fat-tailed dwarf lemur (*Cheirogaleus medius*) found that even though males live in stable pair bonds with females, they increase their reproductive success by additional matings outside these pair bonds. Specifically, they found that males other than their social fathers sired approximately 44% of infants. The most intriguing aspect of their study was that despite this high rate of extra-pair young, males still actively participate in raising their offspring. Fietz and Dausmann argue that thermoregulatory demands during the first days after birth and defence against predators are the driving factors for infant care behaviour in these nocturnal prosimians.

The paper of Fitch-Snyder and Ehrlich compares the interactions between mothers and infants in two species of loris: the slow loris (*Nycticebus coucang*) and the pygmy loris (*Nycticebus pygmaeus*). Surprisingly, their comparison shows few, if any, differences between these closely related species. They did observe, however, that pygmy loris mother-infant dyads spent more time near one another and more time in physical contact (especially huddling) than did slow loris mother-infant pairs.

In an experimental study of infant and mother spectral tarsiers, *Tarsius spectrum*, Gursky found that young infants repeatedly gave alarm calls in response to the presentation of potential predators and also moved away from their parked location upon seeing these predators. Mothers regularly, but not always, responded to the infants' alarm calls. Gursky argues that infants use alarm calls to ask questions about stimuli they encounter in their environment. One of the most intriguing observations Gursky made was that infants and mothers both emitted different alarm calls when exposed to rubber snakes and birds of prey models, including when the infant was less than 1 week old. Gursky therefore argues that these alarm calls are not predator specific but represent an infant's assessment of individual risk from a particular predator's attack.

Nash presents long awaited data on sex differences in mother-infant interactions in *Galago senegalensis braccatus*. Her work shows little or no sex differences in infant care by mothers. However, from the time of weaning on, Nash did observe that females were more active in their rates of location and solitary acrobatic play bouts than were males. The lack of sex differences in infant care is somewhat surprising given the male-biased dispersal patterns exhibited by this species. Nash has

proposed that another factor, growth, needs to be explored to account for this aberration.

Becker et al. present the analyses of the communication systems between mothers and infants in *Otolemur garnettii*, Garnett's bushbaby. Specifically, they explore the relationship between click vocalisations emitted by infants and growl vocalisations emitted by mothers. They found evidence to suggest that the vocal exchanges between mothers and infants occur as a function of the growl sequence emitted by mothers. Specifically, they found that infant clicks most often followed short growls that appeared in bouts.

Nekaris presents data on the mating and parental care system observed in slender loris taxa from Sri Lanka and India, *Loris tardigradus tardigradus*, *L. lydekkerianus nordicus* and *L. l. lydekkerianus*. In particular, she reviews the elaborate role played by males in infant care, including interacting with infants throughout the night as well as at sleeping sites. She relates this relatively unusual behaviour for a nocturnal primate to the high birth potential of 4 infants per year combined with a high-energy milk yield and lack of birth seasonality, leading to paternal helping behaviour in this relatively social species. She also highlights the different life history strategies between these newly recognised slender loris species.

Bearder et al. present data on variation in infant parking and infant retrieval practices across several species of African lorises. Specifically, they review how different galago and potto species vary in carrying of infants, how adults detect and retrieve infants during the period of dawn reassembly and how sleeping site group composition and sleeping site selection vary. They conclude that these behaviours lend further ecological support to the recent discovery of several new African lorisid genera and species, in that similar behavioural patterns tend to be genus specific, especially for allopatric species, but vary slightly within genera when species of a genus are sympatric. They suggest that further detailed field studies are imperative for understanding not only the complex behaviour of the African lorises, but also their phylogenetic relationships.

Andrès et al. present data on the mating patterns of captive mouse lemurs (*Microcebus murinus*). They observed remarkable amounts of precopulatory competition among males that resulted in the development of a dominance hierarchy. Although multiple matings did occur, the dominant male still obtained the majority of fertilisations by mate guarding the receptive females on their first day of oestrus.

In addition to these excellent studies, we would also like to acknowledge the other participants in this symposium who were not able to contribute a paper to this volume, but whose abstracts are included. Eberle and Kappeler [2002] presented fascinating data on cooperative breeding in mouse lemurs. Pimley et al. [2002] presented the first data on social behaviour of the potto since Charles-Dominique's [1977] pioneering study. Similarly, Pullen et al. [2002] presented the first data on *Galago moholi* from a long-term study, the descendants of a population studied first by Bearder and Doyle [1974].

Together, these new field studies shed light on the variety of mating, birth and parenting strategies exhibited by the nocturnal prosimian primates. While males in some species (*C. medius*) are regularly cuckolded, in others (*M. murinus*) the dominant males obtain nearly all the matings and fertilisations. While some species regularly cache-and-carry their young throughout the night, others park them throughout the night. We hope that, as more of these studies are undertaken, we

will be able to perceive common features and differences among nocturnal species and, by so doing, illuminate the underlying evolutionary processes leading to their diverse social patterns.

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