

With its big eyes, short limbs and long tail, the grey mouse lemur is perfectly adapted for a nocturnal life in the trees. Though tiny, it can make prodigious leaps when hunting insects.

# Small is BEAUTIFUL

Why is a tennis-ball-sized primate one of the most successful animals in Madagascar? JASON GILCHRIST discovered the acrobatic grey mouse lemur's sharing and caring approach to rearing young.

## THE EXPERT

JASON GILCHRIST studies group-living animals. His current fascination is the grey mouse lemur, and he has been researching its social life in Madagascar as part of a long-term study with Peter Kappeler and Manfred Eberle.



**WHY WOULD A SCOTSMAN** be standing on one leg, in the pouring rain, in the middle of a forest at 6am? And why would he have a jacket over his head and be balancing a laptop on one knee, trying not

to drop it in a puddle (a feat not aided by the painful attentions of swirling, buzzing swarms of 'tsilk-tsilik', local horseflies that specialise in biting the skin between your fingers – an area difficult to defend under these circumstances). And why would he do this every day for six weeks, year after year?

What drives him to this seemingly eccentric behaviour is the grey mouse lemur – almost, but not quite, the world's smallest primate. Weighing 60-100g, it may be tiny, but what it lacks in size it makes up for with eye-catching agility and fascinating ecology. It also has large round eyes, big round ears

and a soft blonde-brown coat. It's a creature a researcher could become very fond of.

I am that researcher and Scotsman. My location is Kirindy Forest, mid-western Madagascar (recently featured in the BBC's *Planet Earth*). Dominated by massive and unique-shaped baobab trees, and with a dramatic seasonal swing in climate from wet to dry, Kirindy is home to eight species of lemur, as well as many other mammals, such as the tenrec (a cross between a rat and a hedgehog) and the giant jumping rat. The variety and density of reptiles here is also spectacular, including hog-nosed

Young mouse lemurs are reared in tree-holes and even artificial nestboxes. The young are curious about the outside world from an early age.



## A NIGHT IN THE LIFE OF A GREY MOUSE LEMUR



**1 DUSK FALLS** While mum is away, three pups peer out of the nestbox. Adult females must head out to forage at night so that they can suckle their youngsters.



**2 SUCCESSFUL HUNT** Bounding through the trees, the lemur uses its superb vision to spot potential prey in the dark world of the forest. Here, a female has caught a grasshopper.



**3 SWEET TOOTH** Insects make up a large part of the mouse lemur's diet, but it will also feed on forest fruits and lap energy-rich nectar from night-blooming flowers.



**4 NOCTURNAL MANOEUVRE** A mother relocates her pup to a new nest. Females only carry their own offspring and probably swap nests to prevent predators from discovering their young.

## NEED TO KNOW

- » **SCIENTIFIC NAME** *Microcebus murinus*
- » **LENGTH** Body 12.5cm; tail 13.5cm
- » **WEIGHT** 60-100g. Varies seasonally
- » **SOUNDS** Generally quiet, but makes ultrasonic chirps, twitters and long whistles.
- » **DIET** Insects and fruit.
- » **BREEDING** A seasonal breeder, with females generally producing one to three litters a year in the wet season. Litters comprise up to four pups, and up to three females will crèche their youngsters together in a tree-hole for as long as two months.
- » **HABITAT** Dry, deciduous and spiny desert forest.
- » **DISTRIBUTION** Probably the most widespread, common and adaptable lemur in Madagascar. Due to inland deforestation, its forest habitat is restricted to western coastal areas.



snakes, bright, variably-patterned chameleons, tortoises and terrapins. Add to these a number of boldly coloured birds and a multitude of invertebrates, such as giant stick insects and social spiders, and you have a place of constant movement and life.

### DID YOU KNOW?

Though tiny, the grey mouse lemur is pipped to the title of the world's smallest primate by the pygmy mouse lemur, which weighs only about 30g.

Despite so many distractions, the grey mouse lemur is still the main attraction, at least for me. Though the species feeds on fruit and other vegetation, it prefers insects, especially moths, and uses its incredible agility to catch them. Clambering up a thin branch, a lemur will wait for a juicy individual (often bigger than itself) to fly by. With complete confidence, it then pounces, seizing its prey in its mouth in mid-air before landing on another branch a metre or so away. This is a giant leap for such a tiny creature. Oh, and did I mention that all this takes place in the dark?

Things get even more interesting when you look at the grey mouse lemur's social behaviour. It's so extraordinary that I keep dragging myself out into the rain to learn more. The lemurs forage alone at night, so their social life only

begins in the morning, when they congregate to sleep away the heat of the Madagascan day. Up to six males or four females squeeze into separate tree-holes, with males and females rarely resting together.

This cosy set-up is extended beyond daily cohabiting to

longer-term sleeping arrangements. In the dry season, when insect food is scarce, the lemurs go into hibernation (*see box, p56*). They will have fed heavily to put on enough weight to keep them going, storing much of the fat in their tails. This species is one of the few mammals to hibernate communally, and the great benefit of such behaviour is that it conserves heat and thus saves precious energy.

Males are less likely to hibernate than

females. They need to stay awake so that they are ready to mate when their first potential partners emerge. And they have to work fast – the mating season in Kirindy is limited to the four weeks after hibernation.

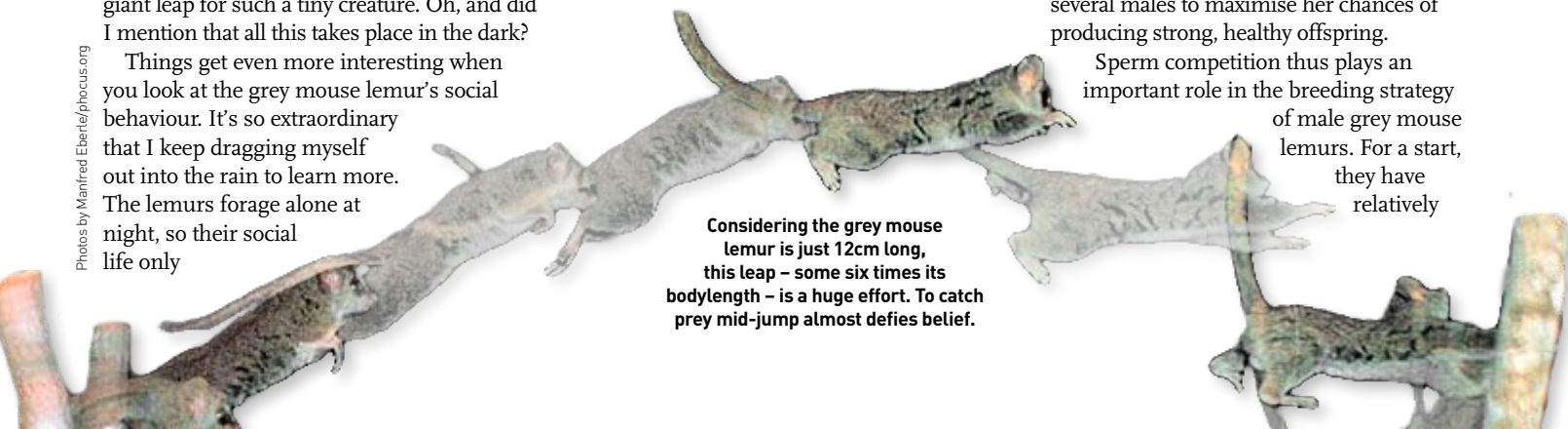
To make matters worse, each female is receptive for one night only. To have the best chance, a male must range widely in search

## In one study, a single testicle of one male was found to weigh more than his brain.

of willing partners and copulate with as many as possible. Equally, a female will mate with several males to maximise her chances of producing strong, healthy offspring.

Sperm competition thus plays an important role in the breeding strategy of male grey mouse lemurs. For a start, they have relatively

Considering the grey mouse lemur is just 12cm long, this leap – some six times its bodylength – is a huge effort. To catch prey mid-jump almost defies belief.



large testicles for such small mammals (mating with multiple partners requires a great deal of sperm), and these organs double in size in the run-up to the mating season. In one study, a single testicle of one male was found to weigh more than his brain – either an alarming or a rather impressive notion, depending on your perspective.

Males also use sperm plugs, which they lodge in the females' reproductive tracts at the end of intercourse in an effort to block the sperm of subsequent partners. But this is not always successful. Females may mate with up to seven males on the single night that they are receptive, and often produce litters of mixed paternity.

### CO-OPERATIVE MOTHERHOOD

After mating, the male plays no further part in parenting. The mother lemur must seek help elsewhere, and usually turns to other females. As well as sleeping communally, most grey mouse lemurs rear their pups in shared nests alongside fellow mothers. While individuals of other primate species compete to produce the most offspring, grey mouse lemurs actually co-operate in rearing each other's young.

To explore the benefits and costs of such behaviour, my colleagues and I set up and now monitor nestboxes around Kirindy's forest trails. We trap, weigh and mark the

resident mothers and pups (by shaving tiny individual patterns into their fur), record temperatures within the nestboxes (hence the laptop on the knee for downloading figures from temperature data loggers), and film our lodgers using miniature infra-red cameras positioned inside their dwellings. When they leave their nests after a couple of

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months, I continue to observe both mothers and pups (who now disperse?) to monitor their survival rates.

Recording temperatures allows me to assess how communal sleeping helps to save heat and energy, and the video footage enables me to evaluate how much care – babysitting, grooming and nursing – the individual females give to each pup in the nest. In addition, I can observe the development and behaviour of the infants. They are energetic little furballs and it's easy to get

distracted as they climb, jump and swing, Tarzan-like, on their mothers' tails.

To collect all of this data, I patrol the forest trails both day and night. One of the joys of these walks is that I get to meet other members of the lemur clan. By day, I bump into troops of foraging red-fronted brown lemurs, with wide-eyed youngsters clinging to their mothers' backs. Interestingly, these animals have a rather bizarre attraction to human urine. If you pee in the forest, it's not unusual to later discover a group of them crowding around and pawing excitedly at your chosen spot.

Night, when all is dark and quiet, is an eerier time. There's a stillness in the air, and the silence is usually broken by pale fork-marked lemurs. When not making loud cracking noises that sound like giant trees toppling, these primates produce harsh, cackling shrieks that pierce the night. These screams are rather frightening when you are alone in a dark forest. To calm my nerves, I concentrate on my laptop, my video cameras and my grey mouse lemurs.

### DID YOU KNOW?

While many lemurs are threatened by loss of forest habitat, the grey mouse lemur remains common, probably thanks to its small size and varied diet.

### WORKING TOGETHER

So why do these little lemurs raise their pups together? With more females, they may be better



**What the grey mouse lemur lacks in size, it makes up for with fascinating ecology.**

A grey mouse lemur pup fits comfortably in the palm of a human hand.

able to defend their young from predators attempting to enter the nest. From video footage, I have witnessed tree boas and rats invading some of my nestboxes, while others have been disturbed by a large animal that I suspect was a fossa. This sleek tree-climber resembles a cross between a cat and a mongoose, and makes a living by eating lemurs. One of my colleagues even saw a fossa kill an adult sifaka, a large and powerful member of the lemur family.

Sharing a nest with other females may also mean that the pups are left alone for shorter periods, leaving them less vulnerable to predators. Additionally, large, communal litters may help to keep the pups warmer for longer, as they can share body heat. Moreover, I found that while mothers concentrate on their own pups, they also groom and suckle the other young in the nest. This means that the intervals between meals may be reduced, enabling the youngsters to receive a steady food supply and thus grow and develop more swiftly.

Over time, I discovered that the breeding groups almost invariably comprise sisters, mothers and daughters. The fact that all the lemurs are related, with care shared between family members, appears to drive co-operation. If a female dies while rearing her offspring, the other females

in the breeding group adopt them. This is probably a common occurrence, as high predation means poor survival rates for this diminutive primate. Each adult has just a 50 per cent chance of surviving from one breeding season to the next. Even excluding cases of adoption, pup survival is higher in communal litters than when females nest

### **If a female dies while rearing her young, the other females in the group will adopt her offspring.**

alone. Crèching your pups with your relatives really seems to pay off.

The grey mouse lemur may be one of the tiniest of the many diverse creatures that reside in Kirindy Forest, but it demonstrates incredibly impressive teamwork – if only among related females. When I finally hang up my video cameras, I will look back and feel privileged to have had such an intimate insight into the private life of this charismatic animal. The experiences I've had in Kirindy are almost worth the sacrifice of an expensive laptop to a rainforest puddle.

## **THE POWER OF SLEEP**

By sleeping together and lowering their body temperature (adaptive hypothermia) during the day, grey mouse lemurs save energy. In addition, in the dry season, they hibernate.

These two strategies allow the lemurs' body temperature to drop below the normal operating level (35°C) to match that of the environment (22-24°C). This saves energy that would otherwise be used to keep warm. And by snuggling together, the lemurs lose less heat, saving up to 40 per cent of their energy expenditure. Both adaptive hypothermia and hibernation prevent individuals from losing too much weight in periods of extended inactivity.



Two adults wake in the evening after a day of sleepy torpor. They will separate to find food.