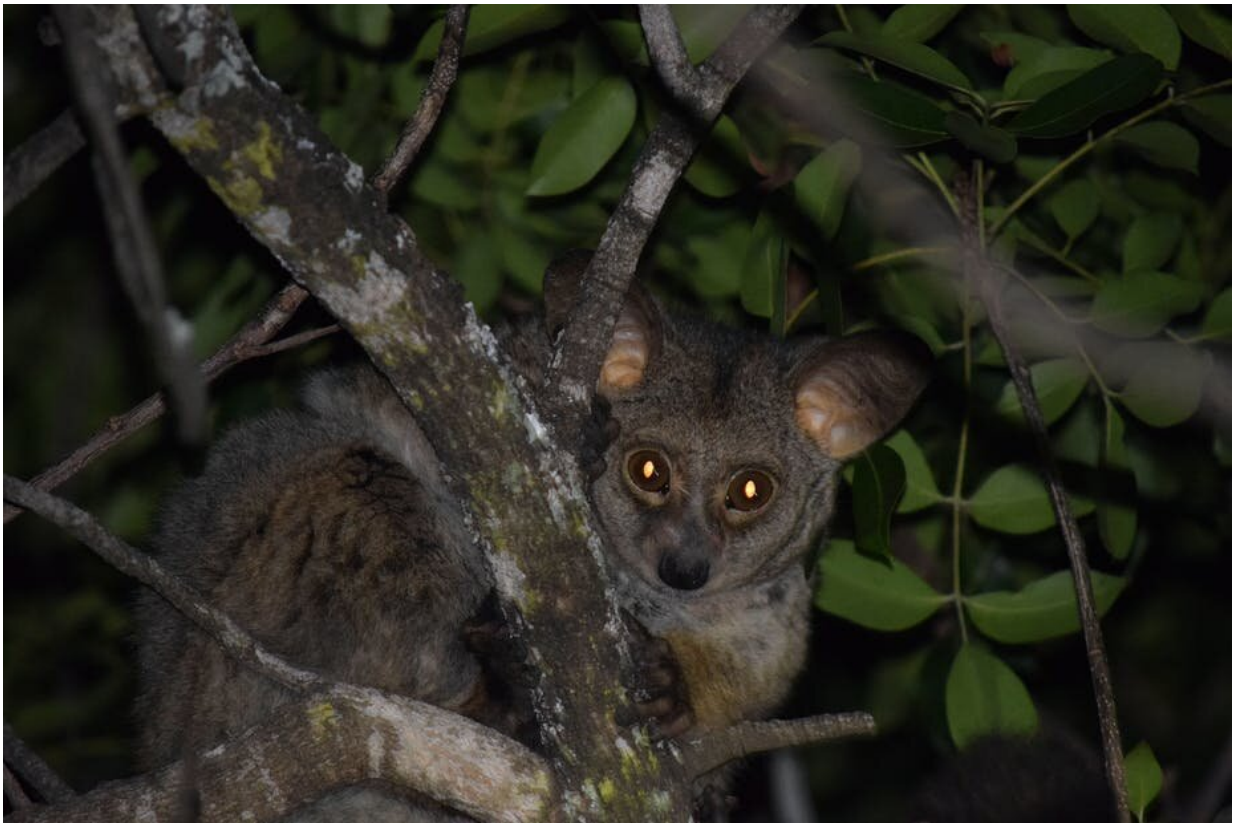
# Even bushbabies get stressed: How we know, and what it means

January 7 2022, by Channen Long



A thick-tailed greater galago peering out from amid tree branches. Credit: Michelle Sauther

Many South Africans will be familiar with bushbabies—or, at least, with their distinctive call. The small animal, more formally known as the

thick-tailed greater galago, takes its common name from that call; it sounds like a crying baby.

Bushbabies are primates. They have large eyes and are nocturnal creatures. They're usually spotted meandering through tall trees at night in search of fruit to eat.

Very little research has been conducted about bushbabies in South Africa since the 1980s, partly because they are not gregarious or easy to observe. And almost nothing is known about what physiological mechanisms they and other African primates use to cope with environmental and social changes. Climate change and human encroachment on their habitat, for example, may affect their food sources, their reproductive success, and possibly their survival. We set out to help fill in this knowledge gap.

Our study explored the main factors that contribute to changes in bushbabies' physiology. These included the influences of diet, weather and their reproductive state. We tested their adrenocortical activity (that is, the hormones they secreted) across a 12-month period at the Lajuma Research Centre in the Soutpansberg mountains in South Africa's Limpopo province.

When an animal is exposed to any form of change—for instance predator exposure, temperature changes, or mating—their physiological stress response is activated and the glucocorticoid hormone is secreted. Glucocorticoid hormones play a part in numerous mechanisms in the body. Their primary functions include growth, the maintenance of energy requirements, and the immune and stress responses. An acute secretion of glucocorticoids is healthy. But long-term exposure can have detrimental effects on the body: immunity and reproductive capabilities, for example, may be reduced. So there's a lot to learn from an animal's long-term glucocorticoid patterns.

Over the 12 months of our study, we identified the main factors that affect bushbabies' responses to changes in the environment. We found that female bushbabies were more susceptible than males to elevated glucocorticoid levels brought on by environmental changes. This may have implications for the species' longer term ability to adapt to dwindling food availability or a shifting climate, for instance.

## Hormonal changes

When an animal is exposed to some kind of change, glucocorticoids are released into the bloodstream to reach their target organ or tissue. After this they are broken down in the liver to create glucocorticoid metabolites or by-products; these metabolites are then excreted from the body. That means researchers can study animals' feces as a proxy to monitor adrenocortical activity.

This method of sampling has become popular in science. It requires little direct interaction with an animal, minimizing the risk of stress or injury.

The Lajuma Research Centre consists of a variety of habitats including mist-belt forests and savannah grassland. Temperatures range from 37°C in summer to 0°C in winter and rain falls in the summer months. Living in this highly seasonal environment, bushbabies need to withstand fluctuations in food availability. The fruit, insects and gum they eat aren't as abundant in winter.

One of the bushbabies involved in the study. Credit: Channen Long

They also experience constantly changing social interactions. These are generally solitary animals, but each year they must interact during the mating season or females must look after their offspring during the lactating period.

To survive, the species should be adaptive, or "plastic": hormonal fluctuations should occur, but there shouldn't be consistently high concentrations of glucocorticoids.

We started by establishing which assay or "hormone detector" would be most accurate in detecting the metabolites of this species. Then, to explore the effect of seasonal and social factors on metabolite levels, we collected fecal samples from wild individuals over an entire year. Animals were captured using traps—we've been trapping these individuals since 2013 for different studies and they kept coming back for the free food. They were identified, weighed, and released, and we collected the feces that had accumulated in the traps.

We also determined seasonal food availability by taking tree gum samples and counting the available insects and the seeds in fecal samples.

The results revealed that males did not have a significant change in fecal glucocorticoid metabolite levels across seasons or during important social events such as mating. This was unexpected: we had predicted that the mating season, combined with the less favorable winter conditions, would cause a dramatic rise in levels. We suspect the galagos adjust their behavior to reduce their activities and, thus, their energy use and glucocorticoid secretion during the colder months.

We determined that the lactation period had the greatest impact on female galagos' glucocorticoid levels. Lactation uses a lot of energy and has been shown to cause increases in glucocorticoid concentrations in several other primate species. It could also be an influence of "maternal stress" when the mother must care for her offspring.

We found that changes in food availability influenced females' glucocorticoid concentrations. The lactation period is in summer, when food is amply available. This could create higher levels of competition between individuals. Previous research on lesser galagos has shown females may elevate aggression during times of high food availability and periods when they need to look after their young. Altogether, these

factors could have caused the rise in fecal glucocorticoid metabolite concentrations.

## Final conclusions

Our study shows that fecal glucocorticoid metabolite concentrations are most affected by food availability and reproductive state. Females are more likely to experience higher concentrations because of the physiological costs of reproduction. The results suggest they are more sensitive to environmental change than males. Overall, bushbabies are fairly resilient to change—for now.

This information will help to contextualize future research on the impact of environmental change, human environmental degradation and especially climate change, which may have an impact on the survival of this primate species.



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