ANIMAL BEHAVIOUR

Dictators of the desert

When the going gets tough for the baboons of the Namib Desert, their leaders get tougher. ANDREW KING has studied how these complex primate societies cope with their harsh environment and found that sometimes dictatorship works better than democracy.

In Namibia, the biggest and strongest baboons control the troop and decide when the animals move, rest and eat. When they find precious water, it's the leaders who drink first.

Michael Nichols/National Geographic Image Collection

One of the joys of living in a group is that there are always plenty of opportunities for a little grooming.

D Alter Photography/Animals Animals/OSF

A young baboon hitches a ride on its mother's back. This is the only way the youngster can keep up with the far-ranging troop.

Michael Poliza/Gallo Images/Getty Images

THE EXPERT

After a zoology degree, ANDREW KING spent a year in the Kalahari Desert with meerkats. He then travelled to Namibia and, for three years, has been studying desert baboons with the Tsaobis Baboon Project, run by the Zoological Society of London.

THE LOCATION

The TSAOBIS BABOON PROJECT is based in the wildlife reserve of Tsaobis Leopard Park in central Namibia.

CAN YOU IMAGINE having to walk up to 10km each day in temperatures hotter than 40°C just to find enough food to stay alive? Or digging a 60cm-deep hole in a parched riverbed to reach enough water to quench your thirst? Or scrambling up a rocky cliff-face to find somewhere to spend the night that's safe from predators? These are the gruelling tasks that the baboons living on the edge of the Namib Desert must endure every day of their lives.

The Namib Desert is big and it is old. It covers an area of around 50,000km² along the coast of Namibia, and is thought to have existed for at least 55 million years, longer than any other desert on the planet. It supports a number of specialised plant and animal species found nowhere else on Earth, and is home to an extraordinarily adaptable baboon.

Baboons have colonised a huge range of habitats – an achievement surpassed by no other primate except ourselves. In the driest of all these environments lives the desert or chacma baboon. Though this species is found in a range of different habitats across southern Africa, Namibia is where it has adapted to life in the desert. Here, the baboons endure the most arid conditions recorded for any non-human primate, and can withstand both extreme changes in body temperature and long periods without water. In one of the first studies of the species, Conrad Brain of the Desert Ecological Research Unit of Namibia found that a desert baboon's temperature can fluctuate by more than 5°C, and regularly rises above 41°C. This is remarkable, given that if our own body temperature increases by just 2°C, we start having hallucinations.

But desert baboons haven't just adapted physically to survive in their environment. They've adapted socially, too. Living in groups of up to 80 individuals, they forage together, queue for the chance to sip water from the bottom of a sandy hole and jostle for the best sleeping spots on rocky outcrops.

DID YOU KNOW?

Annual rainfall at the desert edge is light and seasonal, averaging just 1cm a year. These rains support a diverse desert plant community on which the baboons thrive.

Professor Jeanne Altmann, of Princeton University, USA, one of the first to study baboon behaviour, describes the intimacy of a baboon troop perfectly: "Imagine living with the same group of people for your entire life. Not just staying connected to them through letters and phone calls, or even sharing a house with someone for your whole adult life, but literally being within 100 metres of the same set of people from the time you are born until the time you die."

After spending years as a researcher on the Tsaobis Baboon Project, observing these fascinating primates in their natural environment, I am beginning to understand that it is the very nature of the baboons' society that is key to their success in the Namib. To survive, they need to stick together – and then find ways to get along.

COMMUNAL PROS AND CONS

But first, the basics. Communal living affords individuals a number of benefits, such as a reduced risk of predation. Baboons are hunted by leopards, but living in a group means that there are more pairs of eyes looking out for danger, which in turn frees up foraging time for all.

But you rarely get something for nothing, and baboons have to trade off these benefits against various costs. Larger group sizes mean increased competition for food, water and mates. What's more, being reliant on your neighbours for information leaves you open to exploitation by the more cunning among them.

Anyone who visits a game park in southern Africa will probably return with stories of crafty baboons. I will never forget an episode in Tsaobis concerning a young female called Ruby. It was a particularly hot day, and, like most of the baboons around me, I had wedged myself between some boulders lining a sandy riverbed in search of shade. Meanwhile, Myra, Ruby's mother, was drinking from a hole she had dug in the sand below. As Myra's pink bottom glistened in the sun, I watched Ruby fidgeting in the hot sand behind her, waiting for her turn to drink. Suddenly, the youngster let out a loud, sharp alarm bark. Predictably, Myra leapt out of the hole to see what the danger was. I also scanned the vicinity, but neither I nor Myra could spot anything of concern. I then glanced back at the waterhole to see Ruby's younger, pinker bottom now poking out from the sand.

Being reliant on your neighbours for information leaves you open to exploitation.

I noted the cause of alarm as 'unknown' in my log, but as Myra joined the back of the queue for water, I contemplated the sophisticated mental processes Ruby had employed to jump the queue.

DEMOCRATS OR DESPOTS?

For a community to function, there has to be some sort of decision-making structure – otherwise there would be chaos. Making collective decisions about where to eat, where to sleep and how to avoid predators is vital if individuals are to maximise the benefits and minimise the costs of group living.

So what rules do animals use to guide their decision-making? Scientists are only just beginning to understand the methods they use. Research suggests that flocks of swans, bands of gorillas and herds of buffalo act on majority decisions (democracy), while in wolf packs and elephant herds, the rulings of a few dominant or experienced individuals dictate the actions of the rest of the group (despotism). Such a range of communal decision-making strategies is not

DID YOU KNOW?

The hamadryas baboon was sacred to the Ancient Egyptians. The baboon god worshipped in the pre-Dynastic period (5,500–3,000BC) was called Baba, which may be an origin of the species' name.

HOW TO JOIN A BABOON TROOP

To understand baboon behaviour, my colleagues and I had to become part of the troop. Here's how we did it:

» BEGIN FROM AFAR

Baboons are naturally very cautious of anyone following them, so we started by observing them from a distance of several hundred metres.

» INFILTRATE THE TROOP

Slowly but surely we approached the baboons and got close enough to observe them directly. This process, known as 'habituation', involved following the baboons on foot, day after day and week after week. Eventually, the baboons accepted that we posed no threat and allowed us to enter their world.

» OBSERVE THEIR WAYS

Once we had successfully become part of the troop, we were able to move among the baboons and observe their actions closely without altering their natural patterns of behaviour. This allowed us to collect a host of behavioural data.

» FOLLOW CLOSELY

To collect enough data for our studies, we needed to follow the troop for many months. Our baboons use more than 30 different sleeping cliffs and travel more than 10km each day, so it was essential to stick with them – seeing them to bed at night and meeting them when they woke. It was tiring and required a fair bit of kit, 10 items of which were essential:

1. Four litres of water
2. GPS tracking device
3. Sunscreen
4. Sunglasses and sunhat
5. Food (plenty of it)
6. Binoculars
7. Torch
8. Radio to keep in touch with base-camp
9. First-aid kit with pressure bandages in case of a snake bite or scorpion sting
10. Oh, and data sheets and a clipboard!

Having been accepted by the troop, Andrew begins to spy on his fellow baboons.

Tsaobis Baboon Project/ZSL

Excellent climbers, these desert baboons readily use trees as refuges from danger.

Don't challenge the hierarchy. A large, dominant male charges at a junior male of the baboon troop, putting him firmly in his place.

Adrian Bailey/OSF

Richard du Toit/naturepl.com

Tim Davies/ZSL

unlike that seen in human society.

So where do baboons lie within this spectrum? At the end of despotism, I am discovering. Monitoring the animals' movements, examining what they eat and recording where they sleep suggests that power is concentrated with just a few dominant individuals (usually the largest males), whose choices are accepted and followed by the rest of the troop.

In baboon society, males outrank all the females, while females have a clear linear ranking system among themselves.

Canine teeth can grow to 5cm long in large males and are often bared as a threat.

Interestingly, a female baboon's rank is inherited from her mother, while the male hierarchy is more fluid.

So how does the dictatorship manifest itself? Well, at mealtimes, the most dominant baboons will often choose to forage at a concentrated food source, guaranteeing themselves a good meal for minimal effort, but perhaps leaving little for the others. So why do the lesser members tag along instead of finding their own supplies? Mainly because they gain a great deal of protection from leopard attacks by associating with the larger members of the group. The alternative is splitting from the troop and running greater risks with no guarantee of food.

TRADE-OFFS

Again, it's a question of trade-off. Accepting the decisions of others is preferable to leaving the group. Even if this means short-term costs for some, the long-term benefits for all make it worthwhile: you've got friends to groom and be groomed by, and sentries to keep a lookout for possible food sources and potential danger.

The last days of one old baboon's life underline the benefits of group living – even in a dictatorship. Hetty was more than 20 years old and had gone through the menopause (unusual for wild animals). This meant she no longer developed the characteristic swollen bottom at mating time, and no longer appealed to the mêlée of young males surrounding her. But Hetty's role in the troop had been established long before their arrival (males leave their natal

Power is concentrated with just a few individuals whose choices are accepted by the rest.

troops when they come of age and join neighbouring groups, where they can mate with unrelated females), and it was this that ensured her longevity. It's possible that her experience and knowledge, such as her familiarity with the best feeding sites, was still useful to the troop.

She hobbled among her companions, bow-legged and stiff-necked, taking her share of the food found by her daughters and grandchildren, and relying on these close relatives to alert her to any danger. Alone, she would surely have been picked off by a predator, but the intimate network around her ensured her survival through her twilight years in the desert.

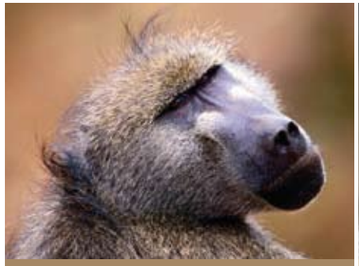
In 1838, Charles Darwin famously said: "He who understands the baboon would do more towards metaphysics than [renowned philosopher] John Locke." When I began my research, I had to look up 'metaphysics' – the dictionary told me it was about 'explaining the ultimate nature of being and the world.' Many biologists have taken up Darwin's challenge over the past half-century, and field initiatives such as the Tsaobis Baboon Project are being carried out in almost every country with resident baboons.

We are slowly but surely beginning to understand baboons – their social structures, foraging ecologies, mating strategies, communication mechanisms and, now, how they make collective decisions and co-ordinate group activities. One day, we will fully understand the species – and perhaps then be able to explain the ultimate nature of being and the world. In the meantime, I will enjoy adding my pieces to the puzzle that Darwin first highlighted nearly 170 years ago.

FIND OUT MORE

The Tsaobis Baboon Project is run by the Zoological Society of London. www.zoo.cam.ac.uk/ioz/projects/tsaobis_baboon_project.htm

MEET THE EXTENDED FAMILY: BABOONS & LOOKALIKES



CHACMA BABOON *Papio ursinus*
» HEIGHT 58-76cm WEIGHT 35kg (males)
» HABITAT Scrub, woodland, grassland and semi-desert of southern Africa as far north as Zambia.

HAMADRYAS BABOON *Papio hamadryas*
» HEIGHT 60-75cm WEIGHT 23kg (males)
» HABITAT Semi-arid grasslands and rocky hill country of north-east Africa, up to 2,600m.

YELLOW BABOON *Papio cynocephalus*
» HEIGHT 60-80cm WEIGHT 24kg (males)
» HABITAT Savannah, thorn scrub and woodland of central Africa.

GUINEA BABOON *Papio papios*
» HEIGHT 50-70cm WEIGHT 23kg (males)
» HABITAT Evergreen forest and wooded savannah of West Africa.

OLIVE BABOON *Papio anubis*
» HEIGHT 60-70cm WEIGHT 24kg (males)
» HABITAT From semi-desert through savannah to tropical rainforests of equatorial Africa.

GELADA BABOON *Theropithecus gelada*
NB: not regarded as a 'true' baboon
» HEIGHT 50-75cm WEIGHT 18kg (males)
» HABITAT Highlands of Ethiopia.

MANDRILL *Mandrillus sphinx*
NB: a close relative of 'true' baboons
» HEIGHT 56-81cm WEIGHT 26kg (males)
» HABITAT Tropical rainforests of central Africa.

DRILL *Mandrillus leucophaeus*
NB: a close relative of 'true' baboons. Very rare.
» HEIGHT 56-70cm WEIGHT 17kg (males)
» HABITAT Rainforests of West Africa.

Clockwise from top left: Darrell Gulin/Getty Images; Paul Brough/NHPA; Cyril Ruoso/Biosphoto/Still Pictures; Martin Harvey/NHPA; Cyril Ruoso/Minden/FLPA; Bernard Walton/naturepl.com; Yva Momatiuk/Minden/FLPA; Ariadne Van Zandbergen/FLPA