PORTFOLIO: CAPE GROUND SQUIRRELS

Capturing the breathless activity of these sociable, burrowing rodents was a huge challenge for photographer STEFANO UNTERTHINER. **Words by Jane Waterman**

A CAPE GROUND SQUIRREL on the lookout for danger. Vigilance is vital for a species that numbers goshawks, monitor lizards and jackals among its many enemies. A highly active herbivore, the squirrel must spend much of the day foraging in the open to find enough sour grass seeds and *duwweltjie* flowers to fuel its dynamic lifestyle – and this is when it is most at risk. As a consequence, it has to devote valuable feeding time to keeping watch. But to make life easier, the squirrel usually forages in close-knit groups, where the individuals share the sentinel duties and give everyone more time to feed.

WHEN YOU THINK of a squirrel, you probably picture a solitary tree climber. You might not automatically envisage an animal that lives in burrows and is as sociable as lions or dolphins. Yet the Cape ground squirrel *Xerus inauris* of southern Africa relies on living in close-knit groups to survive. Ranging throughout the dry regions of Botswana, Namibia and the Republic of South Africa, this burrowing rodent is perhaps best known for using its tail to provide vital shade to beat the heat of this harsh environment, hence its nickname 'parasol-tailed squirrel.'

DIVIDED SOCIETY

Relying on powerful forepaws as digging tools, the Cape ground squirrel prefers areas of compact soil, which allow it to construct durable, complex burrow systems. Within these burrows, the squirrel lives in two distinct social groups: the first contains related females and their offspring; the second comprises bands of unrelated adult males.

Female groups contain up to three adult females and up to nine young. Females give birth at any time of year and the periods when the females are receptive to mating are irregular and unpredictable. Though litters are small – just one or two young at a time – females can breed four times a year.

The females leave their groups to give birth alone but return when their young are on the verge of weaning. The entire group then helps care for the growing youngsters including grooming them and watching out for predators – the young being particularly vulnerable to the many large snakes that inhabit the region. It soon becomes virtually impossible to distinguish which young squirrels belong to which mother.

GANGS OF MALES

As female groups grow larger, some of the females will split off to nearby burrows and form new groups. By contrast, young males disperse away from their natal burrow and join an all-male gang. These male groups contain up to 19 individuals but, unlike the cohesive female groups, males form smaller sub-bands, changing members daily. There is no evidence of co-operative defence or territoriality and, similar to female groups, these all-male bands show minimal signs of aggression. The key to dominance is age not body size or fighting ability as is often the case with other mammals. The older the squirrel, the more elevated his position in the male hierarchy.

Occasionally, however, young adult males delay dispersal, sometimes remaining with the females for years after they have reached sexual maturity. Finally, even these reluctant males must disperse, usually because they've been kicked out of the group. And just like males that disperse at an earlier age, they join up with a band of unrelated males.

These all-male groups roam home ranges of up to 12 hectares that overlap those of multiple female groups (female territories average about 3.5 hectares), and the males divide their time between feeding and searching for receptive females.

When a female Cape ground squirrel does ▶

CAPE GROUND SQUIRRELS are considered 'ecosystem engineers' because of their construction of complex burrow systems that have an impact on a great number of species. These include slender and yellow mongooses, meerkats, snakes, geckos, scorpions and numerous invertebrates that use the burrows as shelters from predators. At over a metre deep in places, burrow networks allow for some relief from the oppressive desert sun. The burrow systems contain multiple openings so that there are plenty of escape routes for the squirrels from danger both above and below ground.

become receptive, males from all over the area compete to mate with her. Studies show that an average of 10-11 males scramble for access to the single female during the few hours she is in oestrus. Females mate with an average of four males during this period, with more dominant males usually mating first and more frequently. However, with the low rates of aggression between males, even during mating, each potential father may instead be relying on his sperm to out-compete that of his rivals within the female's reproductive tract – a feature known as 'sperm competition'.

SAFETY IN NUMBERS

Apart from breeding, Cape ground squirrel's lives revolve around the availiability of food, and they dig their burrows in areas teeming with favoured plants particularly the grass *Schmidtia kalahariensis*. This abundant species also provides the squirrel with the majority of its water – the species rarely drinks.

In order to feed, the squirrel must leave the safety of its burrow and so it becomes more vulnerable to predation from ground and air. And this is the key to the squirrel's sociability. Being in a group means there are more eyes watching out for attacks from any angle. When a predator is seen, members of the group instantly make high-pitched alarm calls and run back to their home burrow system regardless if it is the closest refuge or not.

But the squirrel is not always safe within its burrows. Venomous snakes have often been seen disappearing into burrow systems in the hope of cornering prey underground. The squirrels respond by teaming up to mob the intruder. The whole group – save the youngest members – combines to harass the snake from all sides, yelping, jumping and flicking their tails at the predator until it decides there are easier meals to be had elsewhere.

LANDSCAPE DESIGNERS

The burrow systems excavated and maintained by Cape ground squirrels play a crucial role in the southern African environment. For a start, their digging activities are thought to benefit water conservation. While much of the region's meagre rainfall lands on compacted earth and evaporates quickly, the squirrels' holes and burrows help channel water deep into the soil, where it can sustain plant growth. In addition, the burrow systems provide refuge for numerous invertebrates, as well as many lizards, snakes and small mammals.

We tend to focus on the actions of large animals on their environments, such as the elephant herds that topple trees and open up wooded regions for other species, but the role small social species play in shaping their local ecosystem should never be undervalued.

JANE WATERMAN, a behavioural ecologist at the University of Central Florida, has studied Cape ground squirrels for 18 years. Her co-authors, Beth Pettitt and Mary Beth Manjerovic, research reproductive delay in female ground squirrels and mating strategies in males respectively.

▶ **IN THE HEAT** of the desert sun and with little available shade, a Cape ground squirrel curls its broad, furry tail up over its body and head to provide a welcome scrap of shade, rather like a genteel Victorian lady with a parasol. Such behaviour enables the squirrel to extend the time it spends foraging, giving it an advantage over other herbivorous species.

▲ **IT IS EASY TO** see why Cape ground squirrels are famous for being sociable. Sometimes groups of up to seven squirrels will sit and groom each other at the same time. This activity, called allogrooming, is a way for squirrels to remove parasites including ticks and fleas. Squirrels in larger gangs have fewer parasites due to the group's grooming efforts.

▶ **CAPE GROUND SQUIRRELS** have their own way of asking for a favor from another social group member. Sometimes, one squirrel will approach another squirrel and 'present' itself, a behaviour that involves walking up to another squirrel, sniffing it, and then rolling over. If the squirrel responds to the 'request', he or she will begin grooming the prostrate squirrel.

MALE GROUND SQUIRRELS jump and roll in ritual fights for dominance and for access to sexually receptive females. Despite the spectacularly acrobatic manoeuvres, these 'fights' are seldom violent and are a non-aggressive means for males to maintain their dominance over each other.

Female squirrels are sexually receptive for only three to four hours every three or four months. This means that males must constantly search for receptive females – which they locate by scent – so as to not miss an opportunity to mate. When a female is in oestrus (sexually receptive), there may be up to 11 males running around looking frantically for her. Once he's found her, the male will approach the female and she will either reject him or give chase, eventually leading to copulation.

◀ **MANY DIFFERENT SPECIES** make their homes in the burrow systems of Cape ground squirrels, including the yellow mongoose (seen left), slender mongoose and the meerkat. Cape ground squirrels live amicably among these other species, with no fighting or aggression. Research has suggested that each of these species may gain benefits by associating with the others. While Cape ground squirrels' burrow systems provide temporary accommodation for roaming meerkat and yellow mongoose groups, the meerkats and yellow mongooses provide extra pairs of eyes to look out predators. In fact, studies have shown that squirrels are less vigilant when in the presence of meerkats allowing them more time to feed and groom one another.

THE PHOTOGRAPHER

Born in the Italian Alps, STEFANO UNTERTHINER took up photography at the age of 17 – inspired by the beauty of his natural surroundings. After studying natural sciences in Turin and taking a PhD in Zoology at Aberdeen University, he began his career as a professional wildlife photographer. As he says "If you want to have a good chance of photographing wildlife, it is important to know the biology and behaviour of the animals." His work has been published in numerous prestigious magazines, including *National Geographic* and he won categories in Wildlife Photographer of the Year in both 2003 and 2004.

Stefano spends several months each year travelling around the world in search of new stories. He was delighted to learn the story of Cape ground squirrels and to be able to retell it in pictures.

» To find out how Stefano Unterthiner took these photographs, see How to... p60.

THE LOCATION

CAPE GROUND SQUIRRELS are endemic to open savannahs and central and southwest Kalahari desert regions of southern Africa.