



DESERTS



The first night I spent in a tent in the Kalahari was also one of the coldest in my life. Even though I knew that the temperature differences between night and day could be significant in a desert, nothing had prepared me for the near-freezing experience that followed the blistering heat of the day before. Putting on a second pair of pants and another layer of T-shirts, I cursed myself for not being better prepared. I learned my lesson that night, and on my next trip to the desert I stocked up on warm clothes. Unfortunately, my luggage had been lost on its way from Johannesburg to Windhoek, and I only saw it again after spending three weeks shivering each night in a borrowed, thin sleeping bag, with just a single shirt on my back.

The daily difference in temperature in desert ecosystems, which regularly approaches 40°C ($\sim 70^{\circ}\text{F}$), is

rooted in the extremely low humidity of these environments. Deserts lack the buffering effect normally brought by water in the atmosphere. The air above the desert is exceptionally clear, and the lack of water in it means that nothing intercepts and diffuses solar radiation before it reaches the surface. The ground re-radiates the heat, and because there is nothing to trap it, the ground continues to cool throughout the night. This nocturnal cooling is probably the reason why many desert animals, such as ants or darkling beetles, are black, despite the fact that black coloration may cause overheating. Apparently, the ability to absorb solar radiation quickly in the morning and warm up enough to start foraging early is worth the trouble of dealing with excessive heat absorption later during the day. Of course, it would be ideal if an animal could change its color from black to white, depending on its need to warm up or cool off. Although such a thermoregulatory trick is impossible for animals with hard, external exoskeletons, it is entirely within the realm of possibility for reptiles, and the Namaqua chameleon and many geckos can change their coloration from black to almost snow white thanks to numerous chromatophores in their skin.

But high temperatures, which can easily reach 75°C (167°F) on the surface of the sand are not the only problem desert animals must deal with. Solar radiation itself, high in harmful ultraviolet (uv) waves, can increase the rate of genetic mutations, generally a very negative phenomenon. Animals deal with this problem in three different ways. The most obvious approach to avoiding excessive solar radiation is to hide from it. Many small animals, such as beetles, silverfish (*Thysanura*), some crickets, and lizards spend most of their active time under the surface of the sand; others hide under rocks or in thick

For a relatively small (approximately 1,000 species) and rather little-known group of arachnids, sun spiders enjoy a surprisingly elaborate mythology. In southern African countries, these animals are often feared because some diurnal species appear to chase people. In fact, they are simply following the shadow created by a person, trying to avoid direct exposure to the sun's heat. They are also accused of cutting patches of hair from sleeping animals and people, resulting in another common name, the haircutters. Interestingly, clumps of mammal hair have been found in nests of some sun spiders, indicating that females may indeed use it, but whether the hair is cut or simply collected from the ground is unknown.



The seemingly lifeless, constantly shifting dunes of the Namib desert are home to a surprisingly diverse fauna. Most animals living there are exceptionally well adapted to dealing with both the blistering heat of the day and the loose, unstable sand.



The Smith's desert lizard (*Meroles ctenodactylus*) has a number of adaptations to life in the fine, loose substrate of the dunes: a wedge-shaped snout to help it dive into the sand, fringed fingers to increase the surface area of its feet, and a skin fold that covers the ears to protect them from being clogged with sand.

Perched atop a
welwitchia (*Welwitchia
mirabilis*) early in the
morning, a Namaqua
chameleon inflates its
body and darkens
its skin to warm up
quickly in the rays of
the rising sun
(Namibia, Namib desert).

