



# supercool

RUFOUS-CHEEKED NIGHTJAR WARWICK TARBOTON

## Nightjars rewrite the record books

Few sounds of the African night are more evocative than the call of a Fiery-necked Nightjar. The enigmatic and mysterious nature of this group of birds has secured them a prominent place in folklore and mythology; the colloquial name ‘goat-suckers’, for instance, reflects the belief that arose in medieval Europe that nightjars drink milk from the teats of goats and other livestock.

Yet truth is sometimes stranger than fiction and the perception that nightjars are really weird birds is borne out by what we know about their ecology and physiology. Of the 10 000 extant species of birds on earth, just one is known to hibernate: a North American nightjar. Many other nightjars use torpor, a short-term state of reduced metabolism and body temperature; Freckled Nightjars in Namaqualand, for instance, drop their temperature to as low as 10 degrees Celsius on dark, moonless winter nights.

Another facet of nightjars’ biology that is emerging as rather bizarre is their ability to tolerate extreme heat when roosting during the day. Ryan O’Connor, a PhD student at the University of Pretoria, has been investigating the roosting

habits of Rufous-cheeked Nightjars at Dronfield Nature Reserve near Kimberley. Like many nightjars, Rufous-cheeked spend the hot daylight hours roosting in exposed locations where they bear the full brunt of high air temperatures compounded by intense solar radiation. One breeding female in Ryan’s study population laid her eggs on sand that was utterly devoid of shade; at no time between sunrise and sunset did she experience the slightest respite from the sun.

Ryan found that despite these merciless conditions (the effective temperature nightjars experience may approach 60 degrees Celsius), Rufous-cheeked maintain daytime body temperatures slightly lower than those of most birds. They do this using physiological cooling mechanisms that are more efficient than in any other taxon so far investigated. When a day-roosting nightjar – or any other bird – finds itself in an environment where the temperature exceeds 40 degrees, it needs to off-load heat to the environment faster than it gains heat from its surroundings. To achieve this, the bird dissipates heat via evaporation, with the rate of water loss rapidly increasing with rising environmental temperature.

In most birds, panting is the primary avenue of evaporative heat loss. But the muscle contractions required for panting themselves produce metabolic heat, creating a paradoxical situation where a bird must generate heat to off-load heat. Not so nightjars. When roosting in extremely hot sites they rapidly off-load heat at virtually zero metabolic cost, apparently relying on the large area of their massive gapes as an evaporative surface. This process of evaporative cooling, it turns out, is more efficient in Rufous-cheeked Nightjars at Dronfield than in any other bird on the planet so far investigated.

The remarkable ability of nightjars to keep cool under extreme conditions reminds us that these birds are just different and the physiological limits that apply to most groups simply do not hold for them. Who knows what other fascinating secrets nightjars are still hiding?

ANDREW McKECHNIE

### Reference

O’Connor, R.S., et al. (in press). ‘Avian thermoregulation in the heat: efficient evaporative cooling in two southern African nightjars.’ *Journal of Comparative Physiology B*.