

INSIDE JEB

Ringtail possums let their temperature rise to save water when Australia gets hot



The Australian climate can be harsh. With barely any rainfall since 2017, many animals are simply dropping dead in the record high temperatures. Listing flying foxes, koalas and birds among the afflicted species, James Turner from Charles Sturt University, Australia, says, 'In most cases, dehydration, or a lack of access to water, was implicated as the driver of mortality'. Curious to find out how one resident, the common ringtail possum (*Pseudocheirus peregrinus*), deals with the stress of high temperatures, Turner headed into the bush to bring a few of the marsupials back to the lab where he could monitor their responses to a simulated heatwave.

Perching the small animals inside a respirometry system to record their oxygen consumption, carbon dioxide production and water loss, Turner gradually turned up

the heat, raising the temperature in the animal's enclosure from 30°C to 38°C, while also measuring the animal's body temperature. 'The rationale for not exposing possums to the higher temperatures expected during a heatwave is related to the likelihood of exposure in the wild', says Turner, who explains that the marsupials are unlikely to experience the full force of the heat as they nestle in cooler dreys in the trunks of hollow trees and on their branches.

However, instead of losing more water to maintain a constant body temperature as the mercury rose, the possums' body temperatures began to climb from ~36°C to almost 39°C, a temperature at which we would feel quite poorly. Impressively, the animals managed to remain warmer than their surroundings, allowing them to continue losing heat to the slightly cooler

air. And when Turner calculated how much water the strategy would allow the 0.8 kg animals to conserve, he found that they could be saving up to 9.6 ml h⁻¹, which mounts up to a sizeable quantity over the course of the day. However, when the air temperature exceeded 35–36°C, the possums began losing water when they licked their fur and when exhaling. Turner points out that allowing their body temperature to rise can only protect them so far, suggesting that the animals are still at risk of dehydration within 20 h on days when the temperature reaches 39°C.

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Turner, J. M. (2010). Facultative hyperthermia during a heatwave delays injurious dehydration of an arboreal marsupial. *J. Exp. Biol.* **223**, jeb219378. doi:10.1242/jeb.219378

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