originated from a regeneration event gone awry.

Was this three-eyed crab a hopeful monster? Because the crab was dissected before it could procreate in the lab, we will likely never know whether its unusual traits were heritable. But regardless of whether or not the three-eyed body plan had a promising future, such anomalous individuals continue to provide an important substrate for imaginative speculation about an animal's life history, development and evolution.

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Scholtz, G., Ng, P. K. and Moore, S. (2014). A crab with three eyes, two rostra, and a dorsal antenna-like structure. *Arthropod Struct. Dev.* **43**, 163-173.

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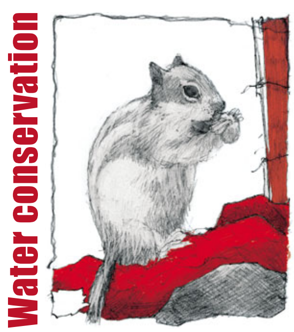
Hidden capacity for water preservation in mammals



Nearly 65 years after Per Scholander and his colleagues published their pioneering work on mammalian thermoregulation (Scholander et al., 1950, *Biol. Bull.* **99**, 237-258) the general consensus is that we have a good understanding of the relationships between body temperature, ambient temperature and metabolic rate. However, more recently the model has been expanded to incorporate patterns of water loss. This is important because losing water via evaporative cooling is one of the primary means of maintaining a lower body temperature at high ambient temperatures. In general, evaporative water loss is relatively constant at and below thermoneutrality (where organisms maintain a stable temperature with little metabolic investment), and increases dramatically above the upper critical limit (where costly cooling measures result in increased metabolism) as water-dependent processes such as panting and sweating are recruited. However, the effects of relative humidity on these patterns have received little attention. At temperatures above the upper critical limit, high humidity reduces the animal's ability to dissipate heat via evaporation, often resulting in increases in body temperature. Below this temperature, however, water loss was generally believed to be dictated purely by the laws of physics and therefore dependent entirely on the humidity gradient between the animal's surface and the air. However, in a recent study on a small arid-zone Australian marsupial (the little red kaluta, *Dasykaluta rosamondae*) published in *Proceedings of the Royal Society B*, Phil Withers and Christine Cooper, of the University of Western Australia, have demonstrated that instead of increasing with decreasing humidity, evaporative water loss below the thermal neutral zone is remarkably constant.

In a previous study the authors had found that kalutas exhibited a number of physiological characteristics that made them well suited to their arid habitats, including low metabolic rates and a high degree of flexibility in body temperature regulation. They also observed that these tiny animals managed to remain cool at high temperatures using lower rates of evaporative water loss relative to other species. Kalutas therefore presented a good candidate to test for potentially beneficial water-conserving adaptations to changes in humidity at lower temperatures. The authors evaluated this by exposing the animals to varying levels of humidity at temperatures in and below the thermoneutral zone and measuring metabolic rate, body temperature and evaporative water loss. Somewhat surprisingly, rather than finding that evaporative water loss increases with decreasing humidity, they found no change.

Their results mean that even in low humidity environments, where the humidity gradient and the laws of physics would favour increased water loss, minimal rates of evaporation were maintained, allowing the small marsupials to save significant amounts of water (nearly 40–50% at a relative humidity of 20%). The authors concluded that this must be indicative of a level of physiological control over evaporative water loss previously unrecorded in mammals. Although they initially believed this means of water conservation to be an adaptation to the arid habitat of the kalutas, they proceeded to find similar patterns in a number of species from a range of habitats. These findings indicate that mammals may have more control over rates of evaporative water loss at lower temperatures than was previously believed. This has important implications for water conservation, as most mammals live at temperatures within or below the thermoneutral zone where additional means of water conservation were not believed to be available. It remains to be seen what mechanisms species such as the kaluta employ to achieve control over evaporative water loss at these temperatures, how common this is among endotherms, and what this means for water and energy budgets in free-ranging animals.

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Withers, P. C. and Cooper, C. E. (2014). Physiological regulation of evaporative water loss in endotherms: is the little red kaluta (*Dasykaluta rosamondae*) an exception or the rule? *Proc. R. Soc. B* **281**, 20140149.

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