

# Australian animals as models in physiological studies

Paul Cooper 

School of Botany and Zoology, Australian National University, Canberra, ACT 0200, Australia.  
Email: paul.cooper@anu.edu.au

This special issue of the *Australian Journal of Zoology* consists of papers that were initially to be presented at the 37th annual meeting of the Australia–New Zealand Society of Comparative Physiology and Biochemistry in December 2020. However, the meeting was postponed as a result of the COVID-19 pandemic. The meeting was to be held in 2021, but has been postponed again, because of the effects of the delta strain of COVID-19 and the shutdown of New South Wales, Victoria, the ACT and New Zealand, resulting in limited travel throughout Australia and New Zealand. To keep the meeting alive and to aim for a meeting in 2022 when vaccinations will permit a return to in-person meetings, we present a paper that was to be one of the keynote addresses and two submitted papers that indicate the breadth of comparative physiology and biochemistry research present in Australia and New Zealand.

‘Australian lizards are outstanding models for reproductive biology research’ (Van Dyke *et al.* 2020) is a review of work that has been done on this group of reptiles and covers a wide range of topics that investigate various aspects of reproduction. The paper starts with a discussion of the wide distribution of lizard habitats and diversity of lizards in those habitats, and how that allows for studies that are interested in how habitat may influence lizard evolution and ecology. The paper then continues with 10 different areas of study on different aspects of reproduction that have been investigated using various lizard taxa. Besides reviewing the literature on the various topics, the sections also indicate which areas require further study. Whether a person is a researcher in lizard biology, or simply interested in learning about diversity of reproductive traits and behaviour, this review article will be useful for understanding how Australian lizards have provided a fertile area of research.

In a study of the western ringtail possum, *Pseudocheirus occidentalis*, Cooper *et al.* (2020) point out the importance of comparative and general physiological traits for understanding species distribution and potential for adjusting to changes in environment that can challenge the range of environmental conditions that limit species. In this paper, they use the Point of Relative Water Economy (PRWE) determined from changes in metabolism, metabolic water production and evaporative water loss to explain how this species can survive in hotter and

drier habitats than other ringtail possums and koalas. This technique can be extended to understand whether current animal distributions are based on environmental changes or in response to other causes.

Zhou *et al.* (2020) use morphological and physiological data to explain how the foreguts of crickets and locusts differ in their initial handling of food. The main anatomical difference is the presence of the proventriculus in crickets, but the main physiological difference is the force of contraction in the locusts. The locusts use the forceful contractions of the foregut to compress the food and remove more of the water and potentially the soluble nutrients before moving the food into the midgut, while the crickets spend more time reducing the food particle size before passing the food through the proventriculus into the midgut. The action of the foregut of the locusts is one reason that they can consume food at a faster rate and may be part of the reason that locusts are able to consume large quantities of agricultural fields during periods of outbreak.

## Conflicts of interest

The author declares no conflicts of interest.

## References

- Cooper, C. E., Withers, P. C., and Turner, J. M. (2020). Physiological implications of climate change for a critically endangered Australian marsupial. *Australian Journal of Zoology* **68**, 200–211. doi:[10.1071/ZO20067](https://doi.org/10.1071/ZO20067)
- Van Dyke, J. U., Thompson, M. B., Burrige, C. P., Castelli, M. A., Clulow, S., Dissanayake, D. S. B., Dong, C. M., Doody, J. S., Edwards, D. L., Ezaz, T., Friesen, C. R., Gardner, M. G., Georges, A., Higgie, M., Hill, P. L., Holleley, C. E., Hoops, D., Hoskin, C. J., Merry, D. L., Riley, J. L., Wapstra, E., While, G. M., Whiteley, S. L., Whiting, M. J., Zozaya, S. M., and Whittington, C. M. (2020). Australian lizards are outstanding models for reproductive biology research. *Australian Journal of Zoology* **68**, 168–199. doi:[10.1071/ZO21017](https://doi.org/10.1071/ZO21017)
- Zhou, S., Woodman, J. D., Chen, H., and Cooper, P. D. (2020). The role of the foregut in digestion in the cricket *Teleogryllus commodus* and the locust *Chortoicetes terminifera*. *Australian Journal of Zoology* **68**, 212–221. doi:[10.1071/ZO20092](https://doi.org/10.1071/ZO20092)