

Thesis abstract

Causes and consequences of sleepy lizard, *Tiliqua rugosa*, social networks

Stephan T. Leu

Abstract of a thesis for a Doctorate of Philosophy submitted to Flinders University, South Australia, Australia

An important aim of behavioural ecological research is to develop a unified model to explain the determinants of the great variety of animal social groups, including their maintenance and evolution. Social reptile species, lizards in particular, are increasingly used to systematically test social behaviour theory, expanding its application beyond the usually studied birds, mammals and social insects and better describing the natural variability of sociality. I contributed to this important expansion by investigating the ecological and evolutionary processes that drive the social behaviour in the unusually social Australian sleepy lizard, *Tiliqua rugosa*.

I used modern Global Positioning System technology to investigate socially relevant behaviours that are rarely seen by direct observation in this species. Using social network analysis techniques, I identified the social organisation as pair-living. Detailed continuous data records supported previous findings of pair-living behaviour from snapshot observations, but also revealed that social pairs remained associated after mating had finished, an intriguing behaviour since reproduction is a strong driving force in pair living. (Leu et al. (2010a)).

Further analysis of the pair behaviour showed that predominantly males, but also females, initiated the reunion of the social pair after

temporary natural separations. But, males appear to experience higher costs of pair living than females because they initiated temporary separations of the pair more frequently than females. Sex biased activity, males showed higher movement activity and remained active for longer each day, may be an important mechanism to mitigate the higher costs of pair living for males, such as lost extra-pair matings and within pair competition for food. (Leu et al. (2011a)).

Ecological factors influence social behaviour, for example refuge availability may determine refuge sharing frequencies. Sharing refuges of otherwise solitary individuals during periods of inactivity is an integral part of social behaviour and has been suggested to be a potential precursor to more complex social behaviour. To test this assumption I compared social networks for active versus inactive lizards, both for social pair partners and for non-pair members of the social neighbourhood. However, I did not find evidence that refuge sharing may have been the evolutionary pathway to sleepy lizard social behaviour (Leu et al. (2011b)).

Social associations and interactions with other individuals of the species may facilitate the development of tolerance and cooperation. However, they may also increase the risk of parasite transmission, which negatively affects

host fitness. I investigated this for ticks, important parasites that are indirectly transmitted at refuge sites. I found that sleepy lizard individuals that frequently used their neighbours' refuges were highly connected within a tick transmission network, had higher cross-infection risks and suffered from higher tick loads. Furthermore, increasing the number of refuges each lizard uses may be an important defence mechanism against ectoparasite transmission. (Leu et al. (2010b)).

Investigating these different aspects of social behaviour, this study extends our knowledge of sociality in lizards and provides valuable comparative information for a better understanding of the generality of animal social behaviour.

References

Leu, S.T. Bashford, J., Kappeler, P.M., Bull, C.M. (2010a) Association networks reveal social

- organization in the sleepy lizard; *Animal Behaviour*, **79**, 1, 217–225
- Leu, S.T., Kappeler, P.M., Bull, C.M., (2010b) Refuge sharing network predicts ectoparasite load in a lizard; *Behavioral Ecology and Sociobiology*, **64**, 1495-1503.
- Leu, S.T., Kappeler, P.M. Bull, C.M. (2011a) Pair-living in the absence of obligate biparental care in a lizard: trading off sex and food? *Ethology*, **117**, 9, 758–768.
- Leu, S.T., Kappler, P.M., Bull, C.M., (2011b) The influence of refuge sharing on social behaviour in the lizard *Tiliqua rugosa*; *Behavioral Ecology and Sociobiology*, **65**, 4, 837-847.

Dr Stephan Leu,
Flinders University SA 5042
AUSTRALIA

E-mail: stephan.leu@flinders.edu.au

