

RESEARCH DIRECTIONS

The pace of life

Dr Christopher Turbill from the Hawkesbury Institute for the Environment has been awarded a prestigious Australian Research Council Discovery Early Career Researcher Award to support his research into the physiological basis of life-history trade-offs that cause some individuals or species to age faster than others.

'No animal lives forever while producing endless offspring – this hypothetical creature has been coined a "Darwinian demon" explains Dr Turbill. 'Instead, animals are forced to trade-off future survival in favour of current reproduction. My project seeks to understand the physiological basis of these key "life-history" trade-offs which cause most, if not all, organisms to exhibit biological ageing. One of the leading hypotheses for a cause of ageing is oxidative stress, which can result from an imbalance between the production of reactive molecules from oxidising food and the biological system's ability to neutralise these free radicals into something less toxic or repair the resulting damage. A major problem with previous studies, however, has been the inherent difficulty in measuring oxidative stress in whole animals. In this project we aim to manipulate the pace of key life-history traits such as growth rate, body temperature, metabolism and reproductive effort, and measure changes in an exciting new biomarker of chronic oxidate stress.'

The investigators will measure the rate of shortening of telomeres, repeated segments of DNA on the ends of chromosomes. Telomeres shorten with age and are especially sensitive to oxidative damage. The team will combine molecular genetics, physiology and ecology to answer a fundamental question: which mechanisms underlie the link between vital processes such as growth and reproduction, and rates of biological ageing? The experiments will shed light on how physiological



states are linked to variations in rates of cellular damage and ageing, and how these mechanisms are influenced by environmental conditions at various stages of life.

This research is likely to produce significant new discoveries about a topical and far-reaching biological question: which mechanisms underpin the fundamental trade-offs observed among life-history traits.

Project Title: Oxidative stress as a physiological constraint on the pace of life histories

Funding has been set at: \$375,000

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