The long tale of a lizard's regrown tail

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King's skink lizard. Credit: James Barr

Curtin University researchers have found that King's skink lizards can re-regenerate their tails, which may help them conserve energy and escape predators, potentially improving their survival and evolutionary fitness.

Lead researcher Ph.D. candidate James Barr, from Curtin's School of Molecular and Life Sciences, said many species of lizards use the ability to self-amputate a portion of their tail, called caudal autotomy, as a defence mechanism when they are being attacked by a predator.

"While self-amputating its tail may save the lizard's life, there are negative trade-offs for the lizard, mainly relating to the fact that its tail doesn't grow back exactly as it was before, which could affect its mobility, ability to defend itself against predators, and potentially even affect its social status amongst other lizards," Mr Barr said.

"When the tail regenerates, it grows back as a single rod of cartilage, and it doesn't have the same vertebrae break points that it previously had, which it uses when self-amputating.

"This means that the next time the lizard needs to self-amputate, this would have to happen closer to the body, resulting in the loss of a larger portion of the tail. This in turn would require more energy to regrow the tail, which over time can directly affect the physical fitness and well-being of the lizard."

Ph.D. supervisor Associate Professor Bill Bateman, also from Curtin's School of Molecular and Life Sciences, said the research analysed three populations of the King's skink, a large lizard from the south-west region of Western Australia.

"We found these lizards were able to re-grow back a portion of their tail that had already been regenerated with a cartilage rod following a tail-loss event, such as from the bite of a predator. This is despite the cartilage rod not having any breakage planes," Associate Professor Bateman said.

"This means that not only are these animals able to regenerate their tail without a true autotomy event occurring at a breakage plane, but also conserve the time and energy into reproducing a 'complete' tail, minimizing negative effects on their fitness.

"If a lizard doesn't need to re-grow its entire tail, but rather re-grow only

a necessary portion, it really could save a lot of time and energy for the lizard, which it then can divert to other activities."

Overall the time and energy to regenerate a 'complete' tail varies because the growth is dependent on other factors, such as the species of lizard, its overall health, the level of tissue trauma at the amputation site and any other energetic demands that the lizard faces.

"It has also been proposed that lizards are able to 'decide' how much of their energy they want to allocate to tail regrowth, and balance that against their requirements for reproductive output," Associate Professor Bateman said.

"So, for example, a species that is short lived and matures early may prioritize reproducing over re-growing a tail, and a species that generally lives longer, may do the opposite.

"It will be interesting to see more research in this space and to see how the use of re-growth strategies may affect lizards in the long term."

The full research paper, "Re-regeneration to reduce negative effects associated with tail loss in lizards," which was published in *Scientific Reports*, can be found online here.

More information: James I. Barr et al. Re-regeneration to reduce negative effects associated with tail loss in lizards, *Scientific Reports* (2019). DOI: 10.1038/s41598-019-55231-6

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https://phys.org/news/2019-12-tale-lizard-regrown-tail.html