Tree lizard's quick release escape system makes jumpers turn somersaults

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If you've ever tried capturing a lizard, you'll know how difficult it is. But if you do manage to corner one, many have the ultimate emergency quick release system for escape. They simply drop their tails, leaving the twitching body part to distract the predator as they scamper to safety. According to Gary Gillis from Mount Holyoke College, USA, up to 50% of some lizard populations seem to have traded some part of their tails in exchange for escape. This made Gillis wonder how this loss may impact on a lizard's mobility and ability to survive. Specifically how do branch hopping, tree dwelling lizards cope with their loss.

Teaming up with undergraduate student Lauren Bonvini, the pair began encouraging lizard leaps to see how well the reptiles coped without their tails and publish their results on 13th February 2009 in The *Journal of Experimental Biology*.

Constructing a jumping arena from boxes and fine sandpaper, the duo gently encouraged arboreal Anolis carolinensis (anole) lizards to launch themselves from a 11cm high platform as they filmed the animals' jumps. The animals performed well, launching themselves by pushing off with their back feet and landing gracefully, covering distances ranging from 14.9-29.9 cm.

But how well would the animals perform without their tails? Encouraging the lizards to drop their tails by holding them, just like a hungry predator would, Bonvini then persuaded the tailless reptiles to jump while Gillis filmed them. As soon as the first animal took to the

air, Gillis knew something was different. 'It looked weird' says Gillis, 'the animals became blurred as they jumped. I called Lauren over and said "you're not going to believe this"'. Replaying the animal's jump in slow motion, the team could see that the animals were tumbling backwards uncontrollably as their tail stump flailed around. Filming other tailless anoles, three more backflipped out of control, although two others seemed to manage their trajectories better.

Teaming up with Duncan Irschick to analyse the reptiles' leaps, the team could see that everything about the tailless lizards' take off was exactly the same as it had been before they lost the appendage. Things only started to go wrong as they left the jump stage. The lizards began flipping back by more than 30deg; some tumbled so far that they landed on their backs. The team also realised that as the animals took off, they raised the base of their tails as the rest of the appendage trailed along the ground, as if it was somehow stabilising the take off.

'If jumping and landing are important for lizards, they are really compromised,' says Gillis. 'Coordinated landing on a branch is out of the question when spinning backwards,' he adds. Escaping lizards probably pay a significant ecological cost for their life saving quick release system.

So how do the animals use their tails to ensure a safe touch down? Gillis isn't sure whether the lizards push down with their tails at take off to prevent themselves from spinning, or whether the trailing tail passively stabilises the animal's departure. He is also keen to find out more about how the animals adjust to life without their tails, and after they have grown back.

More information: Gillis, G. B., Bonvini, L. A. and Irschick, D. J. (2009). Losing stability: tail loss and jumping in the arboreal lizard Anolis carolinensis. *J. Exp. Biol.* 212, 604-609. jeb.biologists.org

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