

Lizards from cold climates may face rapid extinctions in next 60 years, study shows

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The study looked at three groups of diverse lizards from South America. Credit: Daniel Pincheira-Donoso

Lizards that produce live young are significantly more likely to be driven to extinction through climate change than those that lay eggs, new

research suggests.

The study, involving Nottingham Trent University and the University of Lincoln, suggests that live-bearing [lizards](#) face high risks of extinction within the next 60 years, driven predominantly by rising temperatures.

Researchers investigated how strategies for reproduction that live-bearing (viviparous) or egg-laying (oviparous) modern lizards evolved in the past can affect their chance to survive [ongoing climate change](#) caused by humans.

As part of the work, the team argue they have confirmed the emerging 'cul-de-sac' theory, which suggests that live-bearing reproduction evolved in lizards that colonized [cold climates](#), such as high elevations and latitudes.

This adaptation, however, is dragging them to extinction.

The theory—developed by NTU's Dr. Daniel Pincheira-Donoso—suggests that following colonization of those harsh environments, mothers 'retained' the eggs in their bodies to act as incubators, and this provided embryos with stable conditions of temperature and oxygen.

It is thought that, over time, this egg retention evolved into birthing live young.

Reproducing live young is not very effective in hot environments, however, and once reptiles evolve in this way, they remain 'trapped' in cold areas.

As climate warming rapidly progresses towards higher elevations and latitudes, the 'suitable' cold climates where live birthing species live will

be pushed towards [mountain tops](#) and continent edges until lizards run out of space and are eventually wiped out.

The study looked at three groups of highly-diverse lizards from South America: one which only has viviparous species, one with only oviparous species, and one which has evolved both forms of reproduction.

To investigate whether ongoing climate change will cause extinctions predicted by the theory, the researchers used computational modeling of current [climate](#) change, combined with real data on the conditions that lizards live under.

Their team, led by Dr. Pincheira-Donoso, found that live-bearing species will displace towards the mountain tops at significantly faster speeds than egg-laying species—displacing at a rate of 0.3% of the current geographical range per year.

While this means that viviparous lizards will face high extinction risks within just six decades, oviparous species will remain largely unaffected. Of all the [climatic factors](#) studied, temperature was the dominant factor responsible for these extinctions.

"Human-induced [climate change](#) has forced the modern world to face one of the most severe periods of global-scale extinctions of species since life began," said researcher Dr. Daniel Pincheira-Donoso, a bioscientist at Nottingham Trent University.

He said: "Our results highlight the extent of the extinction crisis that modern biodiversity is currently facing. By 2080, more than half of the current 'cold lands' in the area we investigated in South America will have become warm, leading current resident species to extinction.

"Extinction risks are known to increase as a result of rapid climatic

alterations and environmentally sensitive [species](#) traits that fail to adapt to those changes.

"Viviparous lizards appear to have undergone a 'double-edged adaptation' – life births evolved because it was the critical adaptation that reptiles needed to colonize cold climates, but it will also accelerate their extinctions.

"This work provides us with an opportunity to identify specific areas that need more urgent protection—such as high mountain elevations where extinction risks will concentrate.

"This phenomenon would apply to other reptiles, such as snakes, anywhere in the world."

Researcher Manuel Jara, who was at the University of Lincoln when the work was carried out, added: "Live-bearing lizards are predicted to follow their dramatically shrinking cool habitats, increasing their risk of [extinction](#)."

More information: Manuel Jara et al. Alternative reproductive adaptations predict asymmetric responses to climate change in lizards, *Scientific Reports* (2019). [DOI: 10.1038/s41598-019-41670-8](https://doi.org/10.1038/s41598-019-41670-8)

Provided by Nottingham Trent University

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