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Anolis shrevei

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Martha Muñoz asks how behaviour affects the evolution of Caribbean anole lizards.

Anolis shrevei **performs a dewlap display from a rocky perch in the Dominican Republic.**

For much of my career, *Anolis shrevei* has made me wait.

This small anole lizard lives high in the mountains of the Dominican Republic, where pine forests and *sabanas* (grasslands) cover the highest peaks of the Caribbean. To observe them, I often arrived before sunrise, wrapped in my warmest clothes, and settled in for a chilly vigil. I liked to perch on a large boulder and watch the first light spread across the mountaintops as I waited for the lizards to emerge.

The Dominican Republic usually conjures images of balmy beaches and lush forests. Yet, it also bears many tall mountains, with some peaks that exceed three kilometres of elevation. These mountains are the last place in which you would expect to see a tropical lizard. But, as we have learned time and again, anoles are full of surprises. Anoles — a radiation of Neotropical lizards with more than 400 species — are renowned for their convergent evolution into diverse assemblages of microhabitat specialists (ecomorphs) across the Caribbean Greater Antilles. But, some species — such as *A. shrevei* — are also remarkable for their behavioural capacity to buffer temperature.

Lowland anoles are typically up and about around sunrise, but I have never seen *A. shrevei* appear that early. Instead, these lizards wait patiently for the landscape to warm. Only after sunlight toasts the rocky slopes do they emerge. Around midmorning, the first lizard comes out, its body blending almost perfectly into the surrounding rocks. Then, it begins its morning chorus, bobbing its head and extending a pale-yellow dewlap from its throat — advertising its presence to rivals and potential mates.

I first became fascinated by *A. shrevei* because it seemed improbable. Despite living in a much colder environment than its lowland relatives, its thermal physiology differs little from theirs. This remarkable stasis reflects the fact that *A. shrevei* is an accomplished thermoregulator, maintaining relatively high body temperatures despite living in a cold environment. *Anolis shrevei* may not live near sea level, but it ephemerally recreates those warmer habitats simply by being very picky about where it spends its time.

Tropical mountains are often thought to be especially effective at generating new species because climatic conditions differ so dramatically across elevation. In the tropics, where seasonal temperature variation is low, organisms that live at different elevations experience distinct climatic conditions throughout the year. These persistent differences should favour physiological specialization, and create steep climatic barriers to dispersal across elevation. Over time, such barriers promote population divergence and the formation of new species.

But *A. shrevei* and its close relatives do not experience temperature passively; as a result, species in this lineage have broad thermal tolerance ranges and, often, wide elevational ranges. These observations made me wonder whether the climatic barriers of mountain passes are equally formidable to all tropical organisms.

That question has guided much of my research ever since. Across the Caribbean, anoles differ dramatically in how they interact with their environments. Some carefully regulate their body temperatures through behaviour, whereas others largely conform to prevailing conditions. These differences may influence patterns of local adaptation, dispersal across elevation, and the rate at which speciation unfolds, which suggests that evolution in the tropics depends not only on the environments organisms inhabit but also on how they experience them.

Today, my team and I are exploring these questions across dozens of Caribbean anole species. By comparing behaviour, physiology, morphology and patterns of gene flow across environmental gradients, we hope to understand when behaviour promotes evolutionary divergence and when it prevents it.

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Competing interests
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