Researchers document geckos violently shaking from side to side to immobilize their scorpion prey

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When western banded geckos are hungry, they pounce on crickets, beetles, or other small arthropods in their environment, and quickly

gobble them up.

But when they catch scorpions, they begin to shake themselves violently from side to side at high speeds, smashing their prey back and forth against the ground for several seconds until it is immobilized. After the fracas, the gecko devours the much smaller scorpion.

"It's a really kind of physically stunning behavior, something totally unexpected from a lizard like that," said San Diego State University biologist Rulon Clark.

"They seem to be kind of body slamming the scorpions into the ground. If you ever see seals, they'll pick up fish and they'll slap them against the water. I think geckos are doing essentially the same thing, just blunt force trauma." said Malachi Whitford ('20), who studied the geckos' unusual feeding behavior as a graduate student in the joint SDSU and University of California, Davis Ph.D. program in ecology. The University of California, Riverside, also participated in the research.

Clark first noticed the geckos' behavior as an undergraduate research assistant at Utah State University in the 1990s, studying flat-tailed horned lizards at the Barry M. Goldwater Bombing Range in the Sonoran Desert near Yuma, Arizona. Years later, he and his students returned there to film how kangaroo rats fend off rattlesnake attacks with their powerful hindlimbs. While there, they also filmed interactions between geckos and their prey.

"We gave them a variety of different insects and bugs and the comparison between them was pretty stark," said Whitford, now a professor of environmental science at Clovis Community College.

Using high-speed video cameras that capture up to 1200 frames per second, the researchers were able to analyze the geckos' frenetic

movements in fine detail.

"We see every single tiny movement that the gecko makes," said Whitford. "We mapped how quickly different parts of the body were moving."

"You can see what they're doing is rotating their head and body back and forth in this cyclic motion to thrash this thing around—against objects, against the ground—using torsional force to incapacitate the scorpion," said Clark.

The geckos—which, like the scorpions, become active at night—normally are quite mild-mannered.

"It's the least intimidating animal you've probably ever met," said Whitford. "But then when they see a scorpion, they go like berserker mode. And watching that play out and how violent it actually is, how rapidly they're actually shaking, how much they're actually trying to apparently damage the scorpion in some way, that was by far the most impressive and exciting part of this study."

The research was published in the Biological Journal of the Linnean Society earlier this year. The researchers say scorpion-thrashing behavior has been found in one other species of lizard.

As to what explains the geckos' extreme behavior from an evolutionary standpoint, the researchers think it most likely helps minimize the likelihood of being harmed by their own prey.

"When you're dealing with dangerous prey you have to adopt strategies to mitigate that risk," said Whitford. "So like with roadrunners dealing with rattlesnakes, they don't just run up and eat it like they could another snake. They have to try and manage that risk of being bit and injected

with venom. It's clearly a strategy to mitigate that risk because most of the prey that they're eating doesn't pose any risks to them at all."

One possibility is that the geckos shake their bodies so violently to make it impossible for the scorpions to inject them with venom.

"If they're able to break the pointy end of the stinger off through this whipping behavior, maybe they're not getting injured even though the scorpion is poking its tail at them," said Clark.

Whitford thinks it's more likely that when a gecko body-slams a scorpion, the blunt force trauma simply renders the scorpion unable to fight back and physically harm the gecko for long. At which point, the gecko gulps them down. More research is underway to address these hypotheses.

The researchers also don't yet know if the geckos are resistant to the scorpions' venom, but they do get stung often during these interactions without ill effects.

"I think that could be a risk to the gecko for sure. But we never saw a gecko damaged by them," said Whitford.

More information: Shaking things up: the unique feeding behaviour of western banded geckos when consuming scorpions. *Biological Journal of the Linnean Society*, doi.org/10.1093/biolinnean/blab167

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