

Family of rodents may explain how some groups of animals become so diverse

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How did a single species of rodent invade South America and then quickly branch off into 350 new species?

The answer is simple—the rodents were able to move quickly across the continent unencumbered by geographic boundaries that can't be easily crossed such as an ocean.

FSU Professor of Biological Science Scott Steppan and his former postdoctoral researcher John Schenk, now at Georgia Southern University, developed a new model that shows how geography can play a major role in how families of animals evolve and result in many [species](#). The research was part of a \$500,000 grant from the National Science Foundation to understand why the superfamily Muroidea (which includes the subfamily Sigmodontinae) is the most diverse branch of the mammal family tree.

The research is published in the journal *American Naturalist*.

"Biologists have long been fascinated by the process of adaptive radiations, which occurs when a lineage undergoes rapid speciation that is correlated with variation in habitats that species evolve into, resulting in numerous species that differ in the environments in which they live," Schenk said. "Our study was the first to directly measure how movement across the landscape facilitated the speciation process."

Scientists in the past had believed that when species evolved in a short

period of time they diverged because of different [ecological niches](#), not necessarily because of the ability to cross geographic boundaries.

Schenk and Stepan found that the species Sigmodontinae moved into South America and quickly diversified across all the regions within the continent. In about 8 million years, they diversified into about 400 [new species](#) that covered South America.

"That's really fast," Stepan said.

As time passed, the movement between regions and diversification slowed because the regions and their associated ecological niches were essentially full.

"This [geography] largely tracks with what speciation is doing," Stepan said. "After that initial burst, it slows down."

Stepan studies evolutionary biology and has always been interested in how species diversify. Most studies of species diversification involve islands where different groups of terrestrial species are walled off from competing interests by ocean water allowing for animals to diversify based simply on the ecology of the island.

But little is known about how species diversify across the continuous geography of a continent.

Stepan said that he and Schenk are looking at several possibilities for follow-up studies that focus on DNA work and measuring other aspects of the rodents, such as the structure of their limbs and skulls, to see how these structures adapted to new environments over time.

More information: John J. Schenk et al, The Role of Geography in Adaptive Radiation, *The American Naturalist* (2018). [DOI:](#)

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