Why are some groups of animals so diverse?

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A new study of finger-sized Australian lizards sheds light on one of the most striking yet largely unexplained patterns in nature: why is it that some groups of animals have evolved into hundreds, even thousands of species, while other groups include only a few?

The study takes a look at Australia's most diverse group of vertebrates—more than 252 species of lizards called skinks. Researchers at the Cornell Lab of Ornithology have found evidence that the "drying up" of Australia over the past 20 million years triggered this explosive diversification. The results were published in the September 19 online edition of the *Proceedings of the Royal Society B*.

Lead author Dan Rabosky, a Cornell graduate student, spent many months in the remote Australian outback, trapping skinks as they skittered from one prickly clump of grass to another. By documenting where the various skink species occur and using their DNA to define their evolutionary tree, he found that the groups with the most species are the ones that live in the driest parts of Australia. "There's something about colonizing the desert that caused these skinks to diversify at an incredibly high rate," says Rabosky.

An unusual finding of this study is that these skinks upend the usual pattern of species diversity found in other parts of the world. "We typically think of lush tropical rainforests as being the world's major centers of diversity," says coauthor Irby Lovette, director of the Cornell Lab of Ornithology's Fuller Evolutionary Biology Program. "With the skinks, just the opposite has happened: the rainforest skinks in Australia

have much lower diversity, and a lot of the evolutionary 'action' in this system is taking place in the deserts."

Over the last 20 million years, most of Australia changed from humid and tropical to bone-dry desert. "Living in the desert is stressful for animals that are adapted for wetter habitats," says Rabosky. "But somewhere in the distant past, a few skinks developed the ability to survive in their increasingly arid world." It is the descendents of these few early desert colonists that evolved into amazingly large numbers of skink species.

"Australian skinks are really fascinating," Rabosky says. "Two groups in particular have gone evolutionarily crazy, each splitting into as many as 100 different species. In contrast to skinks on other continents, and even some other groups in Australia, the diversity of these particular groups has really exploded."

Rabosky's study included skinks with spots, skinks with stripes, skinks with four legs, or two—or none. Rabosky says there are at least 252 species of these lizards living Down Under, and probably many more that remain to be discovered.

The evolution of these skinks mirrors that of many groups of organisms—from grasses, to beetles, to humans and our relatives—in which some groups have spectacular diversity and others a paucity of species. "For me as a scientist," says Rabosky, "one of the great things about skinks is that there are just so darn many species, making the patterns in their diversity really clear."

Source: Cornell University News Service