



World (BIOCHANGE) in Denmark and lead author on the paper published this week in *Proceedings of the National Academy of Sciences*.

Davis, with the help of ecologists Søren Faurby and Jens-Christian Svenning, using funding from [the Carlsberg Foundation](#), set out to determine just how much evolutionary history has been lost in the mammal lineage alone since the rise of modern humans after the last ice age (roughly, in the past 130,000 years). In addition to counting the number of mammal species that have gone extinct (about 300, in case you were curious), they determined how evolutionarily distinct each species is—that is, the amount of time it spent evolving independently, or in other words, its *phylogenetic diversity*.

If you think of life like a tree, then this evolutionary uniqueness is akin to the length of the branch for each species or group of species. The longer the branch, the more the species have changed since splitting of from their shared ancestors. According to the team's models, in the past couple hundred thousand years, we've lost about two and a half *billion* years of evolutionary history.

“With the extinction of so many megafauna, we've lost both a whole chunk of functional space and some of the longest branches on the evolutionary tree,” Davis explains. “This kind of pattern isn't common in the extinctions we know of from the fossil record, so we are entering uncharted territory.”

The authors calculated that given the current rate of extinctions, we'll lose even more mammals in the next 50 years, and it'll take 3 to 5 million years to once again reach today's biodiversity levels. If we want to go back to the level of mammal diversity that existed before our species, that'll take 5 to 7 million years. Plus, since big body sizes develop more slowly than small ones, it will take even longer to recover the loss of diversity in large mammals like mammoths that occurred between 2,000 and 50,000 years ago. And those are the “best case scenarios,” Svenning says.

### **Weighing what matters**

“Any study like this is always something of a 'back of the envelope' study because there are so many moving parts, but the authors pulled it all together wonderfully,” says evolutionary ecologist [Will Pearse](#) from Utah State University, who was not associated with the research. The findings aren't all that surprising to him, but he's still upset by them and says he “shuddered” when he read the part about how long recovery could take. “This study shows we're on the brink of losing so much diversity it may not even recover within the lifetime of our own species,” he says. “And if that isn't cause for concern, I don't know what is.”

Evolutionary biologist [Arne Mooers](#) from Simon Fraser University in Canada, too, found the paper unsurprising but sobering, and wonders how the findings will inform conservation policy going forward. “That is the 20,000-dollar question, because it gets to the heart of what conservation biologists are actually trying to conserve,” Mooers says.

