

Graduate who started during pandemic completed her evolutionary biology PhD using computational tools

By Risa Aria Schnebly, ASU News
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Editor's note: This story is part of a series of profiles of notable [spring 2025 graduates](#).

Most PhD students spend their first year attending in-person classes, making friends at happy hours and getting into the groove of doing research at a lab on campus. But Sarah Baty started her PhD in the evolutionary biology program in 2020 during the height of the COVID-19 pandemic.

"It was rough," she remembers, "everything was virtual."

Unable to do research in person like she'd hoped, Baty pivoted to a method of researching the evolution of desert tortoises and brittlebush species from afar: bioinformatics, a technique for studying and comparing genomic data using computer programming.

Now, having completed her dissertation using entirely computational methods, Baty is graduating with her PhD within five years — the recommended time frame — an accomplishment that any researcher whose work was disrupted by the pandemic can agree is worth celebrating.

Baty has been curious about biology since she was growing up in New Mexico: "When I was a kid, these giant millipedes would come out and walk around on the sidewalks when it would rain. I was totally fascinated with them, even though they're creepy looking. I was either following bugs or running around trying to catch lizards or snakes."

So, when she started her bachelor's degree at Texas Tech University, Baty decided to study biology, though she wasn't quite sure what to do with it yet — maybe she'd stay in academia, or maybe she'd go to vet school. Then in her senior year, she joined a lab using bioinformatics to compare the genomes of related woodpecker species and found that she was particularly suited for the work.

"I love troubleshooting," she said, laughing. "Some of it is annoying sometimes, like if your code isn't working. But I think I have enough patience to be able to work with it for a week or two or longer. And once you get it working, the result is really cool, because (that data) is something that no one's ever looked at before."

Baty's PhD involved using bioinformatics to compare the genomes of distinct species of desert tortoises — the Mojave Desert tortoise and the Sonoran Desert tortoise. The two tortoise species look and act relatively similar, but are genetically distinct, having diverged from one another about five million years ago.

Using powerful computer programming techniques, Baty was able to construct a reference genome, or a complete record of a species' DNA, for each species of tortoise and compare the two to figure out what caused their divergence.

Baty did similar work sequencing and comparing the genomes of related species of brittlebush — a common desert shrub with fuzzy leaves and yellow flowers that bloom in the spring. For both tortoises and brittlebush, Baty was able to show that ecological differences between the drier Mojave and rainier Sonoran Desert are likely to have driven evolution.

"I feel like everyone thinks that deserts are just kind of like this dry, dead place," Baty said. "But they're actually really unique, and they have a whole host of different endemic species that occur nowhere else in the world."

While Baty loved studying some of those unique desert species, she's most enthusiastic about the tools she got to use to do so.

"I just am super excited about using genomic tools," she said. "In just the past decade or so, technologies have advanced so much. We used to make barely (complete) genomes, and now we have really high-quality reference genomes which comprise most of the genes that an organism has. I think they're super cool tools that everyone interested in genomics should learn to use."

Next, Baty will start a staff position at Los Alamos National Laboratory outside of Santa Fe, New Mexico, run by the US Department of Energy.

"Even though I'm transitioning out of academia into government stuff, I'm excited that I'll be able to continue doing biology-related work and bioinformatics while I'm there."

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Main image

