

## CULTURE

# Caving team discovers, retrieves rare ice age-era cat skeleton from Southwest Virginia cave

*A paleontologist suspects the bones belonged to an American cheetah that lived in Lee County could be up to 500,000 years old.*

 by **Sarah Wade**  
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To get to Petra in Burja Cave, the recovery team had to navigate multiple 40-foot drops, a canyon and some tight spaces—including one that required belly crawling. Courtesy of Katarina Kosič Ficco.

*Updated 12:14 p.m. Jan. 21 with new information on age and gender of skeleton.*

In April 2016, a group of diehard cavers was mapping a vertical cave in far Southwest Virginia when they noticed an odd set of bones. Mike Ficco, one of the cavers, said he often finds animal remains in caves, but they're typically bat- and raccoon-sized and close to the entrances. This skeleton was big — about five feet long — and lay at the bottom of nearly 100 feet of combined vertical shafts and drops.

“Right from the beginning, it looked like it was something unusual and significant,” Ficco said.

Ten cavers returned in the fall of this year with paleontologist Alex Hastings. After two grueling days of hiking, rappelling and crawling through mud, they emerged with what Hastings called a “rare” discovery: the near-complete skeleton of an ice age-era cat.

Hastings said the cat, which they named Petra, could unlock new knowledge about ancient Appalachian predators and the ecosystems that supported them. Confirming the species will take at least a few more months, but he suspects it was an [American cheetah](#) between 10,000 and 500,000 years old.

“There’s not a lot of [American cheetah specimens] out there,” Hastings, paleontology curator at the Science Museum of Minnesota, said. “This would be a really, really amazing skeleton and really give us a much better picture of what these animals were like through Appalachia during the last ice ages.”

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Caver Tom Malabad descends into Burja Cave with several packs. Courtesy of Katarina Kosič Ficco.

“It’s absolutely gorgeous”

Ficco, a consulting geologist from Craig County, said that he and his wife, Katarina Kosič Ficco, a caves and karst field scientist for the Virginia Department of Conservation and Recreation’s Division of Natural Heritag, belong to a regional community of cavers who “live and breathe” to spelunk. Looking at geologic maps, several of them suspected there might be unexplored caves in Lee County — which forms the broken arrowhead tip of Virginia — and headed there in spring 2016.

They hiked an hour down a steep, densely wooded mountain inside Washington and Jefferson National Forests and found the cave only once they were “on top of it,” Ficco said.

The same proved true for Petra.

“We had been split into two exploration teams and both of our teams had actually walked past the bones initially, because we were focused on drawing the cave,” Ficco said. “Ironically, we just thought that the bones were formations, you know—you have stalactites and stalagmites and similar calcite-covered formations.”

Once they realized what they were looking at, the group contacted Hastings. Then serving as assistant curator of paleontology at the Virginia Museum of Natural History, in Martinsville, Hastings has excavated a wide range of prehistoric remains and first identified the fossil that led to the [discovery of the \*Titanoboa\*](#), the world’s largest snake. He was immediately interested in the big cat bones.

Map by Robert Lunsford. Exact location of cave not disclosed.

But Hastings had limited spelunking experience and Burja Cave, as the group named it, was advanced territory.\* To reach Petra, he’d have to descend multiple 40-foot pits, rappel over a floorless canyon and even belly-crawl through a crevice, all while covered in mud.

“[Mike and Katarina] trained me for the better part of a year on how to properly do everything that you need in order to actually get into this very difficult place,” Hastings said. “It’s important to be very, very familiar with the entire process before you do a more difficult cave like Burja.... That took quite a while.”

There were multiple other hurdles: Hastings moved to St. Paul, Minn., for his current job, and the group had to secure a U.S. Forest Service permit and cobble together a few thousand dollars’ worth of project funds. (They got funding from the Cave Conservancy of the Virginias, where Ficco serves as a board leader, along with the Department of Conservation and Recreation and Virginia Museum of Natural History.) When they were finally ready to retrieve the bones in early 2020, the COVID-19 pandemic triggered more delays.

It wasn’t until Friday, Oct. 1, after five-and-a-half years of waiting and hours of hiking and rappelling, that Hastings knelt beside Petra for the first time. Staring at those bones, he forgot the project’s many challenges.

“None of that matters anymore, because you’re staring at this just absolutely gorgeous skeleton of the cat laying on its side,” he recalled. “It’s just kind of tucked off to the side [of the cave] a little bit, has left and right front legs on top of each other, left and right back legs on top of each other, tail outstretched, and it’s just absolutely gorgeous.”

Only the tip of the tail seemed to be missing. How often did Hastings get to work on skeletons that complete?

“Almost never.”

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## Unpetrifying Petra

Hastings said he'd planned for multiple excavation scenarios, just not the one he actually found: The bones were in great condition but encased in a shell of minerals deposited by dripping water. Petra was essentially fused to the cave.

With the help of team members, the paleontologist spent most of that day delicately chipping the bones free with dental tools. Then it was time to make the long trek back up the cave and the mountain, catch a little sleep and return the next day to finish separating the bones. Hastings said they were fused not just to the floor but to each other.

"There was no way in heck we would ever get that thing out of the cave in one giant piece, because it's just way too narrow," he said. "This is never what you want to have to do, but we had to encourage breaks in very strategic places."

The team wrapped every piece of the skeleton in layers of moistened toilet paper, then foam, bubble wrap and, for a few, hard casing, supplies Ficco and another caver snagged at a Walmart that morning. Finally, they used haul lines and human chains to slowly carry Petra's pieces to the surface.

"We probably transported approximately 50 to 70 pounds of material down the mountain, and two or three times that much going up, mostly because of the mud that accumulates on everything," Ficco said.

According to Dave Socky, another caver in the group, they didn't reach their cars [until 2 a.m.](#)

"The final push took us, I think, four hours just to get all the bags and all the people out of the cave, and by that point, you are just done," Hastings recalled. "Then, you have to climb the mountain in the dark. It's an exhausting process...."

He estimated that they did 30 hours of hiking and caving in two days.

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Under a microscope in a lab at the Virginia Museum of Natural History, Paleontology Research Technician Lucy Treado checks her progress in cleaning Petra's ribs for study and display. Treado has been using the microscope, an air scribe and a sewing needle to delicately chip granules of rock, sediment and minerals from Petra's bones. Courtesy of Virginia Museum of Natural History,

## “They’re just time capsules for all sorts of things”

On Oct. 4, the group deposited Petra at the Virginia Museum of Natural History in Martinsville, which plans to exhibit the cat for the public. But that’s a long way off, said Assistant Curator of Paleontology Adam Pritchard.

“There will be years of work on Petra still, including the physical cleanup, preparation for display and detailed scientific study,” he said by email.

But Pritchard said that for anyone interested in seeing the cat sooner, there’s a viewing window into the museum’s preparation lab, where paleontology technician Lucy Treado has begun removing layers of dried mud and calcite (the mineral crust) from the bones. Her tools include a “micro jack”—a tool that cleans fossils using forced air and vibrations—pin vices and old-fashioned dental picks and sewing needles.

“Working on Petra is quite amazing, because even though I was not part of the extraction crew, I was kept in the loop about the excavation process in real time and Petra was found in nearly complete articulation,” Treado wrote in an email. “It is really a stunning find and an honor to work on it.”

Treado said she’s prioritizing bones that will help Hastings formally identify Petra’s species, such as the skull and legs. The paleontologist said his initial hunch was an extinct species of North American jaguar that lived as recently as about 10,000 years ago. But seeing the bones in person, along with the minerals binding it to the cave, made him suspect an older feline: *Miracinonyx inexpectatus*, or the American cheetah.

*M. inexpectatus* and another American cheetah species, *M. trumani*, roamed various regions of North America during the Pleistocene epoch, which stretched from about 2.6 million years ago to 11,000 years ago. Despite the cats’ common name, [research has proven](#) that they evolved in North America and are more closely related to cougars than African cheetahs.

Once Hasting verifies the species, which he expects to do in another few months, he can move on to the question he’s most excited about: What kind of life did Petra live?

“What’s neat about this is it gives you not just a record — okay, we had a cheetah in this spot at this time — but it tells you, a whole skeleton like this, some of the life history of this animal,” Hastings said. “Normally, you don’t get to be a big adult predator without a lot of things happening to you along the way. So hopefully, we can figure out some of what life was like for these animals.”

Hastings said he’s also hoping the cat’s bone chemistry can reveal more about its diet — what sort of prey lived alongside big cats at the time — and that its DNA could show how its fits into “the genetic evolution of these large predators across Appalachia.” And he’ll be able to look for clues about how her life ended so deep inside a cave.

“You completely bond with this thing that’s been dead for a very long time,” he said of the study process. “Especially when they have a name, that makes it even more [personal]. You’re like, ‘Aww, Petra, what did you do? What happened to you?’”

For Ficco, the discovery is another testament to the importance of caves.

“The natural weathering and erosion and aging processes that occur on the surface are often sort of suspended when things end up inside caves,” he said. “So whether you’re talking about art or fossils like this...they’re just time capsules for all sorts of things.”

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\*Ficco said that *burja* is a Slovenian word for a powerful alpine wind. His wife, Katarina Kosič Ficco, is from Slovenia, a country [famous for its karst caves](#).