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SCIENCE & INNOVATION VIDEO

This desert-dwelling dinosaur balanced on single toes

An exceptional Brazilian fossil reveals a dinosaur that walked on one toe like a horse—and tore into meat with knife-like claws.

BY JILL LANGLOIS

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SÃO PAULO, Brazil— When Neurides Martins brushed the sediment from the tiny tooth, she knew she had found something special.

That tooth was the first piece of a new species of <u>dinosaur</u>, and an unusual one. Roughly the size of a Great Dane, the carnivore would have roamed the desert some <u>90 million years ago</u>, walking upright on two legs and resting its weight on just one long clawed toe, the middle toe of three.

Almost 50 years ago, paleontologists found mysterious one-toed footprints in the region, but until now, no one knew what creature had made them. While its three functioning toes make the new species a theropod dinosaur like <u>Tyrannosaurus rex</u>, this rare anatomy makes it function essentially as if it were monodactyl, or one-toed, an adaptation that had not yet been recorded among Brazil's dinosaurs.

Named Vespersaurus paranaensis for the city and state where it was found, the dinosaur is also the first found in Brazil's Paraná region and the most complete and best-preserved theropod dinosaur found in Brazil so far. Martins and colleagues described the dinosaur and its environment June 26 in the journal Scientific Reports.

Finding a foot

At less than a quarter-inch long, that first tooth was easy to miss, but Martins, the historian and director of Brazil's Paleontology Museum of Cruzeiro do Oeste, believed there was more in the 440-pound block of rock and dirt where she found the tooth. One month later, Martins uncovered the dinosaur's unusual foot, which would confirm its unique way of moving and hunting.

"I was really happy, really excited," says Martins.

Vespersaurus paranaensis is a member of the Noasaurinae group of theropod dinosaurs. It measured around 5.2 feet in length and stood at about 2.6 feet tall. Considered a small, desert-dwelling dinosaur, it had pneumatic bones—hollow and filled with air, similar to those of modern-day birds. It weighed about 33 pounds and had arms half the size of its legs.



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For Luiz Eduardo Anelli, a paleontologist not involved in the discovery or description of the Vespersaurus paranaensis, it's the dinosaur's feet that make it such a fascinating find. In true monodactyls, he says, like horses and <u>ancient kangaroos</u>, the extra toes were lost during the course of evolution .

"The kangaroo became a monodactyl to be able to jump, while the horse was able to increase its agility and speed, making it easier to escape predators and go on long journeys," he says, citing those same reasons as possible explanations for the new dinosaurs walking on one toe as well.

"The monodactyly reveals so much, including the anatomical diversity of these animals, which reflects their different ways of life," he says. "Dinosaurs had adaptations to dig burrows, glide, climb, swim, fish, open furrows in the ground for their eggs, run, fly. They were extraordinary animals."

First find

While Brazil had already confirmed that some 40 different species of dinosaur roamed its land tens of millions of years ago, the southern state of Paraná, where the museum is located in a town of just 20,000 people, had never had such a discovery. The paleontological dig site in Cruzeiro do Oeste had already turned up other types of fossils, including bones from a Gueragama sulamericana lizard and several individuals from the pterosaur species Caiuajara dobruskii, but this was the first concrete indication that a dinosaur had set foot here.

And with 40 percent of its skeleton complete, the Vespersaurus paranaensis has already brought experts an exceptional amount of new information. But for Martins, its discovery is just the beginning.

"We could still find more new species—which is something I expect to do and imagine we will do—and more information, more details, about our dinosaur," she says. "We still have a lot to study, even looking just at that same block. We were able to describe our dinosaur and confirm that it is a unique species in the world, but that doesn't mean we're finished. Our work continues."

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