

Polar dinosaur tracks open new trail to past

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Paleontologists have discovered a group of more than 20 polar dinosaur tracks on the coast of Victoria, Australia, offering a rare glimpse into animal behavior during the last period of pronounced global warming, about 105 million years ago.

The discovery, reported in the journal *Alcheringa*, is the largest and best collection of polar dinosaur tracks ever found in the <u>Southern</u> <u>Hemisphere</u>.

"These tracks provide us with a direct indicator of how these <u>dinosaurs</u> were interacting with the polar ecosystems, during an important time in <u>geological history</u>," says Emory University <u>paleontologist</u> Anthony Martin, who led the research. Martin is an expert in trace fossils, which include tracks, trails, burrows, <u>cocoons</u> and nests.

The three-toed tracks are preserved on two sandstone blocks from the Early Cretaceous Period. They appear to belong to three different sizes of small theropods – a group of bipedal, mostly carnivorous dinosaurs whose descendants include modern birds.

The research team also included Thomas Rich, from the Museum of Victoria; Michael Hall and Patricia Vickers-Rich, both from the School of Geosciences at Monash University in Victoria; and Gonzalo Vazquez-Prokopec, an ecologist and expert in spatial analysis from Emory's Department of Environmental Studies.

The tracks were found on the rocky shoreline of remote Milanesia



Beach, in Otways National Park. This area, west of Melbourne, is known for energetic surf and rugged coastal cliffs, consisting of layers of sediment accumulated over millions of years. Riddled with fractures and pounded by waves and wind, the cliffs occasionally shed large chunks of rock, such as those containing the dinosaur tracks.

One sandstone block has about 15 tracks, including three consecutive footprints made by the smallest of the theropods, estimated to be the size of a chicken. Martin spotted this first known dinosaur trackway of Victoria last June 14, around noon. He was on the lookout, since he had earlier noticed ripple marks and trace fossils of what looked like insect burrows in piles of fallen rock.

"The ripples and burrows indicate a floodplain, which is the most likely area to find polar dinosaur tracks," Martin explains.

The second block containing tracks was spotted about three hours later by Greg Denney, a local volunteer who accompanied Martin and Rich on that day's expedition. That block had similar characteristics to the first one, and included eight tracks. The tracks show what appear to be <u>theropods</u> ranging in size from a chicken to a large crane.

"We believe that the two blocks were from the same rock layer, and the same surface, that the dinosaurs were walking on," Martin says.

The small, medium and large tracks may have been made by three different species, Martin says. "They could also belong to two genders and a juvenile of one species – a little dinosaur family – but that's purely speculative," he adds.

The Victoria Coast marks the seam where Australia was once joined to Antarctica. During that era, about 115-105 million years ago, the dinosaurs roamed in prolonged polar darkness. The Earth's average



temperature was 68 degrees Fahrenheit – just 10 degrees warmer than today – and the spring thaws would cause torrential flooding in the river valleys.

The dinosaur tracks were probably made during the summer, Martin says. "The ground would have been frozen in the winter, and in order for the waters to subside so that animals could walk across the floodplain, it would have to be later in the season," he explains.

Lower Cretaceous strata of Victoria have yielded the best-documented assemblage of polar dinosaur bones in the world. Few <u>dinosaur tracks</u>, however, have been found.

In the February 2006, Martin found the first known carnivorous dinosaur track in Victoria, at a coastal site known as Dinosaur Dreaming.

In May 2006, during a hike to another remote site near Milanesia Beach, he discovered the first trace fossil of a dinosaur burrow in Australia. That find came on the heels of Martin's co-discovery of the first known dinosaur burrow and burrowing dinosaur, in Montana. The two discoveries suggest that burrowing behaviors were shared by dinosaurs of different species, in different hemispheres, and spanned millions of years during the Cretaceous Period.

Provided by Emory University

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