

Multiple dinosaur species not only lived in the Arctic, they also nested there

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Artistic depiction of the tyrannosaur *Nanuqsaurus* with its young. Credit: James Havens

In the 1950s, researchers made the first unexpected discoveries of dinosaur remains at frigid polar latitudes. Now, researchers reporting in

the journal *Current Biology* on June 24 have uncovered the first convincing evidence that several species of dinosaur not only lived in what's now Northern Alaska, but they also nested there.

"These represent the northernmost [dinosaurs](#) known to have existed," says Patrick Druckenmiller of the University of Alaska Museum of the North. "We didn't just demonstrate the presence of perinatal remains—in the egg or just hatched—of one or two [species](#), rather we documented at least seven species of dinosaurs reproducing in the Arctic."

Previous studies at a handful of other sites provided tantalizing bits of evidence that one or two species of indeterminate dinosaurs were capable of nesting near or just above the Arctic or Antarctic circles, he says, but this study is the first to show unequivocal evidence of nesting at extremely high latitudes. Environmental conditions at this time and place indicate challenging seasonal extremes, with an average annual temperature of about 6 degrees Celsius (about 40 degrees Fahrenheit). There also would have been about four months of full winter darkness with freezing conditions.

Druckenmiller and co-author Gregory Erickson from Florida State University have a longstanding project to document the ancient Arctic ecosystem of the Prince Creek Formation in Northern Alaska, including its dinosaurs, mammals, and other vertebrates. They also want to know how they lived there, given the challenging environment. The environment is also a difficult place to work.



Perinatal (baby) dinosaur bones and teeth from the Prince Creek Formation, northern Alaska (penny is 19 mm in diameter). Credit: Patrick Druckenmiller

"The field season is short in the Arctic and access is very difficult—aircraft and small boats are required," Druckenmiller says. "To make matters more challenging, the only way to see the rocks is in

river-cut steep bluffs along the largest river in Northern Alaska, the Colville. These bluffs are dangerous, prone to catastrophic collapses, making it hard to safely find and extract fossils. As such, we have focused on finding discrete bonebed horizons where we can more efficiently excavate many bones. In the process, we've also discovered numerous new microfossil deposits that have provided for a wealth of new knowledge about the whole ecosystem that lived in the Arctic over 70 million years ago."

Over the course of about a decade of painstaking work, the researchers, aided by many students they've enlisted over the years, have now found hundreds of small baby dinosaur bones, including tiny teeth from individuals that were either still in the egg or had just hatched out. The Arctic dinosaurs they've uncovered include small- and large-bodied herbivorous species including hadrosaurids (duck-billed dinosaurs), ceratopsians (horned dinosaurs and leptoceratopsians), thescelosaurus and carnivores (tyrannosaurs, troodontids, and dromaeosaurs).

"It wasn't that long ago that the idea of finding any dinosaurs in such extreme latitudes and environments was a surprise," Druckenmiller says. "To then find out that most if not all of those species also reproduced in the Arctic is really remarkable. We have long been asked, 'Have you found any eggs?' To that we have, and still answer 'no.' But, we have something much better: the actual baby dinosaurs themselves."



Researcher Greg Erickson excavating along the Colville River, northern Alaska.
Credit: Patrick Druckenmiller



The research team's camp sits on the banks of the Colville River on Alaska's North Slope, with the bluffs rising in the background. Credit: Patrick Druckenmiller



Greg Erickson and Pat Druckenmiller place a plaster jacket on a bone found along the Colville River on Alaska's North Slope. Credit: Kevin May

The findings add to evidence that the dinosaurs didn't just spend time at these extreme latitudes, but they most likely lived there as year-round residents. Their evidence suggests both smaller dinosaurs and larger species, such as duck-billed dinosaurs, horned dinosaurs, and a tyrannosaur that more likely could have migrated to warmer climes, resided in the Arctic.

"Year-round residency in the Arctic provides a natural test of dinosaurian physiology," Erickson says. "Cold-blooded terrestrial

vertebrates like amphibians, lizards, and crocodilians have yet to be found, only warm-blooded birds and mammals—and dinosaurs. I think that this is some of the most compelling evidence that dinosaurs were in fact warm-blooded."

Erickson says they now have new questions about how dinosaurs survived Arctic winters. It's likely they had unique strategies to cope with darkness, [cold temperatures](#), and food limitation, the researchers say.

More information: *Current Biology*, Druckenmiller et al.: "Nesting at Extreme Polar Latitudes by Non-Avian Dinosaurs"

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