

# Newly discovered predatory dinosaur 'king of gore' reveals the origins of T. rex

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This is a landscape view of *Lythronax*. Credit: Andrey Atuchin

A remarkable new species of tyrannosaur has been unearthed in Grand Staircase-Escalante National Monument (GSENM), southern Utah. The huge carnivore inhabited Laramidia, a landmass formed on the western coast of a shallow sea that flooded the central region of North America, isolating western and eastern portions of the continent for millions of years during the Late Cretaceous Period, between 95-70 million years ago. The newly discovered dinosaur, belonging to the same evolutionary branch as the famous *Tyrannosaurus rex*, was announced today in the open-access scientific journal *PLOS ONE* and unveiled on exhibit in the Past Worlds Gallery at the Natural History Museum of Utah at the Rio Tinto Center in Salt Lake City, Utah.

Among tyrannosaurs, a group of small to large-bodied, bipedal carnivorous dinosaurs including *T. rex* that lived during the Jurassic and Cretaceous periods, the newly discovered species, *Lythronax argestes*, possesses several unique features, a short narrow snout with a wide back of the skull with forward-oriented eyes. *Lythronax* translates as "king of gore," and the second part of the name, *argestes*, refers to its geographic location in the American Southwest. Previously, paleontologists thought this type of wide-skulled tyrannosaurid only appeared 70 million years ago, whereas *Lythronax* shows it had evolved at least 10 million years earlier.

The study, funded in large part by the Bureau of Land Management and the National Science Foundation, was led by Dr. Mark Loewen, research associate at the Natural History Museum of Utah, and adjunct assistant professor in the Department of Geology and Geophysics at the University of Utah. Additional collaborative authors include Dr. Randall Irmis (Natural History Museum of Utah and Dept. of Geology and Geophysics, University of Utah), Dr. Joseph Sertich (Denver Museum of Nature & Science), Dr. Philip Currie (University of Alberta), and Dr. Scott Sampson (Denver Museum of Nature & Science). The skeleton was discovered by BLM employee Scott Richardson, and excavated by a joint NHMU-GSENM team.

*Lythronax* lived on Laramidia, along the western shores of the great seaway that separated North America; this landmass hosted a vast array of unique dinosaur species and served as the crucible of evolution for iconic dinosaur groups such as the horned and duck billed dinosaurs. This study also indicates that tyrannosaurid dinosaurs (the group of tyrannosaurs that includes *T. rex*) likely evolved in isolation on this island continent. *Lythronax* stands out from its contemporaries in having a much wider skull at the eyes and a narrow short snout, similar to its relative *T. rex*, which lived 10-12 million years later. Dr. Mark Loewen, the study's lead author, noted, "The width of the back of the skull of

*Lythronax* allowed it to see with an overlapping field of view—giving it the binocular vision— very useful for a predator and a condition we associate with *T. rex*." Previously, paleontologists thought this type of wide-skulled tyrannosaurid only appeared ~70 million years ago, whereas *Lythronax* shows it had evolved at least 10 million years earlier



This skull, which includes pieces of real fossil, shows the unique features of this new tyrannosaur. Credit: Mark Loewen, NHMU

Paleontologists have recently determined that the dinosaurs of southern Laramidia (Utah, New Mexico, Texas, and Mexico), although belonging to the same major groups, differ at the species level from those on northern Laramidia (Montana, Wyoming, the Dakotas, and Canada). *Lythronax* and its tyrannosaurid relatives on southern Laramidia are more closely related to each other than the long snouted forms from

northern Laramidia.

Dr. Joseph Sertich, a co-author of the study, stated that, "*Lythronax* may demonstrate that tyrannosaurs followed a pattern similar to what we see in other dinosaurs from this age, with different species living in the north and south at the same time."

These patterns of dinosaur distribution across Laramidia lead the researchers to ask what might have caused the divisions between the north and south, given that an enterprising dinosaur could have walked from Alaska to Mexico if given enough time. Dr. Randall Irmis, a study co-author, explained that by analyzing the evolutionary relationships, geologic age, and geographic distribution of tyrannosaurid dinosaurs, the team determined that "*Lythronax* and other tyrannosaurids diversified between 95-80 million years ago, during a time when North America's interior sea was at its widest extent. The incursion of the seaway onto large parts of low-lying Laramidia would have separated small areas of land from each other, allowing different species of dinosaurs to evolve in isolation on different parts of the landmass." As the seaway gradually retreated after 80 million years ago, these differences in dinosaur species may have been reinforced by climate variations, differences in food sources (different prey and plants), and other factors. This hypothesis explains why the iconic Late Cretaceous dinosaurs of western North America are so different from those of the same age on other continents.



This is an artist's version of the new tyrannosaur *Lythronax* announced by paleontologists at the Natural History Museum of Utah at the University of Utah. Credit: Lukas Panzarin

## **A Treasure Trove of Dinosaurs on the Lost Continent of Laramidia**

*Lythronax* was discovered in Grand Staircase-Escalante National Monument (GSENM), which encompasses 1.9 million acres of high desert terrain in south-central Utah. This vast and rugged region, part of the National Landscape Conservation System administered by the Bureau of Land Management (BLM), was the last major area in the lower 48 states to be formally mapped by cartographers. Today GSENM is the largest national monument in the United States. Co-author Dr. Scott Sampson proclaimed that, "Grand Staircase-Escalante National Monument is the last great, largely unexplored dinosaur boneyard in the lower 48 states."

During the past fourteen years, crews from the Natural History Museum

of Utah, GSENM, the Denver Museum of Nature & Science, and several other partner institutions (for example, the Raymond Alf Museum of Paleontology and Utah Geological Survey) have unearthed a new assemblage of more than a dozen species dinosaurs in GSENM. In addition to *Lythronax*, the collection includes a variety of other plant-eating dinosaurs—among them duck-billed hadrosaurs, armored ankylosaurs, dome-headed pachycephalosaurs, and two other horned dinosaurs, *Utahceratops* and *Kosmoceratops*—together with carnivorous dinosaurs great and small, from "raptor-like" predators such as *Talos*, to another large tyrannosaur named *Teratophoneus*. Amongst the other fossil discoveries are fossil plants, insect traces, snails, clams, fishes, amphibians, lizards, turtles, crocodiles, and mammals. Together, this diverse bounty of fossils is offering one of the most comprehensive glimpses into a Mesozoic ecosystem. Remarkably, virtually all of the identifiable dinosaur remains found in GSENM belong to new species.

Dr. Philip Currie, another co-author, stated that, "*Lythronax* is a wonderful example of just how much more we have to learn about with world of dinosaurs. Many more exciting fossils await discovery in Grand Staircase-Escalante National Monument."

Provided by University of Utah

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