U.S. Department of the Interior
Bureau of Land Management

Teratophoneus

Social Behavior Research

Electronic Press Kit

Embargo until April 19, 2021 at 10:00 AM MST

Aftermath of a disaster: Deinosuchus scavenging amongst the remains of a drowned pack of Teratophoneus. Credit: Victor Leshyk, *www.paleovista.com*

BLM will hold an online press conference on April 19. Throughout the week of April 19, BLM Utah will also provide opportunities for the public to engage and learn more about the research on Instagram.
More details will be shared on BLM Utah's social media channels.
Follow the BLM on Twitter, Facebook, Flickr @BLMUtah and
BLM Utah's Instagram @utahpubliclands

25TH 1996–2021 GRAND STAIRCASE ESCALANTE NATIONAL MONUMENT *Learning from the Land*

UNIVERSITY OF ARKANSAS

COLBY COLLEGE 1813 LUX MENTIS SCIENTIA

DENVER MUSEUM OF NATURE & SCIENCE

JAMES COOK UNIVERSITY AUSTRALIA | Celebrating 50 YEARS 1970–2020

U.S. Department of the Interior
Bureau of Land Management

The Research Team

Dr. Alan Titus is the Paria River District Paleontologist for the Bureau of Land Management. Before that he was the Grand Staircase-Escalante National Monument paleontologist for 20 years. His research interests include stratigraphy, paleobiogeography, dinosaur thermoregulation, ammonite paleontology, and tyrannosaur classification and behavior. He was awarded the Gardner Prize for Outstanding Research in Utah in 2020 by the Utah Academy of Science, Arts and Letters and has been featured in numerous news stories about the Monument's internationally famous dinosaur fossils.

Katja Knoll is the paleontology laboratory manager for Grand Staircase-Escalante National Monument. She earned her MSc in Geology from the City University of New York's Brooklyn College and worked as research assistant at the American Museum of Natural History in New York. Previous research includes the microstructural preservation of and diagenetic effects on Late Cretaceous mollusk shells, and the burrowing behavior of freshwater bivalves. Her focus has since shifted to also include vertebrates. Excavating and preparing mostly vertebrate fossil material from the Kaiparowits Basin, she is currently interested in vertebrate taphonomy and paleoecology of southern Laramidian ecosystems.

Dr. Joseph Sertich is Curator of Dinosaurs at the Denver Museum of Nature & Science where his research focuses on dinosaurs and their ecosystems during the Late Cretaceous. His fieldwork is split between the Gondwanan continents of the southern hemisphere and western North America. He is one of the primary researchers on the Madagascar Paleontology Project exploring the latest Cretaceous of Madagascar and has expanded the search for dinosaurs to older deposits across the island. He is also working on several projects searching for the first latest Cretaceous dinosaurs of Africa, including work in northern Kenya and Egypt. In North America, he leads the Laramidia Project, currently leading work to uncover a lost world of dinosaurs in the Cretaceous of Grand Staircase-Escalante National Monument, Utah, northwestern New Mexico, and West Texas.

Dr. Daigo Yamamura is an instructor at Miles Community College in Miles City, Montana. His research interests include diagenesis of skeletal remains and their use as paleoclimate proxies. Previous research has included taphonomy and diagenesis of a fossil assemblage in the Hell Creek Formation near Glendive, MT, and paleohydrology of the Kaiparowits Formation using stable isotope compositions of vertebrate skeletal remains. After receiving his Ph.D. in 2017, he taught as a visiting assistant professor at the University of Arkansas – Fort Smith and worked as a field paleontologist/PI at environmental consultant/engineering firms.

25TH 1996 - 2021
GRAND STAIRCASE ESCALANTE NATIONAL MONUMENT
Learning from the Land

UNIVERSITY OF ARKANSAS

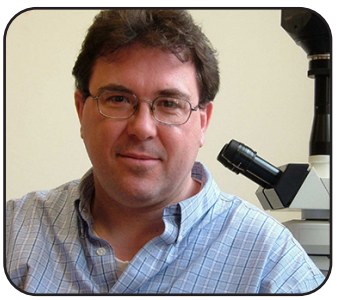
COLBY COLLEGE 1813 LUX MENTIS SCIENTIA

DENVER MUSEUM OF NATURE & SCIENCE

JAMES COOK UNIVERSITY AUSTRALIA
Celebrating 50 YEARS 1970 - 2020

The Research Team

Dr. Celina Suarez is a native of San Antonio, Texas and an associate professor in the De-part-ment of Geosciences at the University of Arkansas, USA. Dr. Suarez's research focuses on using trace element and stable isotope geochemistry of fossil vertebrates, invertebrates, and paleosols to understand fossil preservation, past greenhouse climates and major climate shifts caused by C-cycle perturbations. Her research has taken her from throughout the United States to China, South Africa, and Lesotho.



Dr. Ian Glasspool is a geological research scientist working at Colby College in Waterville Maine. In the UK, Ian trained as a paleobotanist/organic petrologist and now specializes in the study of ancient fire systems dating back through 420 million years of Earth's history. The main tools Ian uses in his research are a combination of reflected light and scanning electron micros-copy. Together, these techniques provide information on fire temperature and the biological affinities of the charcoal studied as well as its taphonomic history (how it came to be preserved). At a broader scale Ian has used large charcoal data sets to study the evolution of Earth's Pha-nerozoic atmospheric oxygen concentration.

Dr. Eric Roberts is the Head of Earth and Environmental Sciences at James Cook University in Townsville, Australia. He is a sedimentary geologist who specializes in age dating and re-con-structing the geological context of important vertebrate fossil localities and their ancient paleoen-vironments. He began his research career investigating the taphonomy and geology of dinosaur ecosystems in Utah and Montana but has also worked on the discovery and context of significant vertebrate fossil discoveries around the globe. His research highlights include explo-ration for fossil vertebrates in America, Antarctica, Australia, China and all over Africa. Among his most important contributions have been his work on the discovery and geological context of early primate and hominin fossils in Africa.

Jonathan Ginouves is a southern Utah native and Bureau of Land Management Intern who has worked at Grand Staircase-Escalante National Monument for the last three years as a field and lab hand. He is pursuing a bachelor geology and a minor in biology at Southern Utah University. His research interests include lower Paleozoic trilobites and Burgess-Shale type faunas of the Basin and Range, as well as dinosaur paleontology of Grand Staircase-Escalante National Monument. He is also a skilled fossil preparator.

Abigail Lukacic is a California native and Bureau of Land Management Intern who has worked at Grand Staircase-Escalante National Monument for the last two years as a field and lab hand. She is pursuing a bachelor's degree in geosciences at Colorado University Boulder.

25TH 1996–2021 GRAND STAIRCASE ESCALANTE NATIONAL MONUMENT Learning from the Land

UNIVERSITY OF ARKANSAS

COLBY COLLEGE 1813 LUX·MENTIS·SCIENTIA

DENVER MUSEUM OF NATURE & SCIENCE

JAMES COOK UNIVERSITY AUSTRALIA Celebrating 50 YEARS 1970 - 2020

U.S. Department of the Interior
Bureau of Land Management

Teratophoneus

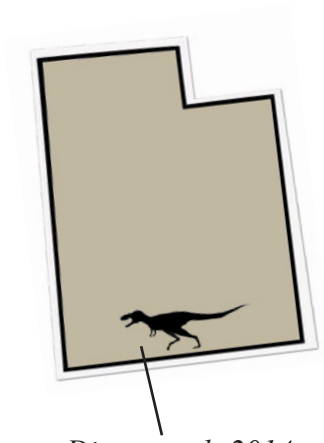
(Ter-at-oe-foh-nee-us) l "monstrous murderer"; Greek: teras, "monster" and phoneus, "murderer"

66 mya Dinosaur Extinction

Lived 77 - 76.5 mya

Cretaceous Period

Teratophoneus curriei, adult (left) and juvenile (right), on display at the Natural History Museum of Utah, Salt Lake City. Credit Jens Lallensack - Own work, CC BY-SA 4.0. https://commons.wikimedia.org/w/index.php?curid=64190083



Discovered: 2014 by Dr. Alan Titus, Grand Staircase-Escalante National Monument.

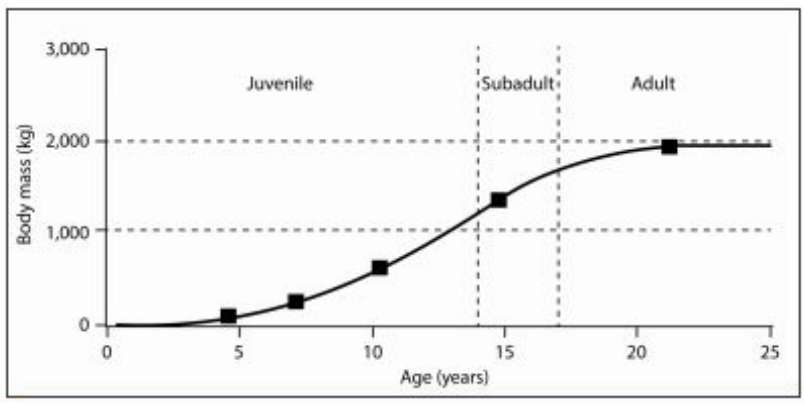
Aftermath of a disaster: Deinosuchus scavenging amongst the remains of a drowned pack of Teratophoneus. Credit: Victor Leshyk, www.paleovista.com

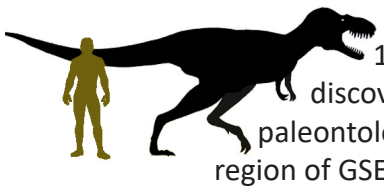
"Tyrannosaurs were the top predators in the Northern Hemisphere during the Late Cretaceous and evolved to become some of the largest carnivores to ever walk the planet (Tyrannosaurus rex)." - Dr. Alan Titus

145 mya

Jurassic Period

Teratophoneus Size





Discovery & Excavation

1. The Rainbows and Unicorns Quarry was discovered in 2014 during a BLM-led paleontological survey within the Kaiparowits Plateau region of GSENM in Kane County, southern Utah, USA. The site was serendipitously discovered by BLM Paria River District Paleontologist Alan Titus because a crew of volunteers couldn't drive in to help with a scheduled project. The same rains that had stranded the volunteer crew had recently uncovered a tyrannosaur ankle bone at a site that had been visited previously, but had only yielded fish and turtle.

2. Excavation began summer of 2014 and has been ongoing ever since. Approximately 1300 mapped specimens have been collected so far from an 80 square meter area. Approximately 1/3 of all the material identified is tyrannosaur.

201 mya

Triassic Period

235 mya Dinosaurs appear

250 mya Permian–Triassic extinction

Major Points of the Paper

1. A new study has been published in the scientific journal *PeerJ* analyzing a large, 76.4-million-year-old bonebed in the Kaiparowits Plateau region of Grand Staircase-Escalante National Monument that contains numerous fish, turtles, alligators, and dinosaurs.

2. The site, nicknamed the Rainbows and Unicorns Quarry because of the abundance and diversity of bone it contains, yielded the remains of four predatory tyrannosaur dinosaurs of the genus *Teratophoneus* over a spread of ages ranging from juvenile to large adult (29.5 feet long).

3. The Rainbows and Unicorns Quarry is the first multi-individual tyrannosaur site ever found in the southern United States.

4. Although the site history was complicated by exhumation and reburial of the tyrannosaur skeletons by a river, enough evidence remained to conclude the tyrannosaurs probably died as a group and were initially washed into a lake.

5. The spread of tyrannosaur ages, simultaneous burial, and lack of evidence for any kind of trap or other mechanism to force the tyrannosaurs together opens the possibility that they were together because of some innate behavior such as habitual gregariousness.

6. The Rainbows and Unicorns Quarry is in many ways similar to a site found in Canada (Dry Island Buffalo Jump) preserving at least 12 individuals of the tyrannosaur *Albertosaurus* that has been used as evidence that tyrannosaurs were social animals living and hunting in groups like wolves.

Paria River District
Grand Staircase-Escalante National Monument
669 S. Highway 89A, Kanab, Utah 84741

GRAND STAIRCASE ESCALANTE NATIONAL MONUMENT — Learning from the Land — 25TH 1996 - 2021

UNIVERSITY OF ARKANSAS 1871

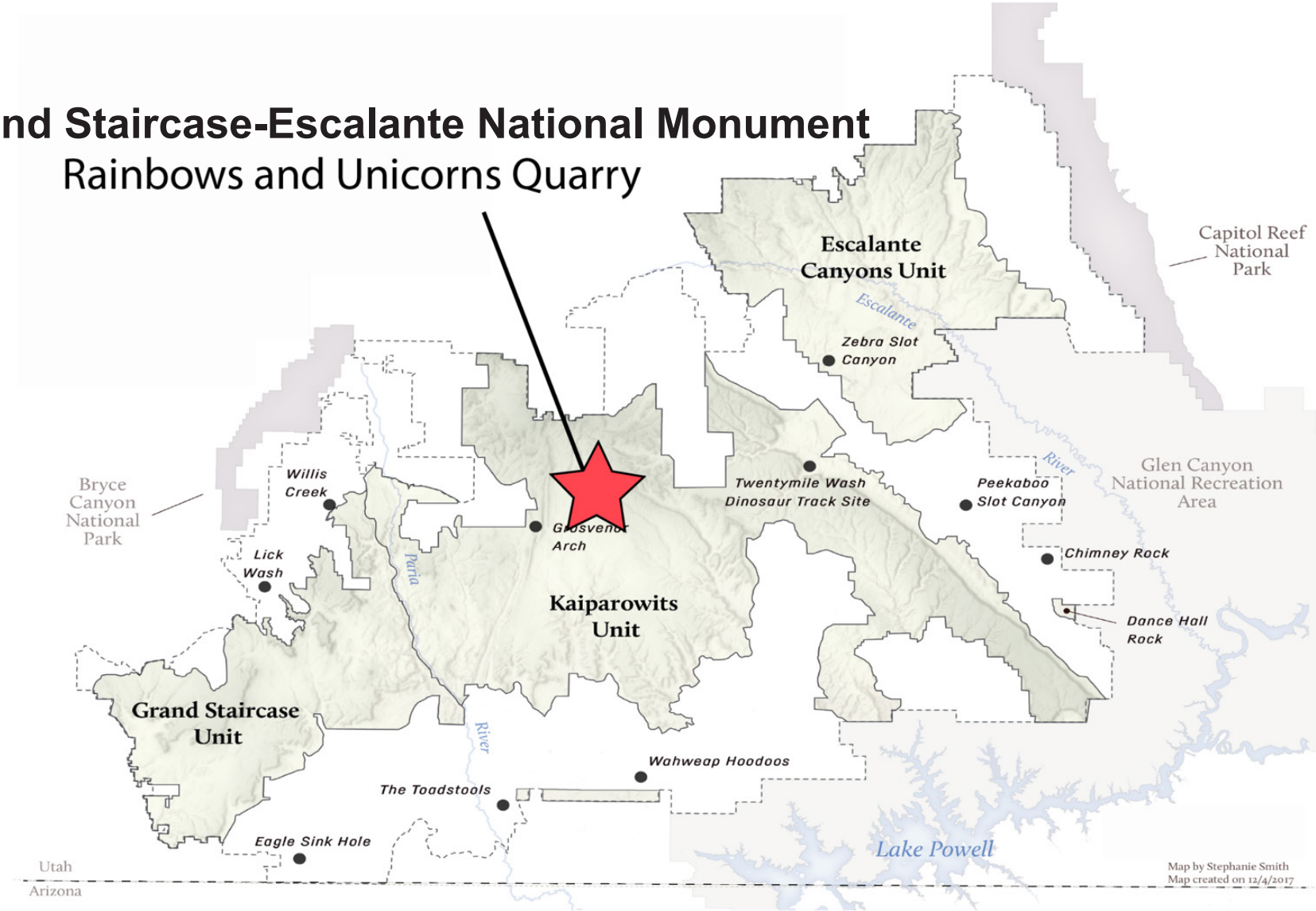
COLBY COLLEGE 1813 LUX · MENTIS · SCIENTIA

DENVER MUSEUM OF NATURE & SCIENCE

JAMES COOK UNIVERSITY AUSTRALIA — Celebrating 50 YEARS 1970 - 2020

Grand Staircase-Escalante National Monument

Rainbows and Unicorns Quarry



GRAND STAIRCASE ESCALANTE NATIONAL MONUMENT
Learning from the Land

UNIVERSITY OF ARKANSAS

COLBY COLLEGE 1813

DENVER MUSEUM OF NATURE & SCIENCE

JAMES COOK UNIVERSITY AUSTRALIA

U.S. Department of the Interior
Bureau of Land Management

Teratophoneus

A high-resolution digital library for the
“Rainbows and Unicorns Quarry” discovery and excavation
is available at https://www.flickr.com/photos/blmutah/albums/72157718801858032

Follow the BLM on Twitter, Facebook, Flickr @BLMUtah & BLM Utah’s Instagram @utahpublicclands

25TH 1996 - 2021 GRAND STAIRCASE ESCALANTE NATIONAL MONUMENT Learning from the Land

UNIVERSITY OF ARKANSAS

COLBY COLLEGE 1813 LUX·MENTIS·SCIENTIA

DENVER MUSEUM OF NATURE & SCIENCE

JAMES COOK UNIVERSITY AUSTRALIA Celebrating 50 YEARS 1970 - 2020