

Preserving Deep Time Resources at the Denver Museum of Nature & Science

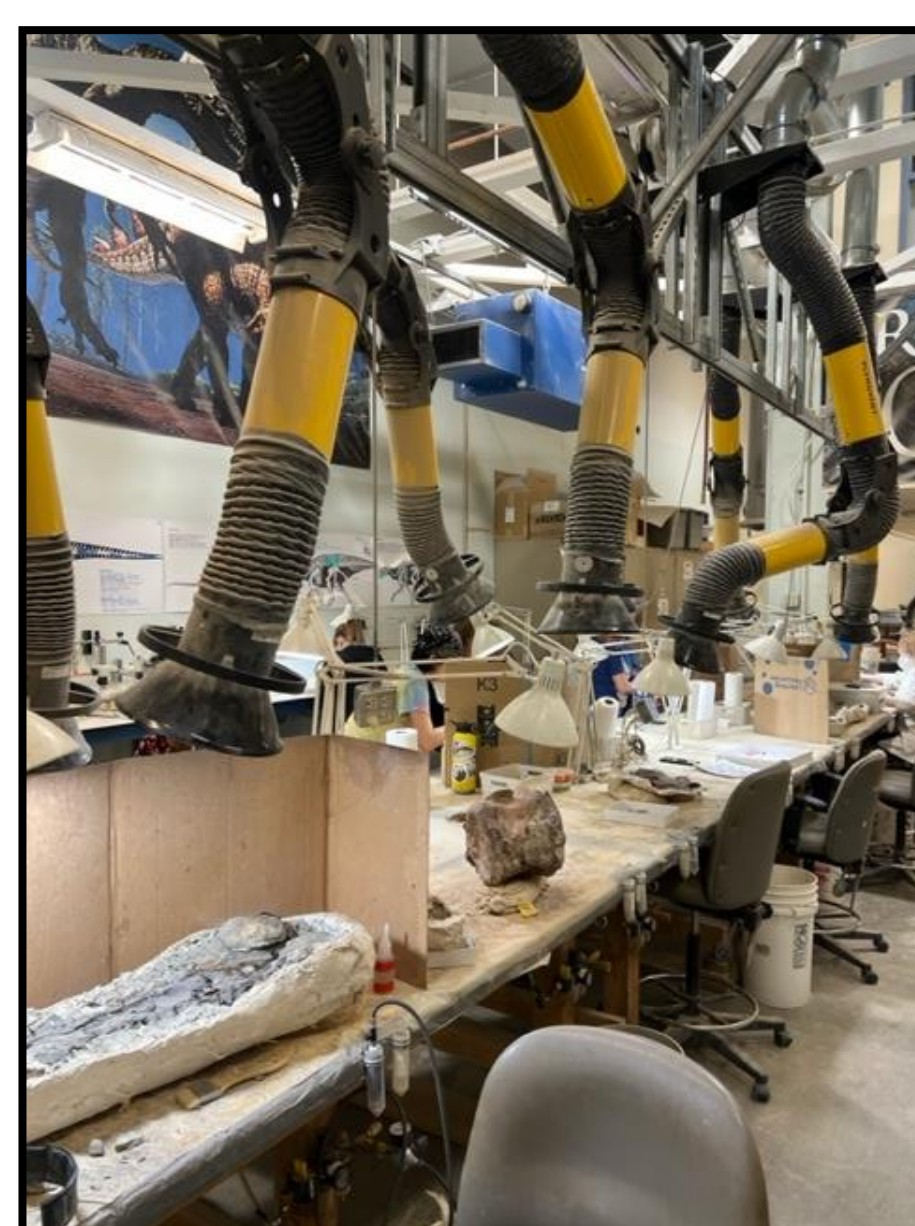
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Background



The mission of the Earth Sciences Department at the Denver Museum of Nature & Science (DMNS) is to preserve deep time resources, such as rocks, minerals, and fossils. These resources are extremely important for scientific research and understanding Earth's past. The work done in the paleontology preparation lab preserves these resources by stabilizing and repairing fossils so they can be used for education, research, and exhibition locally, regionally, and around the world.



These fossils are important visible connections to ancient life and ecosystems.

Research Question(s)

Goals:

Prepare, stabilize, and repair vertebrate fossils, Specifically those of sauropod dinosaurs, which will provide a greater understanding of Colorado's late Jurassic ecosystems.

Objectives:

1. The fossils prepared in the lab at DMNS are extremely important for our understanding of Earth's past.
2. Deep time resources are useful in addressing research questions in a multitude of different disciplines relating to Earth sciences.
3. These fossils are used for museum visitors' experience and learning in the prehistoric journey exhibit, as well as other parts of the museum.

Methods & Preliminary Findings

Since 1988, staff, volunteers, and interns have worked to preserve vertebrate fossils from around the world. Currently the museums paleontology collections room:

- Houses around 300,000 cataloged specimens
- Is at 60% capacity
- Has vertebrate fossils dating back to the Devonian, up to the Pleistocene
- Has around 280,000 specimens from the Rocky Mountain region
- Holds many extremely well preserved and complete fossils.

Vertebrate Fossil Collections at DMNS

Colorado Formations

- Morrison (My focus)
- Laramie
- Denver

Utah Formations

- Kaiparowits
- Wahweap

New Mexico Formations

- Fruitland
- Kirtland

North Dakota, South Dakota, and Montana Formations

- Hell Creek
- Fort Union

Wyoming Formations

- Lance Creek
- Wind River
- Willwood
- Bridger

Madagascar Formation

- Maevarano

K-Pg Boundary Project: Exploring the extinction and recovery after one of the worst mass extinctions on Earth.

Madagascar Paleontology Project: Uncovering the vertebrate fossil record from Gondwana – the southern landmass of South America, Africa, Australia, and India that existed 82 - 68 million years ago.

Laramidia Project: Uncovering vertebrate fossils from roughly 75 million years ago, when North America was split into two subcontinents.

Jurassic Giants Project (My Focus): Uncovering vertebrate fossils from roughly 145 - 200 million years ago in the Upper Jurassic Morrison Formation. These fossils include giant theropods, sauropods, and other large herbivorous dinosaurs like the Stegosaurus.

Fossil Preparation Steps



Air Scribes

The most common tool used in the lab is an air scribe. This tool uses pressurized air and acts like a miniature jackhammer to safely remove the matrix from the fossils.

Keeping the Fossils Stable

A variety of different glues, made in the lab using different concentrations of plastic and acetone, are used throughout the preparation process to keep fossils stable and intact.

Epoxy and Putty Work

2-part epoxy and putty are also used once the matrix has been removed from the fossil. These are stronger than glue and provide permanent stabilization for the fossils in collections. It is important that the putty is easily distinguishable from the fossil so that researchers don't mistake it for the fossil itself when doing research.

Archival Cradles

Once fossils are stabilized and the preparation is completed, archival cradles are built out of felt, fiberglass, and plaster. These cradles are made specifically for each fossil and ensure their structural integrity as they are housed in collections.



Discussion

As a result of my contributions in the paleontology preparation lab at DMNS, we have been able to better understand what type of sauropod dinosaurs lived in Colorado during the late Jurassic.

Why do sauropods from Colorado matter?

- They help us understand Earth's past and present life and ecosystems.
- They provide insights into the ecological shifts that caused sauropods to dwindle in North America during the Cretaceous.
- They help us identify how many different sauropods were preserved at these quarries, giving us a better understanding of their diversity and how they're affected by changing climate.

Next Steps

In 2023-2024, the Earth Sciences Department team can focus on:

- Adding room to the collections in the future as it is currently around 60% full.
- Additional research projects
- Other localities can be added
- Continue to produce virtual 3D models of the specimens.
- Update the prehistoric journey exhibit to showcase new fossils to the public.
- Additional opportunities for public engagement in the paleo prep lab.

Selected References

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