

Introduction

- The goal of this research was to reconstruct the ecosystem of North Dakota during the Paleocene Epoch (about 60 million years ago) and analyze the biodiversity of the system.
- Research of this and nearby areas indicate that this area was likely aquatic with crocodilian species as the main predators (Hoganson et al. 2011).
- The biodiversity of the system will help determine the ecological makeup of the area.
- Our research of the matrix collected from the Medora dig site in the North Dakota Sentinel Butte Formation examine the hypothesis that this site had a large established aquatic system with more aquatic species (fish) than terrestrial or partially terrestrial species (reptiles and amphibians).

Materials & Methods

- Fossils were collected and screen washed by North Dakota Geological Survey authors.
- In the lab, matrix was analyzed under the microscope, approximately 1 teaspoon at a time.
- Large rocks and clay were removed. Fossils (pieces of bones, teeth, shells, etc.) were pulled out and set aside.
- A visual guide was used to identify the taxa of fossils and they were sorted into vials based on taxa and type (i.e. Osteichthyes- vertebrae).
- The fossils in each group were counted to gather data on biodiversity.



Figure 2. Fossilized crocodile teeth.

Discussion & Interpretation

- Based on evidence, such as the presence of multiple fish taxa, we have reconstructed the ecosystem as being a freshwater aquatic system.
- Because the 71% of the fossils found were from bony fish, we can infer that the aquatic system was large and well-established.
- This is because there was a much higher abundance of fish than amphibians and reptiles. If the aquatic system was less-developed, we would expect a higher percentage of partially terrestrial animals (reptiles and amphibians).

Results

Types of Animals Found at the Medora Dig Site

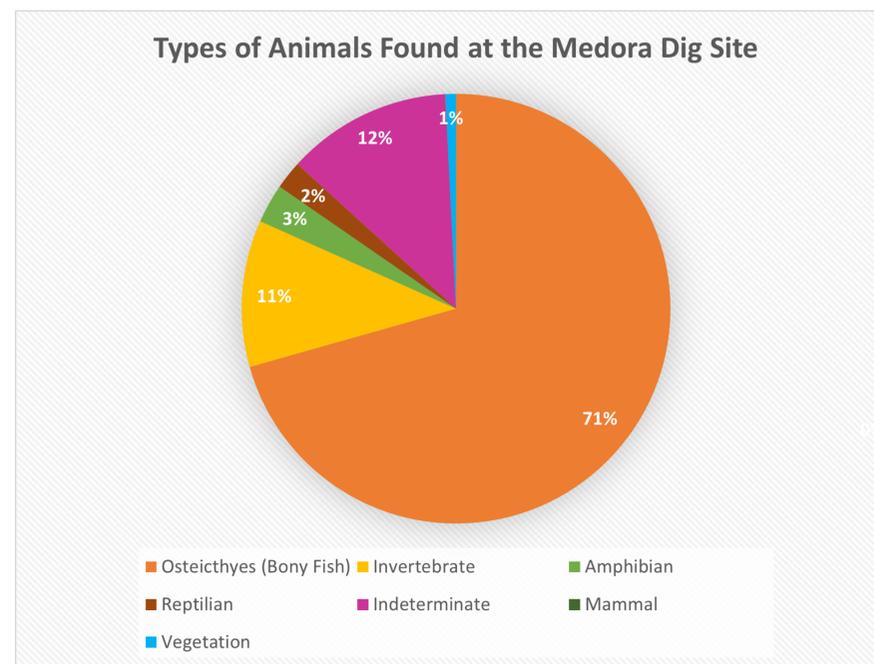


Figure 3. Breakdown of the types of fossils identified from the Medora Dig Site.

- Over 2,400 fossils were found.
- Osteichthyes include *Teleostei* and *Amiidae* (bowfin fish) specimens, which are both ray-finned fishes.
- Reptiles includes crocodiles, lizards, and *champsosaurus* (crocodile-like species).
- Amphibians included *Anuran* (frog) and salamanders.
- Invertebrates included bivalves and coral.
- 1 mammal tooth was found.
- The majority (71%) of the specimens found belonged to Osteichthyes, or bony fish.
- 12% were indeterminate.

Future Work

- Matrix from the Medora Site will continue to be collected, screen washed and sorted in order to add to the number of fossil specimens.
- Looking at data from similar sites or traveling to the Medora Dig Site may be beneficial for our understanding of the local environment and allow us to collect more data.

Stratigraphy of the Medora Site

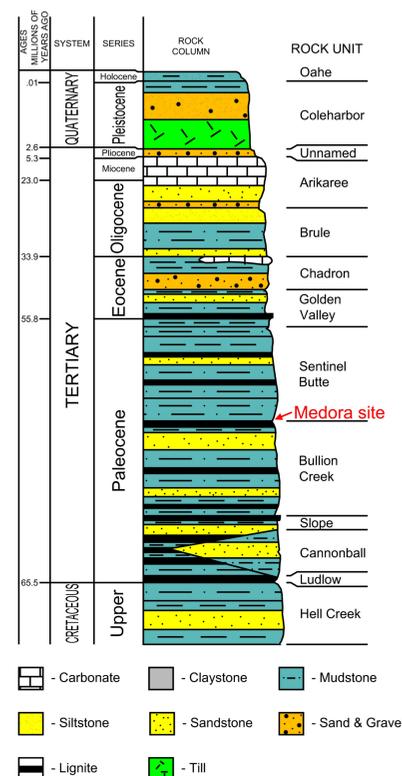


Figure 1. Stratigraphic position of the Medora Site.

Acknowledgements & References

- DeMar DG. An Illustrated Guide to latest Cretaceous Vertebrate Microfossils of the Hell Creek Formation of northeastern Montana Wilson GP, Tsurusaki BK, editors.
- Hoganson JW, Person JJ, Becky Gould. Paleontology of the Medora Public Fossil Dig Site (Paleocene: Sentinel Butte Formation), Billings County, North Dakota. Geo News. 2011 Jan.
- North Dakota Geologic Survey. <https://www.dmr.nd.gov/ndgs/ndnotes/ndn9.asp>