COLORADO STATE UNIVERSITY
EXTENSION

GEOLOGY INTERN
DENVER COUNTY

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PROJECT INTRODUCTION

This project took place at the Denver Museum of Nature and Science within the Earth Sciences Department.

The Paleogeographic Mapping Project intends to hypothesize the environmental conditions of the Rocky Mountain corridor during a variety of different time periods. Well logs, outcrop measurements, and fossil specimens are used to create and confirm these hypotheses. Once the maps are created and peer-reviewed, skilled artist Hannah Bonner will turn them into realistic renditions.

This project is incredibly relevant as we learn more about our past. Prior patterns of a changing continent may be helpful in predicting changes that may occur in the future in our own landscape. Additionally, paleogeographic studies in the past didn't make their data publicly available, which means that the painstaking task of locating and cleaning the data is being done for every new study. Supporting evidence for geographic choices wasn't transparent either. This project intends to make the data used to create these maps accessible to other professionals in the field.

INTERNSHIP GOALS

The Earth Sciences Department intended for this internship to pass down important skills such as map-making, R programming, GIS, and extrapolation based on historical data.

The map-making aspect was emphasized due to the importance of visual communication with audiences including the general public as well as scientists in the field of paleogeography.

HOW DOES THIS APPLY TO YOUR EDUCATION

This internship is relevant to my education due to the research-based nature of the project, as well as the various tools introduced to me during this timeframe. Ecosystem Science and Sustainability, my major, focuses on problem-solving and knowledge about natural systems, which most definitely was emphasized throughout my experience.

WHAT YOU DID

My primary research goal was to download and sort fossil data from individual collection sites into taxa chosen by my own discretion, as well as data cleaning and plotting. I was able to do this manually at first, but I later developed code in R that made it easier to work with the larger datasets.

I downloaded outcrop shapefiles and filtered them by period. I exported those as SVG files, which helped other members of the team create the paleogeographic maps in Adobe Illustrator. We then imported the illustrations in ArcMap and used georeferencing to associate the illustration with spatial data. I turned the fossil data I created into a KML file and plotted points that were associated with the environment that each taxon resided. This is a way to visually confirm the environmental hypotheses created by the map. Additionally, I got to go into the field in Wyoming to measure sections of outcrop formations that assist in characterizing the environment of a given time period.

WHAT YOU LEARNED

I learned a lot about phylogenetics while I sorted through the fossil data, which is incredibly helpful in supplementing my Zoology minor and puts me ahead in my Invertebrate Biology class that I am currently in. For instance, organizing the fossil data increased my understanding of phylogenetics.

Additionally, I learned many principles of geology that I wouldn't have had I not done this internship. These are extremely helpful for my degree, as the field of ecology is inherently interdisciplinary. Abiotic and biotic aspects are equally as important and feed off one another to characterize a system. My knowledge of limnology in my current course is strengthened because of that experience.

state	county	formation	environment	lng	lat	taxon	diversity	taxon_environme
Wyoming	Albany	Morrison	fluvial-lacustrine i	-106.002	41.89306	Actinopterygii	2	marine
Wyoming	Albany	Morrison	fluvial-lacustrine i	-106.002	41.89306	Algae	1	
Wyoming	Albany	Morrison	fluvial-lacustrine i	-106.002	41.89306	Anura	3	brackish,freshwat
Wyoming	Albany	Morrison	fluvial-lacustrine i	-106.002	41.89306	Bivalvia	1	freshwater
Wyoming	Albany	Morrison	fluvial-lacustrine i	-106.002	41.89306	Caudata	1	brackish,freshwat
Wyoming	Albany	Morrison	fluvial-lacustrine i	-106.002	41.89306	Crocodylomorpha	2	marine, terrestria
Wyoming	Albany	Morrison	fluvial-lacustrine i	-106.002	41.89306	Cynodontia	5	terrestrial
Wyoming	Albany	Morrison	fluvial-lacustrine i	-106.002	41.89306	Dipnoi	2	marine
Wyoming	Albany	Morrison	fluvial-lacustrine i	-106.002	41.89306	Gastropopda	2	freshwater

Table 1. Example data. Features collection site, location, age, the chosen taxa, the number of species that are found in each taxon in each site, and the environment that the species can live in.

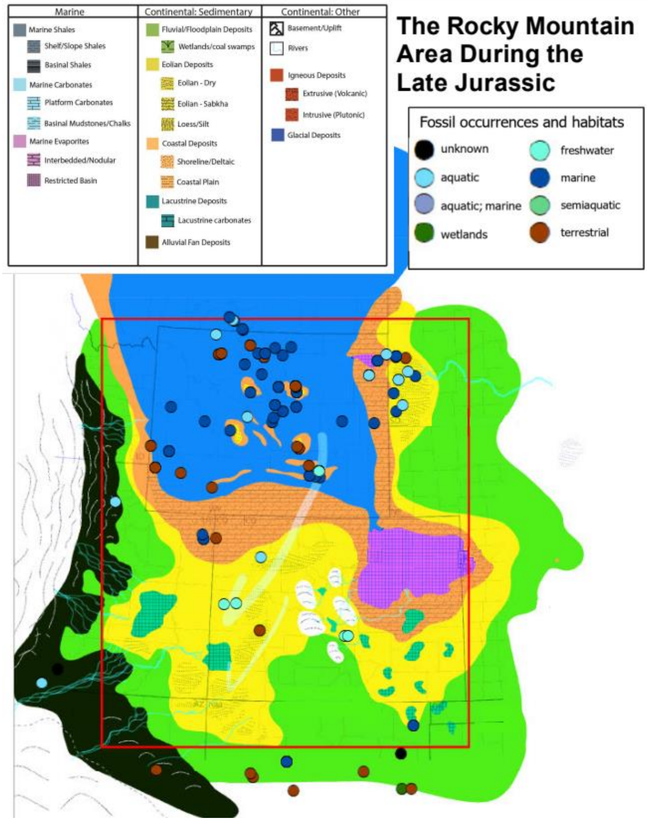

Figure 1 (above) . The Rocky Mountain Area during the Late Jurassic.

Figure 2 (left). An example of a Cephalopod in the Middle Jurassic. Found, catalogued, and photographed by the Denver Museum of Nature and Science.