Paleontology

Hello and welcome to the exploration of the career of paleontology! Many of us have heard of paleontologists, but what do they actually do? A paleontologist is a scientist that learns about the history of the Earth by studying fossils. There are many different types of paleontologists such as an invertebrate paleontologist, vertebrate paleontologist, paleoecologist, paleobiologist, etc. Today we will dive into the basics of what a paleontologist is, what they do, and how you could prepare to become a paleontologist right now!

What do they do?

- As discussed before, paleontologists study fossils, but what does that include?
    - Finding, excavating, and preparing fossils
    - Comparing and contrasting animals from different time periods
    - Investigating prehistoric crime scenes
    - Perform research or experiments, and interpreting the data
- And so much more!

Paleontology Introduction

- Watch this video below from our paleontologist at Thanksgiving Point, Rick Hunter, to get an idea on some of the work paleontologists do:

  https://www.youtube.com/watch?v=Pp5LtUL0-Io

- There are lots of resources you can learn right now that relate to paleontology, some of which will be discussed here today

Cladogram Basics

As you have learned, cladograms sort animals by common ancestry and characteristics rather than just looks. This is a different way to approach animal sorting than most of us have been taught in school, which leads to surprising realizations about what animals are more closely related.

Let’s take a look into how we normally categorize animals. Circle two groups out of the four animals below that you think share a common trait

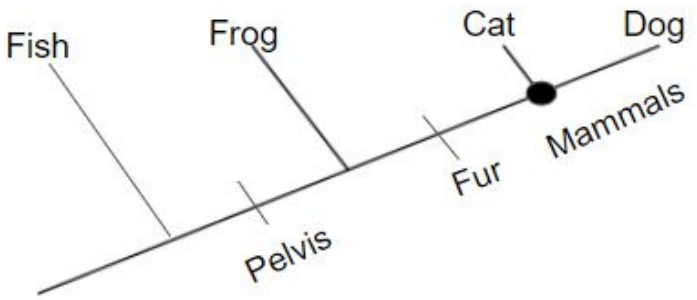
Fish	Frog	Dog	Cat

Once you have your animals grouped together, circle the mammals (dog and cat) with one of the remaining animals that you think is more closely related to the mammals than the other animal.

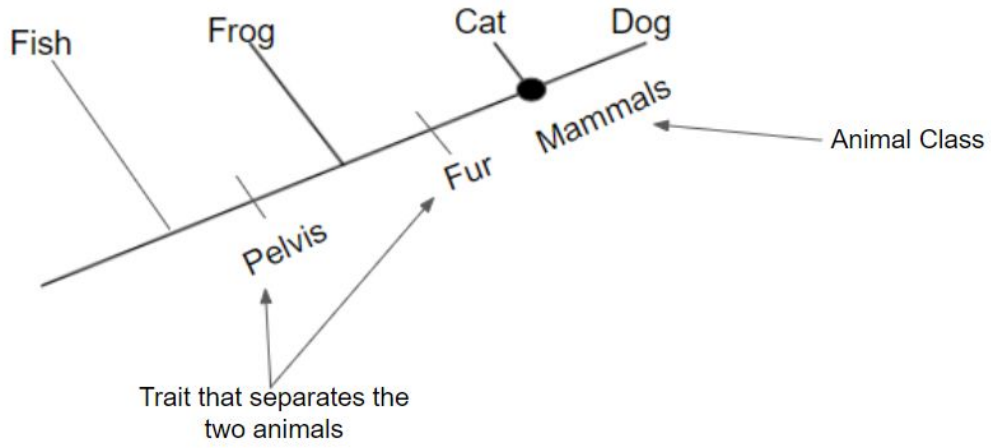
Fish	Frog	Dog	Cat

Compare your answers with a partner. Did you get the same results? If so, why did you sort them together? If not, discuss why you circled them differently.

Once you have discussed with a partner, let’s look at how these animals would look together on a cladogram:



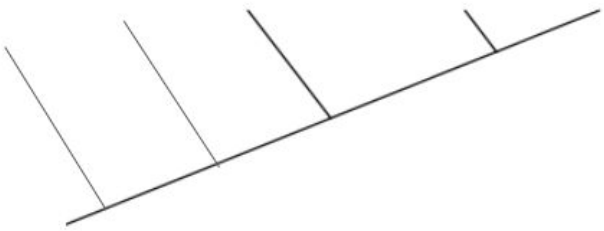
So what does that mean? Well, we see the frog has more common traits that come from a common ancestor with dog and cat, rather than a fish. Below is the same cladogram labelled to help us understand what it all means:



Now that we have discussed how cladograms work, now there is a paleontology cladogram challenge! There are pictures and names of 5 animals, including some prehistoric ones. Try to make your own cladogram on your worksheet using these 5 animals:

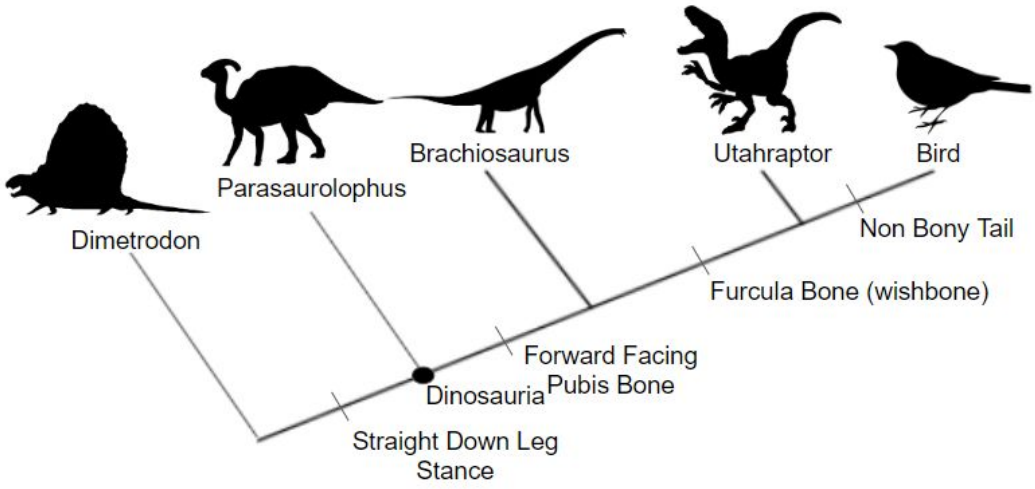
Bird Utahraptor Brachiosaurus Parasaurolophus Dimetrodon

And use these traits to separate each of the animals: Straight down leg stance, non-bony tail, furcula bone (wishbone), fur, pelvis



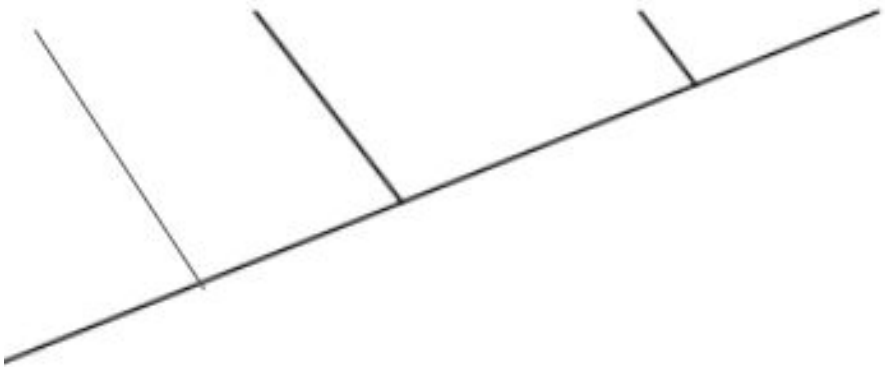
Now compare your answers with a partner and discuss why you sorted animals the way you did

Now that you have tried it out for yourself, here is how these animals would look on a cladogram:



Paleontologists help make cladograms by looking at the fossilized ancestors of these animals. They can also use cladograms to make sense of what types of dinosaurs are related, much like we do today with modern animals.

Challenge: Go outside and find 4 different animals. Try to put these in your very own cladogram!



Now that we have made cladograms that discuss evolutionary history in the form of a chart, let's take a look at how life changed through time using some resources paleontologists could use. Pay special attention to North America and Utah and how animal life and the environment transitioned. Use the following websites to fill out the chart below:

- https://paleobiodb.org/navigator/
    - If you would like a tutorial this video by Dr. Pheobe Cohen from Williams College (0:00-2:00 and 5:52-6:33 most applicable sections) is a wonderful resource https://www.youtube.com/watch?v=n_FkX4Vf_8I
- https://www.biointeractive.org/classroom-resources/earthviewer (this is also an app)

Earthviewer

Use Earthviewer data to fill out the following table for Utah (If you can't find Utah, just use the US or North America)

	Triassic	Jurassic	Cretaceous
How many years ago was this?			
What was the oxygen %?			
How long were the days?			
What was the water level? Did it cover the land?			

Paleobiology Database

Use the paleobiology database website to fill out the following table for Utah

	Triassic	Jurassic	Cretaceous
List the percent of different types of animals (right side of screen)			
What animal was the most abundant (highest %)?			
What animals were the least abundant (lowest %)?			
Where on the map of Utah were most of the fossils for this period found?			

Discuss with at least 2 people what you noticed during the different time periods, as well as the following questions and write your answers in the blank space below:

- Did you notice a change in type of animals related to the rising or falling of sea level?

- Do you think there were any extinctions between the time periods that we looked at? Why or why not?

- How could you use these tools for other research or experiments?

Now that you have done some paleontology work, let's discuss some statistics regarding paleontologists:

- Average yearly Salary
    - $67,000-$91,000
-
- Required Education
    - Bachelor's degree for entry level education, although Masters would open up more opportunities
- Number of jobs in 2018
    - 31,000
- Job outlook from 2018-2028
    - 6% growth rate

These stats show that it is a great time to get into paleontology! Even if you only get a bachelors, you could still try to get paleontology related jobs! Many would prefer a masters, but it is always good to look at every option in your field.

Now, what colleges or universities have programs? While almost all schools in Utah will have a geology major, here are some of the top schools in the state:

- University of Utah
    - Geoscience bachelor's degree with an emphasis in paleontology
    - Grad school offered for a masters or PhD
- BYU
    - Geology bachelor's degree with an emphasis on paleontology
    - Grad school offered for a masters or PhD
- USU
    - Geology bachelor's degree with emphasis on paleontology
    - Grad school offered for a masters or PhD
- UVU
    - Geology bachelor's degree with emphasis on paleontology

Notice how none of these have specific paleontology majors, just emphasis. This means when you go to college and get your degree, you will need to choose any paleontology courses that

are offered, and even engage in paleontological research.

Interested in becoming a paleontologist? Below is a list of classes and resources that you can access right now to begin your journey early! Even if you don't want to become a paleontologist, many of these topics are important in other jobs.

- Courses to take in middle school and high school
    - Earth Sciences (if offered)
    - Biology
    - Chemistry
    - Algebra/Calculus
    - Physics
- Other resources
    - Paleobiology database
    - Utah Friends of Paleontology (UFOP)
    - Local Museums