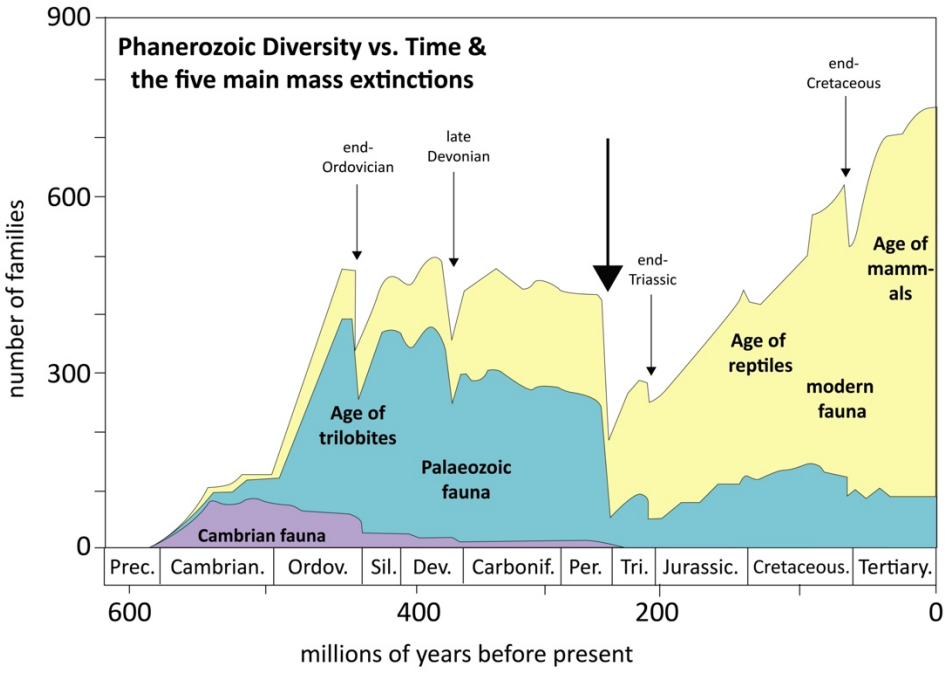
Name: _____ Period: _____ Date: _____

Mass Extinction Laboratory Activity – Student Edition

Investigating Evidence for Mass Extinctions

Background Information:

Animals and plants disappear all the time as extinction is a natural part of life. About 98% of all the organisms that have ever existed on our planet our now extinct. When a species goes extinct, its role in the ecosystem is usually filled by new species, or other existing ones. Earth's "normal" extinction is rate is often thought to be somewhere between 0.1 and 1 species per 10,000 species per 100 years. But when species vanish much faster than they are replaced, this is known as **mass extinction**. It is usually defined as about 75% of the world's species being lost in a "short" amount of geological time which is less than 2.8 million years.



At least five mass extinctions have been recorded throughout Earth's history. The vast majority of plant and animal species have been annihilated in a geologic instant five times. What triggered these dramatic events? What might they tell us about the fate of Earth? In this laboratory activity, you will explore an online simulation that will allow you to investigate the different evidence for mass extinctions.

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Learning Objectives:

At the end of this laboratory activity, students are expected to:

- Explore the Earth Viewer online simulation to be familiar with different geologic events
- Identify evidence for mass extinctions based on the biodiversity before and after the extinction

Laboratory Proper:

Materials:

- Computer or mobile device with Internet connectivity
- Calculator

Procedure:

1. Work with a partner for this activity.
2. Launch and explore the features of EarthViewer: https://media.hhmi.org/biointeractive/earthviewer_web/earthviewer.html
   a. Click, hold, and drag to rotate the planet.
   b. Click, hold, and drag down the horizontal silver slider on the timeline. Then, watch what happens to the planet and the data indicators as you move backward and forward in time.
   c. Position the silver timeline slider at 0 MYS (top of the timeline). Click on the left "play" button at the bottom of the timeline; watch what happens. When the silver bar stops at the bottom, click on the right "play" button and watch again.
   d. Position the silver timeline slider at 0 MYA. Click on **"Charts"** at the bottom of the screen. Choose a chart. Now, click on the left "play" button at the bottom of the timeline. Watch what happens on your chosen chart as the slider moves down the timeline.
   e. Click "pause" before the slider reaches the bottom of the timeline. Note that your chosen chart will show a demarcation in the data for that point in time.
   f. Close your chart in EarthViewer by clicking on the "X" in the upper right-hand corner.

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3. Make sure the timeline displays 0–540 million years and then click on "View" at the bottom of the screen; turn on "Mass Extinctions." Click "View" again to minimize the menu.
4. Note the five yellow triangles that appear on the right side of the timeline. These correspond to mass extinctions.
5. **Gather Data:** Drag the slider to the Ordovician extinction, 440 MYA. Use the EarthViewer features to fill in the following chart. For Biodiversity, you will need to move the slider carefully and record the number of marine genera present just before and just after the extinction event. Gather data in the same manner for the remaining four mass extinctions.

Mass Extinction	MYA	What was Earth's surface like? Landmasses? Proportion of land to water?	Avg. Surface Temp., °C	O_2 (%)	CO_2 (ppm)	Day Length	Luminosity	Biodiversity (# of genera just before & just after extinction)
Ordovician								
Devonian								
Permian								
Triassic								
Cretaceous								

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Analysis:

1. Do any patterns and correlations emerge from your chart? If yes, describe this pattern.

   _____

   _____

   _____

2. Does any of the data suggest an explanation for the occurrence of mass extinction? Explain your answer.

   _____

   _____

   _____

3. Return to EarthViewer and click on each mass extinction to find out its cause. Based on the information you have gathered, how do mass extinctions occur?

   _____

   _____

   _____

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