

**Student Sheet**

**Name** \_\_\_\_\_

**Title: Evolutionary Trees**

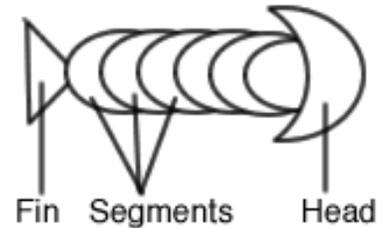
**Introduction:** The fossil record cannot accurately determine when one species becomes another species (speciation). Two hypotheses regarding speciation exist. **Punctuated equilibrium** suggests that abrupt mutations in a few genes occur after a species has existed for a long period of time. This mutation results in the entire species shifting to a new species. **Gradualism** suggest that a slow, steady accumulation of small genetic changes add up to many changes and new species develop. Most evolutionary biologists accept that a combination of the two models has affected the evolution of species over time.

**Materials:** per group: one geologic time scale, one set of paper fossils, scissors, glue

**Procedure:**

1. Cut the bottom off the Geologic rock sequence where it says "trim below this line". Tape the bottom of the table underneath the top to form a single column.
2. The group of "fossils" you will work with are imaginary animals but not unlike the ancient trilobites. Each fossil on your sheet is marked with a time period and a letter to identify it. Cut out each fossil, include the time period and letter.

3. Use the picture to help describe the fossils:



4. Arrange the fossils alphabetically. You will place them on your data chart, next to the period from which the fossil came from. The term "upper" means more recent and should be placed higher on the row. The term "lower" means an earlier time period, fossils from a "lower" time period should be placed toward the bottom. So time periods may have more than one fossil, some may not have any.
5. You will place the fossils on the sheet in the order they were "discovered". Answer the questions as you go. Do not tape the fossils until you are done.

**START:**

6. Place fossils A, E and O in their proper location. At this point, what might scientists infer about the evolution of this organism?
7. Add fossil F. Now what inferences might scientists make?
8. Now add Q, S, T, L and M. What may have happened to the species during the Nevadian time period?
9. Add P, V, N and I. How sure are you of your answer to #8?

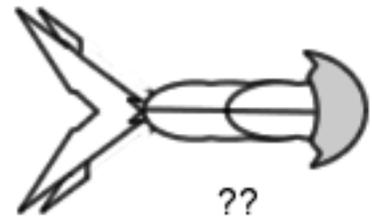
10. Add the remaining letters to the evolutionary tree and show your teacher. When you have discussed it, tape the fossils to the paper and draw a line connecting fossils in each branch of the tree.

11. Give a brief description of the evolutionary changes that occurred in the organism.

12. What may have happened in the Montanian Period to organisms like Fossil L?

13. Explain how the chart illustrates both punctuated equilibrium and gradualism. Use specific fossils from the chart to support your answer.

14. Examine the fossil that was unearthed in a museum, apparently the labels and other information were lost. Using your fossil record, determine the time period that this fossil is likely from.



15 . Of the two major species that arose from the parent species, which was more successful? What inference did you make?

16. For each of the "blanks" on your fossil record make a sketch of what the animal would look like. Draw them on your fossil record.

Conclusion: How does evidence from the fossil record support evolutionary theory?