

Team members (First and Last Names): \_\_\_\_\_

Period: \_\_\_\_\_ Group #: \_\_\_\_\_

### Fossil lab

**Background:** Fossils are traces of organisms that lived in the past. When fossils are found, they are carefully excavated and then analyzed. Most fossils form by one of three methods.

*Method 1: The hard structures such as bones, teeth or shells create an imprint in rocks.*

*Method 2: The replacement of structures in the organism with minerals in a process known as petrification.*

*Method 3: A body part is preserved when sediment covers it.*

Analysis of fossils includes dating and careful observations of **morphology**, or **the changes in physical characteristics**, to determine if it is related to other fossils or existing organisms. Scientists use this information to develop ancestral lineages (or evolutionary lineages).

**Task:** In this lab you will be working with a fictitious organism of the genus *Adventurian*. You will examine *Adventurian* fossils to find similarities in their morphology and age in an attempt to give specific evidence that organisms of the genus *Adventurian* slowly evolved over time.

**Hypothesis:** If *Adventurian* has evolved, then... (*What will you notice?*)

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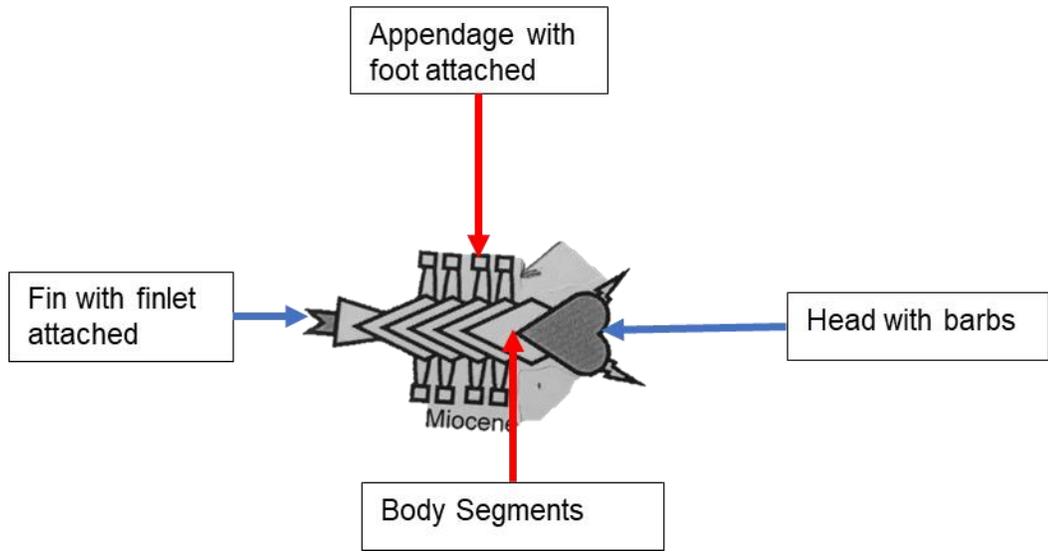
**Supplies:** Adventurian fossil chart, mystery fossil

#### Understanding the Adventurian Fossil Chart:

1. The chart of fossils you will examine are fictitious animals. Each fossil on the chart is marked with the time period it was found and the duration of that period. As is true in the real fossil record, some fossils are "missing".
2. The oldest fossil is centered at the bottom of the fossil column (This is the oldest period, Cambrian, and hence the oldest layer.)
3. Throughout the chart, those fossils that appear to be the same (or close to the same) as the fossils preceding them are placed in a **vertical** line.
4. During a certain period, **the fossils split into two branches**. In other words, one fossil from that period showed one type of change, and another fossil showed a different change. When this happened, the fossils were placed **side by side in the appropriate time period**. From this point forward, you have two lineages.

#### Data Collection:

5. For now, set the "mystery fossil" aside. **STARTING WITH THE OLDEST LAYER**, examine the morphology (appearance of each fossil) on the chart. (To help you understand the morphology of the specimen, view the diagram of parts below.)



6. Add a brief description of the evolutionary changes you see in each fossil as you move to the next younger period. A few descriptions are randomly done for you below. If there is no change in the fossil, record no change.

Organism		Periods (Epochs)	Began (million years ago)	Duration (in million years)
14a.	14b. Finlet changes color	Tertiary (Miocene)	21 MYA	18.5
13a.	13.b Feet develop	Tertiary (Californian)	23.8 MYA	
12a.	12.b No change	Tertiary (Oligocene)	33.7 MYA	
11a.	11b.	Tertiary (Eocene)	54.8 MYA	
10a.	10b.	Tertiary (Paleocene)	65 MYA	
9a.	9b.	Cretaceous	142 MYA	
8a.	8b. Appendage nubs are visible.	Jurassic	205.7 MYA	

7a.	7b.	Triassic	248.2 MYA	
6a.	6b. Barbs move to middle of face	Permian	290 MYA	
5a. Rounded segment encloses the whole body. Loses of another body segment.	5b.	Pennsylvanian	323 MYA	
4a. Rounded segment increases in size. Loses another body segment.	4b.	Mississippian	354 MYA	
3a.	3b. Finlet appear. Barbs even more pronounced. Head changes color.	Devonian	417 MYA	
	2.	Silurian	443 A	
	1. Barbs appear on head.	Ordovician	495 MYA	52 MY
	<b>N/A</b>	<b>Cambrian (oldest layer)</b>	545 MYA	50 MY

**Analysis:**

2. During which time period did the fossils differentiate into two branches. \_\_\_\_\_

3. After the branching, what kind of environment do you think the “**gray heads**” lived in? Explain why you think so, providing evidence from your observations.

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4. After the branching, what kind of environment do you think the “**white heads**” lived in? Explain why you think so, providing evidence from your observations.

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5. Pick up the mystery fossil you set aside. Compare its morphology to the fossils you have on your chart. Discuss with your team the appropriate time period where it would belong. Explain your decision.

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6. Of the two major species that arose from the parent species, which was more successful? How do you know?

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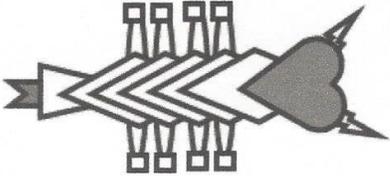
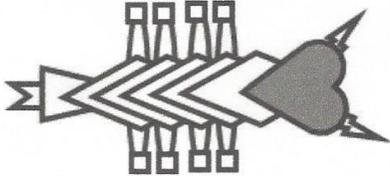
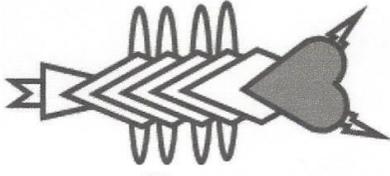
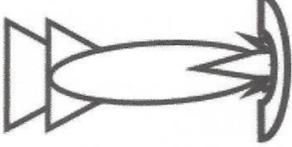
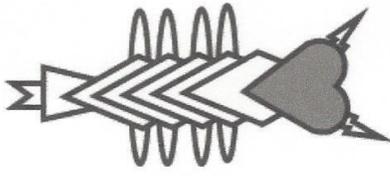
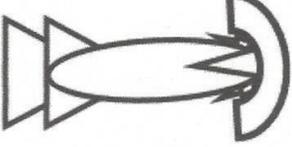
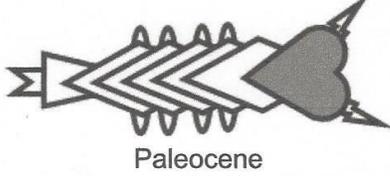
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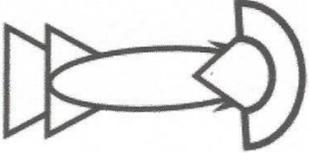
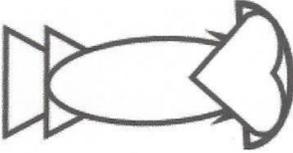
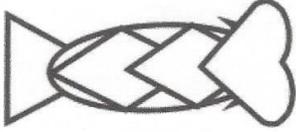
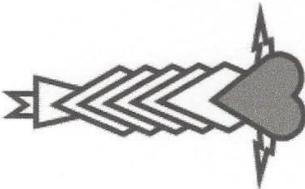
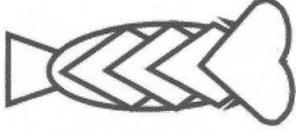
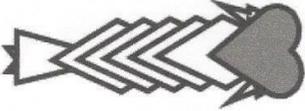
7. Go back to your hypothesis, use evidence from your fossil chart to prove/disprove that the genus *Adventurian* has evolved.

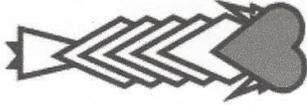
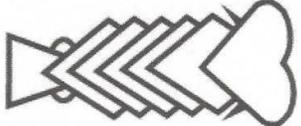
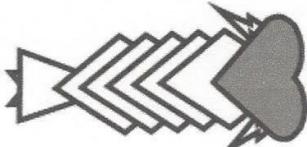
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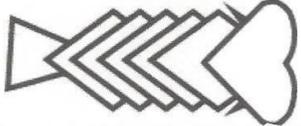
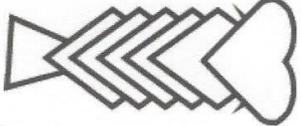
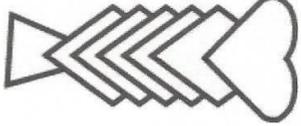
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Organism		Began (MYA)	(Duration MY)
	 <p>Miocene</p>	21	18.5
	 <p>Californian</p>	23.8 MYA	2.8 MY
	 <p>Oligocene</p>	33.7 MYA	9.9 MY
 <p>Eocene</p>	 <p>Eocene</p>	54.8 MYA	21.1 MY
 <p>Paleocene</p>	 <p>Paleocene</p>	65 MYA	10.2 MY

 <p>Cretaceous</p>		142 MYA	77 MY
 <p>Jurassic</p>	 <p>Jurassic</p>	205.7 MYA	63.7 MY
	 <p>Triassic</p>	248.2 MYA	42.5 MY
 <p>Permian</p>	 <p>Permian</p>	290 MYA	41.8 MY
 <p>Pennsylvanian</p>	 <p>Pennsylvanian</p>	323 MYA	33 MY

 <p>Mississippian</p>	 <p>Mississippian</p>	354 MYA	31 MY
 <p>Devonian</p>	 <p>Devonian</p>	417 MYA	63 MY

	495 MYA	52 MY
	443 MYA	26 MY
 <p>Cambrian</p>	545 MYA	50 MY

