

Unit 8 Topic 3 - Cladogram Worksheet

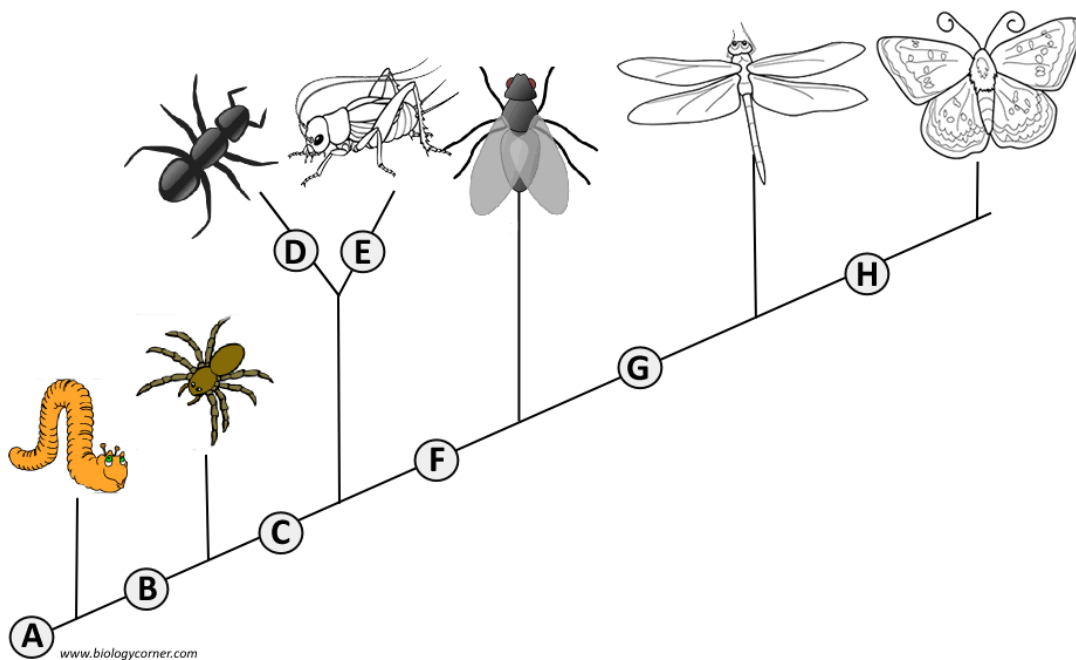
What is a cladogram? It is a diagram that depicts evolutionary relationships among groups. It is based on **PHYLOGENY**, which is the study of evolutionary relationships.

In the past, biologists would group organisms based solely on their physical appearance, or **MORPHOLOGY**. Today, with the advances in genetics and biochemistry, biologists can look more closely at individual's DNA and RNA sequences to discover their pattern of evolution and group them accordingly - this strategy is called **EVOLUTIONARY CLASSIFICATION**

CLADISTICS is form of analysis that looks at features of organisms that are considered "innovations", or newer features that serve some kind of purpose. These characteristics appear in later organisms but not earlier ones and are called **DERIVED CHARACTERS**.

PART I - Analyze the Cladogram

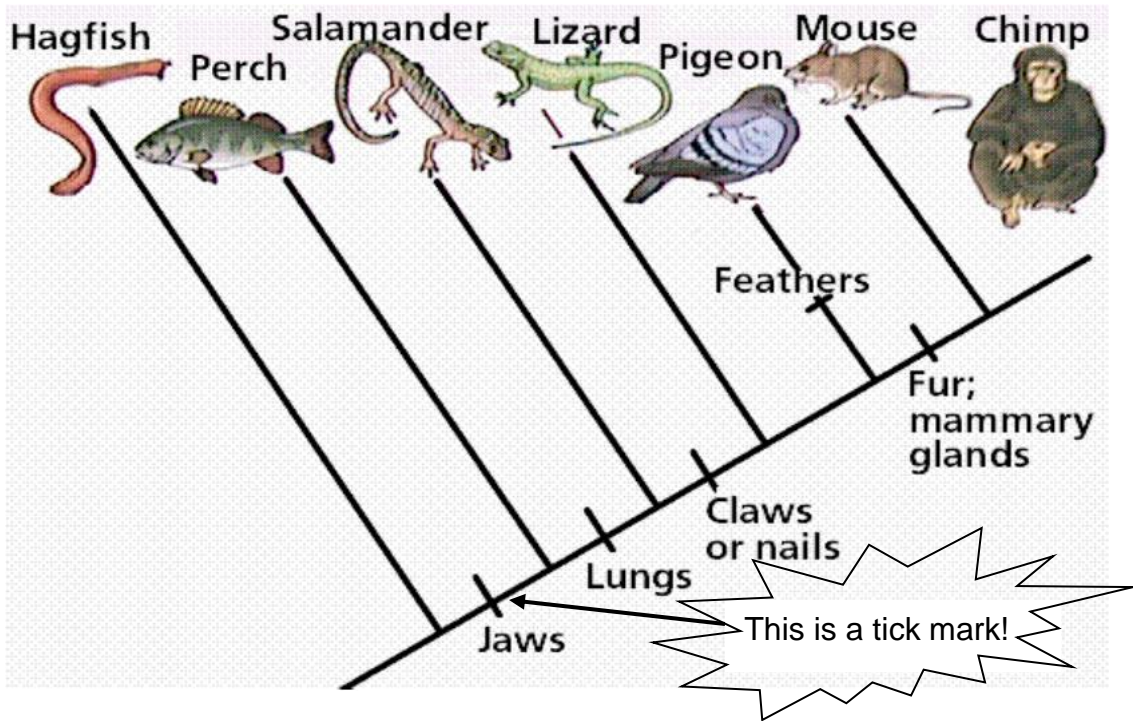
Examine the sample cladogram, each letter on the diagram points to a derived character, or something different (or newer) than what was seen in previous groups. Match the letter to its character. *Note: this cladogram was created for simplicity and understanding, it does not represent the established phylogeny for insects and their relatives.*



1. _____ Wings
2. _____ 6 Legs
3. _____ Segmented Body
4. _____ Double set of wings
5. _____ Jumping Legs
6. _____ Crushing mouthparts
7. _____ Legs
8. _____ Curly Antennae

Another Example

Analyze the cladogram below by answering the associated questions.



1. After which animals did mammary glands develop? _____
2. What animal does not have jaws? _____
3. Which animals have lungs? _____
4. Which animals are probably predators? _____
5. After which animal did protection from the elements arise? _____

PART II - Create Your Own Cladogram

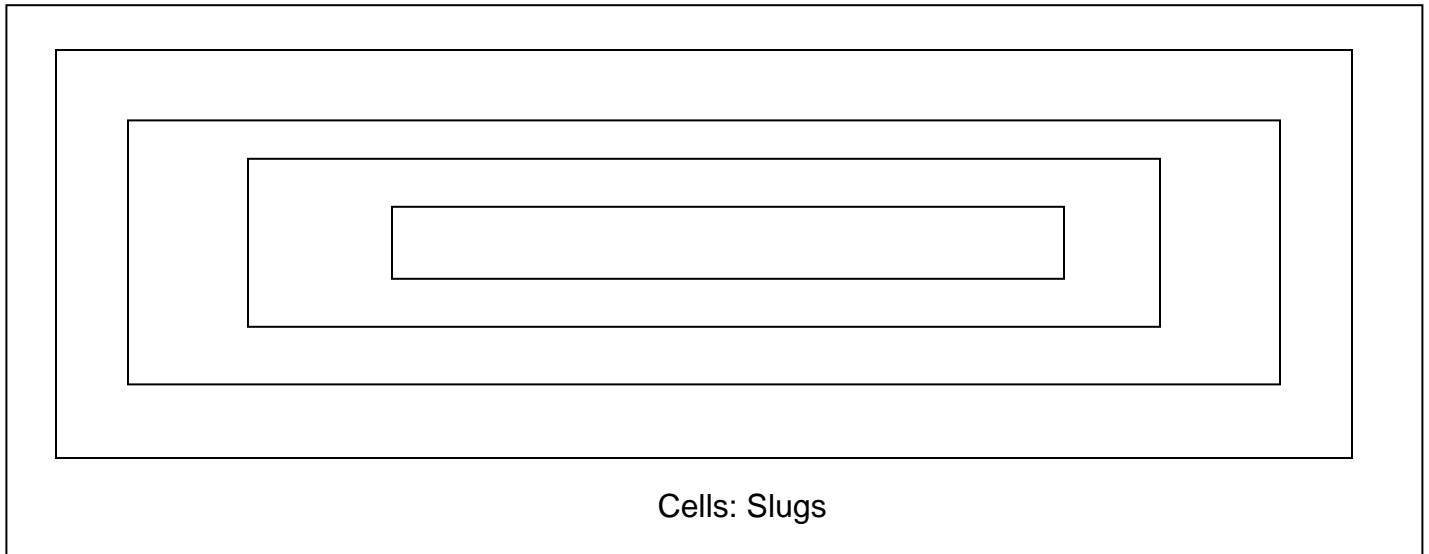
To make a cladogram, you must first look at the animals you are studying and establish characteristics that they share and ones that are unique to each group. For the animals on the table, indicate whether the characteristic is present or not by placing a checkmark in boxes for organisms that possess a given trait. Based on that chart, create a venn diagram and a cladogram like the one pictured above. After this, you must interpret your cladogram by answering the questions at the end.

Step 1: Creating a Table of Shared Characteristics

	Cells	Backbone	Legs	Hair	Opposable Thumbs
Slug					
Catfish					
Frog					
Tiger					
Human					

Step 2: Creating a Venn Diagram

Start with the characteristic that is shared by all the organisms on the outside. Inside the box, write the name of the organism that has **ONLY** that characteristic. The first label is given for you and each box should be labeled with a different characteristic. The largest box will represent the trait that is closest to the “root” of your cladogram”



Step 3: Draw Your Cladogram

Note: each trait will represent a “tick mark” on the tree. Again, traits that are shared by most of the organisms will be shown by tick marks that are closer to the “root” of the cladogram.***

Step 4: Interpret Your Cladogram (Answer in complete sentences!)

1. Which organism is most closely related to the slugs? How do you know?

2. Which trait is found only in humans? Do we place this trait closer to the root or the tip of our cladogram?

3. Provide the definition of derived characteristics. In your cladogram, which characteristic is the "most derived," and which characteristic is the "least derived?"

4. Does your cladogram provide a perfect view of the evolutionary relationships between these groups? In other words, is there any other data you would need to see to confirm your results? What kind of data?
