Week 4 Assignments-Due May 13

In this set of lessons (there is one more set after this one.), you will be looking at how organisms are grouped, how to interpret charts that identify specific organisms from each other, and diagrams that show similarities among organisms. As you complete those diagrams (cladograms) keep in mind they **are not** saying those organisms came from each other. They are just saying they have some traits in common (like a cat and a dog both have a backbone). In this packet you have two pages that explain how to create and interpret cladograms. If you have good enough internet, you can also check out this video that I show in class to help you understand. (https://www.youtube.com/watch?v=ouZ9zEkxGWg) As always though, if you have questions please email or send me a message on Remind or Classroom. You will also begin to think about what you have learned over the year. To do this part your first assignment is below.

Assignment 1

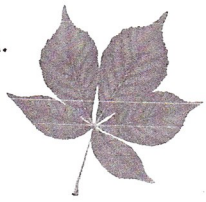
Create a 10-question quiz over any topic(s) we have talked about this year. The type of questions (T/F, MC, Short answer, matching, etc.) and topic(s) are your choice. You MUST include an answer key, as that will help me see what you have learned.

Assignment 2

Complete the Quick Lab explaining how to use a dichotomous key to identify organisms.

Quick Lab Guided Inquiry

Using a Dichotomous Key

A. 

B. 

C. 

A dichotomous key is a series of steps that lead to a classification of an organism. It consists of a series of paired statements that describe alternative characteristics of organisms. Use the key to identify the type of tree that produced each leaf. Begin with Step 1. Your answer to each step will either bring you to the next step or identify the tree. The results will show either the next step or the name of the tree.

ANALYZE AND CONCLUDE

1. **Classify** Identify the type of tree that produced leaves A, B, and C.
2. **Identify Patterns** Use the objects provided by your teacher to make your own dichotomous key.

Dichotomous Key for Classifying Leaves

Step	Leaf Characteristics	Result
1a	Compound leaf, divided into leaflets	Go to step 2
1b	Simple leaf, not divided into leaflets	Go to step 4
2a	Leaflets all attached at a central point	Buckeye
2b	Leaflets attached at several points	Go to step 3
3a	Leaflets tapered with pointed tips	Pecan
3b	Leaflets oval with rounded tips	Locust
4a	Veins branched out from one central point	Go to step 5
4b	Veins branched off main vein in middle of the leaf	Go to step 6
5a	Heart-shaped leaf	Redbud
5b	Star-shaped leaf	Sweet gum
6a	Leaf with jagged edges	Birch
6b	Oval leaf	Magnolia

Biology

Name _____
Date _____
Section _____

Exploring How Cladograms are Created

adapted from Texley, Juliana. March 2002. The Science Teacher. "Teaching the New Taxonomy."

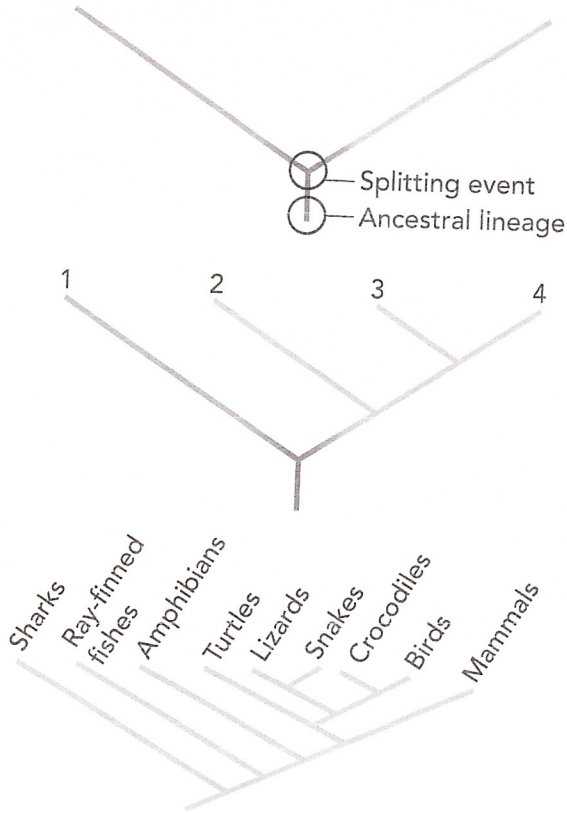
Challenge 1: Welcome to my museum

Instructions: *Imagine you are the curator of a natural history museum in the year 1700. Explorers have provided you with preserved (stuffed) specimens of unusual animals from around the world. Most people in your town have never seen the animals in your collection. You want to arrange your specimens by a characteristic that is easy to understand by people who visit the museum. Divide your specimens into three groups, each of which will be housed in a room of your museum. Create a title for each room and then* list who you are grouping together & what characteristic they share.

Room 1
Name of Room:
Uniting Characteristic:
Organisms Found in the Room:

Room 2
Name of Room:
Uniting Characteristic:
Organisms Found in the Room:

Room 3
Name of Room:
Uniting Characteristic:
Organisms Found in the Room:



1 Cladograms are diagrams showing how evolutionary lines, or lineages, split from each other over time. This diagram shows a single ancestral lineage splitting into two.

2 The relationship of lineages to each other is based on how recently they share a common ancestor. Here, lineages 3 and 4 are each more closely related to each other than any of them is to any other lineage.

3 This cladogram shows the evolutionary relationships among vertebrates, animals with backbones.

Figure 19-6

Building a Cladogram

A cladogram shows relative degrees of relatedness among lineages.

Cladograms

Modern evolutionary classification uses a method called cladistic analysis. Cladistic analysis compares carefully selected traits to determine the order in which groups of organisms branched off from their common ancestors. This information is then used to link clades together into a diagram called a **cladogram**. ***A cladogram links groups of organisms by showing current hypotheses about how evolutionary lines, or lineages, branched off from common ancestors.***

Building Cladograms To understand how cladograms are constructed, think back to the process of speciation and look at part 1 of **Figure 19-6**. Part 1 represents how one ancestral species branches into two species, each of which could found a new lineage. Now look at part 2. The bottom, or "root" of this cladogram, represents the common ancestor shared by all organisms in the cladogram. The branching pattern shows how closely related various lineages are. Each branch point represents the last point at which species in lineages above that point shared a common ancestor. Lineages 3 and 4 share a common ancestor more recently with each other than they do with lineage 2. So you know that lineages 3 and 4 are more closely related to each other than either is to lineage 2. The same is true for lineages 2, 3, and 4. All three of these groups are more closely related to each other than any of them is to lineage 1. Now look at part 3 of the figure. Does it surprise you that amphibians are more closely related to mammals than they are to ray-finned fish?

INTERACTIVITY

Complete a cladogram that shows the evolutionary history of plants.

Interpreting Cladograms Look at **Figure 19-8**, which shows a simplified phylogeny of the cat family. The lowest branching point represents the last common ancestor of all four-limbed animals, which are members of the clade Tetrapoda. The forks in this cladogram show the order in which various groups branched off from the tetrapod lineage. The positions of various characters in the cladogram reflect the order in which those characteristics arose. Hair, for example, is a defining character for the clade Mammalia. In the lineage leading to cats, specialized shearing teeth evolved before retractable claws.

Furthermore, each derived character listed along the main trunk of the cladogram defines a clade. Retractable claws is a derived character shared only by the clade Felidae. Derived characters that occur "lower" on the cladogram than the branch point for a clade are not derived for that particular clade. Note that hair is a derived character for the entire clade Mammalia, but it is not a derived character for the branch of mammals in the clade Carnivora.

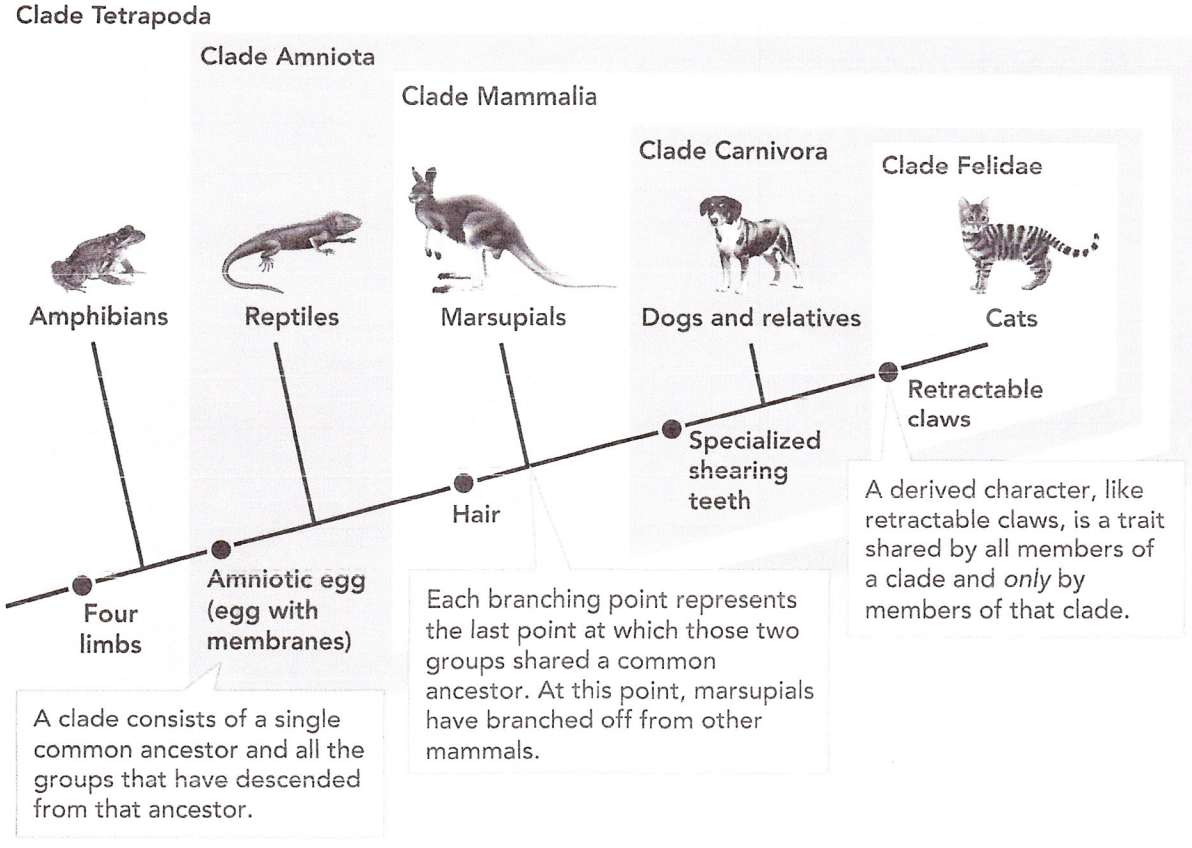
Clades and Traditional Groups Which Linnaean groupings form clades, and which do not? Remember that a true clade must contain an ancestral species and *all* of its descendants, with no exceptions. It also must exclude all species that are not descendants of the original ancestor. Cladistic analysis shows that many traditional taxonomic groups form valid clades. For example, Linnaean class Mammalia corresponds to clade Mammalia.

CASE STUDY

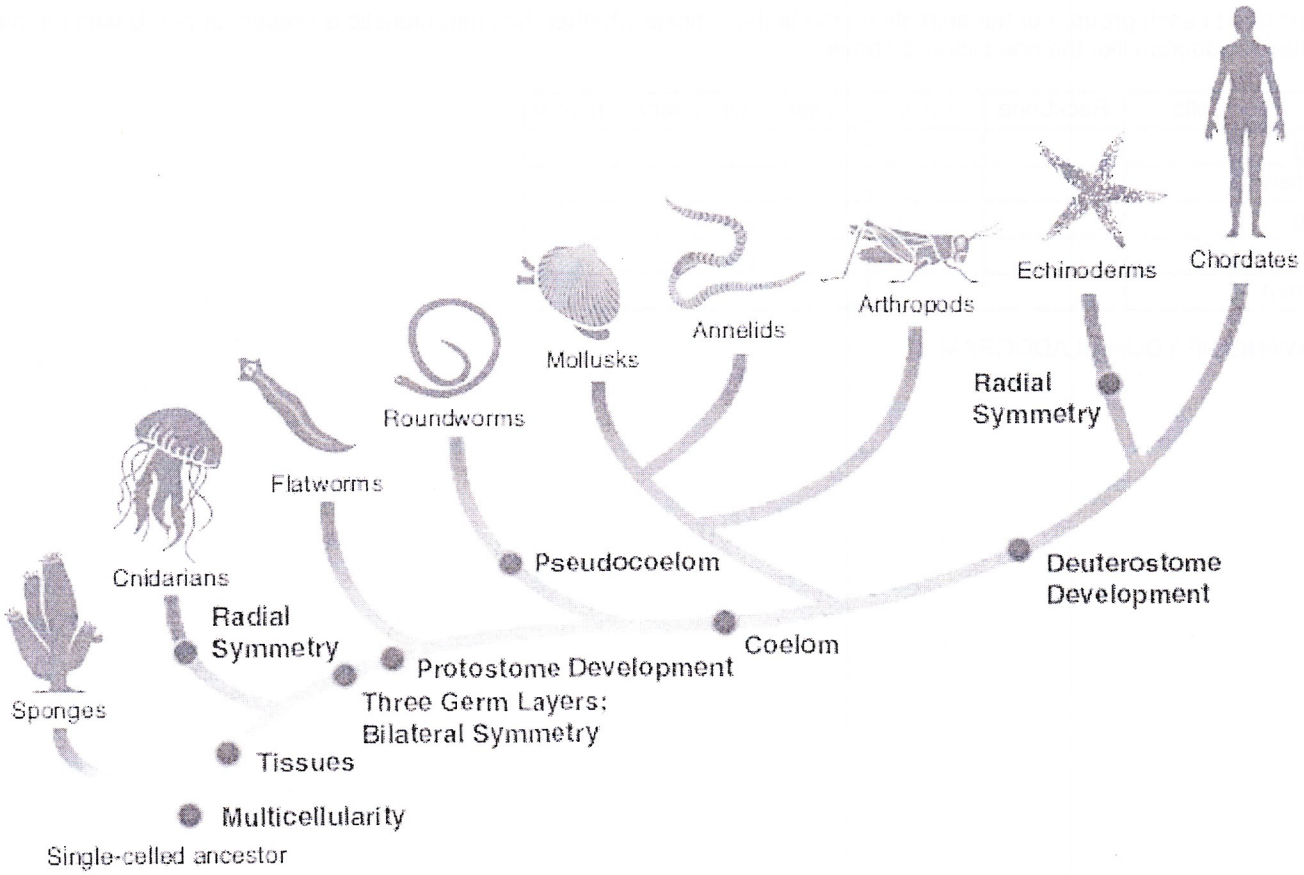
Figure 19-8

Interpreting a Cladogram

In a cladogram, all organisms in a clade share a set of derived characters. Notice that smaller clades are nested within larger clades.
Interpret Visuals For which clade is an amniotic egg a derived character? Is the duck-billed platypus a member of the clade Amniota? Explain.



Cladogram Practice



1. List the organisms that show multicellularity.

2. List any organisms that lack tissues.

3. List organisms with radial symmetry (body parts arranged around a central axis).

4. What organisms have deuterostomic (blastopore opening becomes the anus) development?

5. List organisms with a coelom (fully lines body cavity).

6. List protostomes (blastopore becomes the mouth) organisms that have a coelom.

7. Name the deuterostome with radial symmetry.

8. Name the deuterostome with bilateral symmetry.

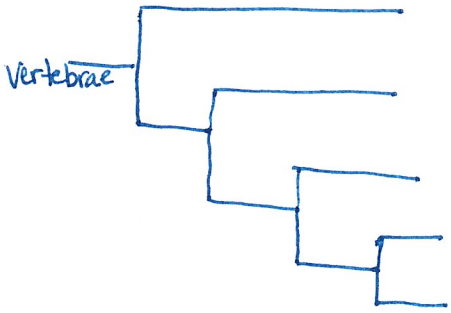
Character Matrix for Constructing a Cladogram

Student Version

Fill in the table below, indicating a "0" if the trait is absent in the group and a "1" if the trait is present.

	Vertabrae	Bony skeleton	Four limbs	Amniotic egg	Feathers
Human				1	
Bird				1	
Salamander				0	
Fish				0	
Shark	1	0	0	0	0
Total shared traits					

Once you have the chart above filled out, place the animals & the characteristics on one of these charts. Both are ways you may see a cladogram layed out.



or