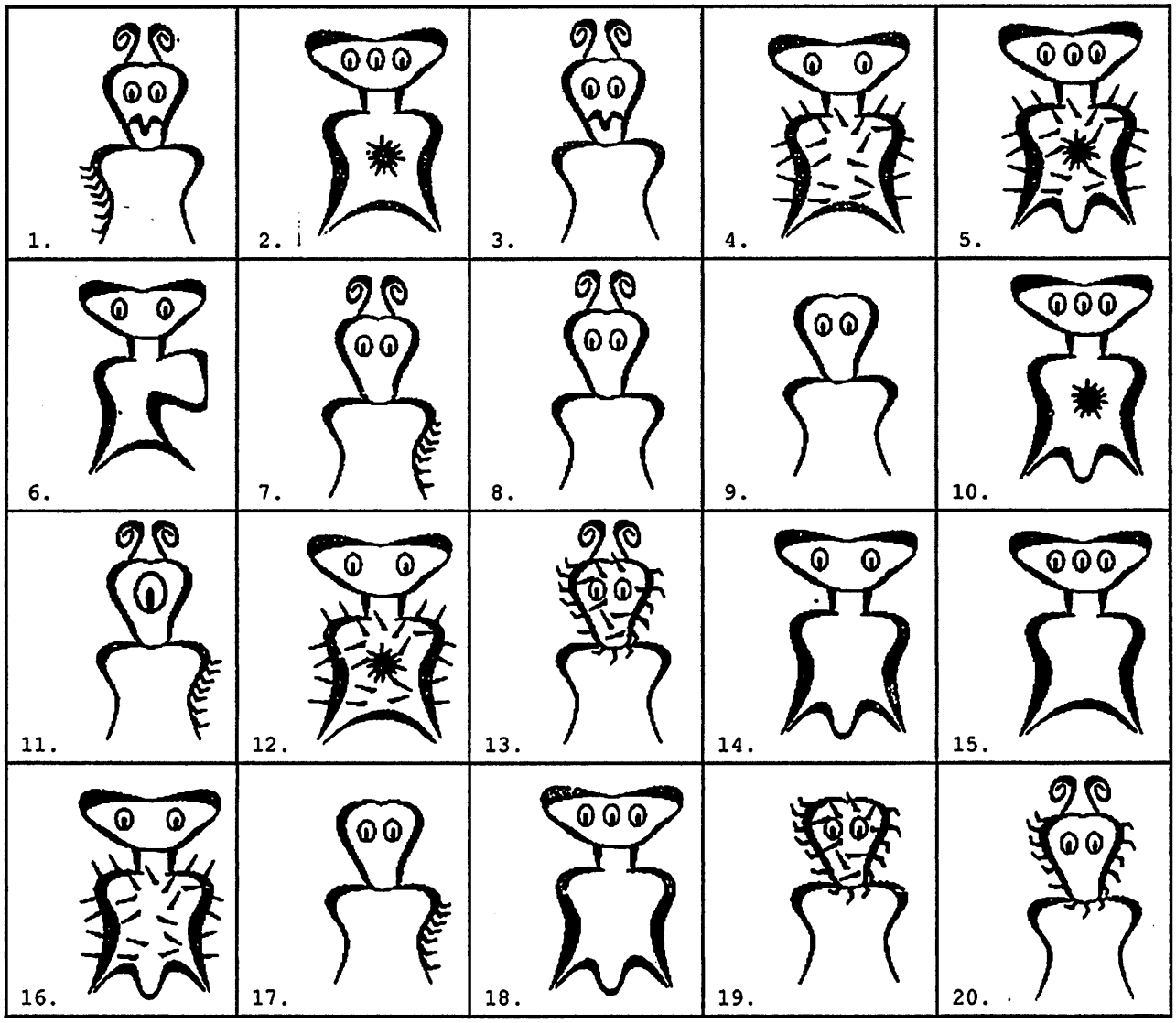
Taxonomy, Classification, and Dichotomous Keys

Help! Scientists have discovered quite a few new crewatures on planet Pamishan. They need your help to identify and classify them. Use the dichotomous key on the next page to identify these creatures.



A Key to New Pamishan

1. a. The creature has a large wide head.....go to 2
   b. The creature has a small narrow head.....go to 11
2. a. It has 3 eyes .....go to 3
   b. It has 2 eyes .....go to 7
3. a. There is a star in the middle of its chest.....go to 4
   b. There is no star in the middle of its chest .....go to 6
4. a. The creature has hair spikes .....*Broadus hairus*
   b. The creature has no hair spikes.....go to 5
5. a. The bottom of the creature is arch-shaped .....*Broadus archus*
   b. The bottom of the creature is M-shaped .....*Broadus emmus*
6. a. The creature has an arch-shaped bottom .....*Broadus plainus*
   b. The creature has an M-shaped bottom.....*Broadus tritops*
7. a. The creature has hairy spikes ..... go to 8

b. The creature has no spikes.....go to 10
8. a. There is a star in the middle of its body .....*Broadus hairystarus*
b. The is no star in the middle of its body .....go to 9
9. a. The creature has an arch shaped bottom .....*Broadus hairyemmus*
b. The creature has an M shaped bottum .....*Broadus kiferus*
10. a. The body is symmetrical .....*Broadus walter*
b. The body is not symmetrical.....*Broadus anderson*
11. a. The creatrue has no antennae .....go to 12
b. The creature has antennae .....go to 14
12. a. There are spikes on the face .....*Narrowus wolfus*
b. There are no spikes on the face .....go to 13
13. a. The creature has no spike anywhere .....*Narrowus blankus*
b. There are spikes on the right leg .....*Narrowus starboardus*
14. a. The creature has 2 eyes.....go to 15
b. The creature has 1 eye.....*Narrowus cyclops*
15. a. The creature has a mouth.....go to 16
b. The creature has no mouth.....go to 17
16. a. There are spikes on the left leg .....*Narrowus portus*
b. There are no spikes at all .....*Narrowus plainus*
17. a. The creature has spikes .....go to 18
b. The creature has no spikes .....*Narrowus georginia*
18. a. There are spikes on the head .....go to 19
b. There are spikes on the right leg.....*Narrowus montanian*
19. a. There are spikes covering the face .....*Narrowus beardus*
b. There are spikes only on the outside edge of head .....*Narrowus fuzzus*

Name:_____

Dichotomous Keys Using Smiley Faces

Instructions: Use the key below to identify the species name of each of the smileys below.

1. Teeth visible .....go to 2
.....Teeth not visible .....go to 4

2. Has a wide, toothy smile .....Smilus toothyus
....Is not smiling .....go to 3

3. Visibly crying .....Smilus dramaticus
.... Frowning .....Smilus upsettus

4. Eyes are symmetrical .... go to 5
....Eyes not symmetrical .....go to 8

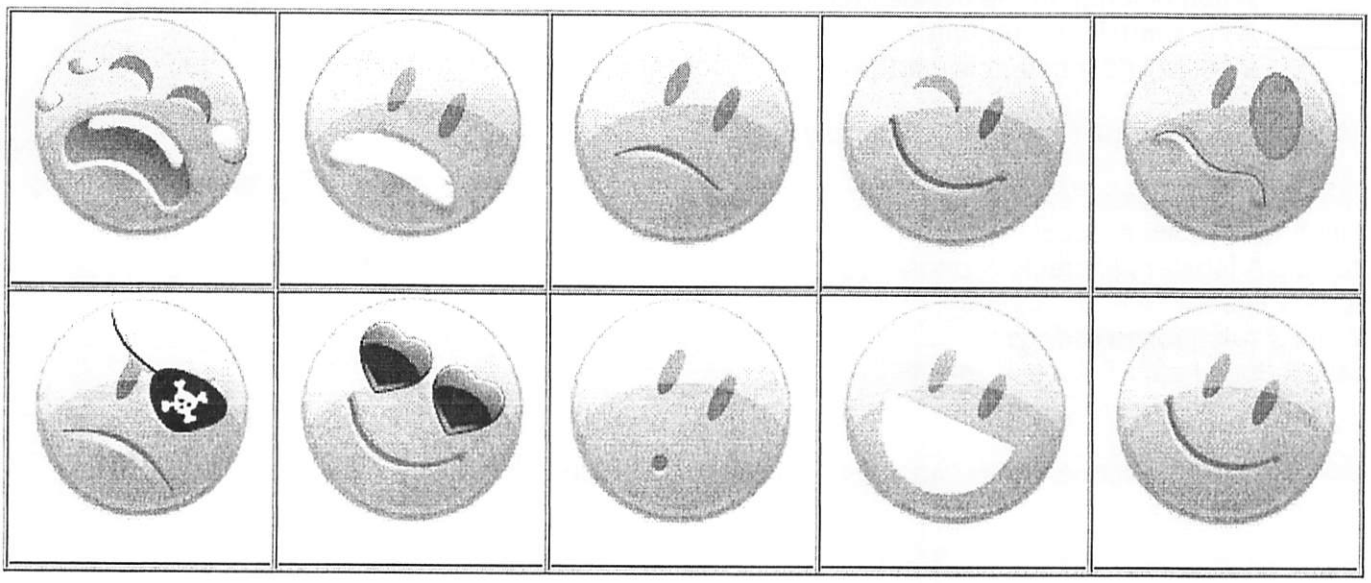
5. Eyes shaped like hearts ..... Smilus valentinus
....Eyes are shaped as ovals .....go to 6

6. Smiling, happy face ..... Smilus traditionalis
.....Not happy, frowning or other .....go to 7

7. Mouth curved down, frowning .... Smilus saddus
.... Mouth is a small circle .....Smilus suprisus

8. Has a pirate eye patch .....Smilus piratus
....Does not have eye patch ..... go to 9

9. One eye is much larger than the other eye
..... Smilus mutatus
One eye is winking .....Smilus winkus



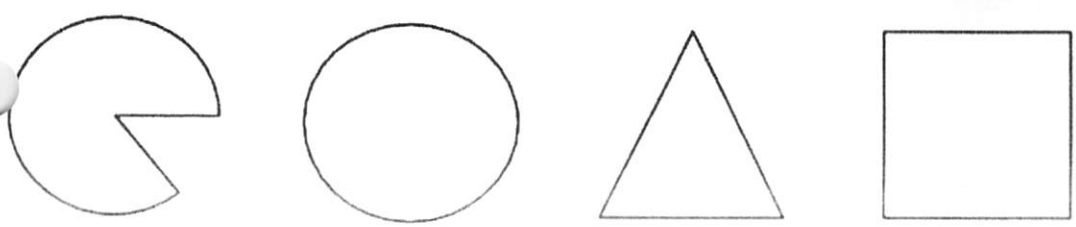
Extension:

A. The names of the smilies give you another bit of information about their taxonomy. Each of these smilies belongs to the same genus. What is their genus? _____

B. Names are often given to an organism by the person who discovers it, though they follow certain conventions, often they are named after the person, or where the organism was found, or given a name that describes the creature. Which convention was used in naming these smilies? _____

C. Suppose you discovered the new smiley pictured to the right.
What name would you give it? _____

D. Create a small dichotomous key that names the following creatures.



Name: _____

Interpreting Graphics - Taxonomy

Answer true or false to the following statements. Use the graphic to determine the answers.

1. _____ Dogs belong to the order Felidae.
2. _____ A fox belongs to the phylum Arthropoda.
3. _____ Snakes belong to the phylum Reptilia.
4. _____ Lions belong to the class mammalia
5. _____ All arthropods belong to the Class Insecta
6. _____ All rodents belong to the phylum chordata.
7. _____ All amphibians belong to the class reptilia.
8. _____ All primates are mammals.
9. _____ The class mammalia includes dogs, cats and rats.
10. _____ A lion belongs to the genus Felis.
11. _____ All mammals are primates.
12. _____ Insects and lobsters are arthropods.

In each set, circle the pair that is most closely related.

13. snakes & crocodiles | snakes & frogs
14. rats & cats | cats & dogs
15. insects & lobsters | insects & birds
16. lions & tigers | lions & cougars
17. foxes & rats | foxes & dogs
18. cats & dogs | cats & lions

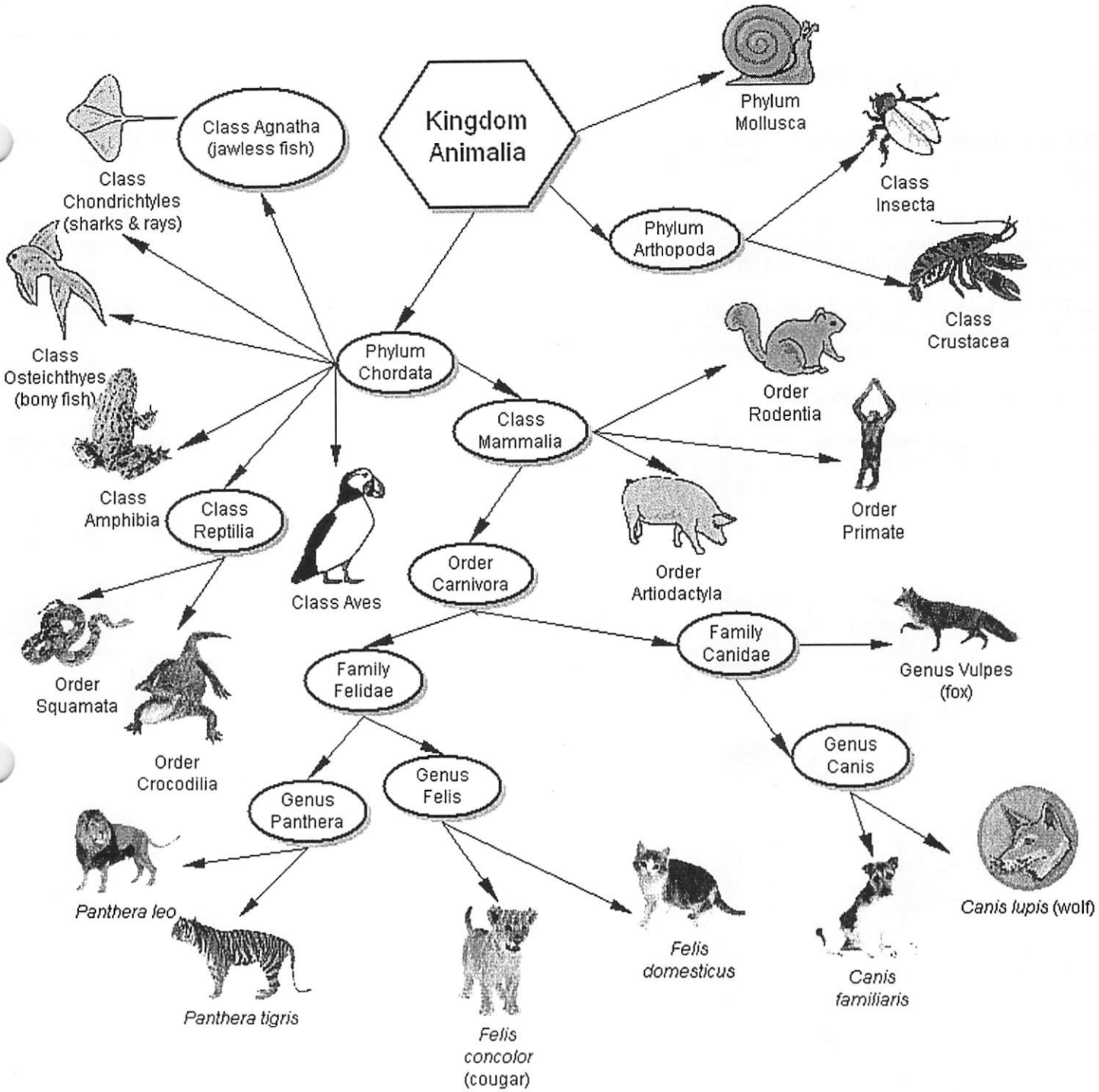
19. List (use species name) all the animals pictured that belong in the Felidae family.

20. The image does not show orders of insects. Suggest three categories of insects that would likely be grouped into orders. Hint: think about what kind of insects there are. Add your three categories to the image.

21. Create an addition to the image given the following information.

- Mollusks are divided into three classes: Class Cephalopoda (squids), Class Gastropoda (snails), Class Bivalve (clams and oysters)
- Cephalapods have a few orders, one of which is Octopoda (octopus) and and another is Teuthida (squids)
- The scientific name for the common octopus is *Octopus vulgaris*.
- The scientific name for the common european squid is *Loligo vulgaris*.

Source: http://www.thecephalopodpage.org/taxa.php



(Image made using Inspiration software)

Name_____

CLADOGRAM ANALYSIS

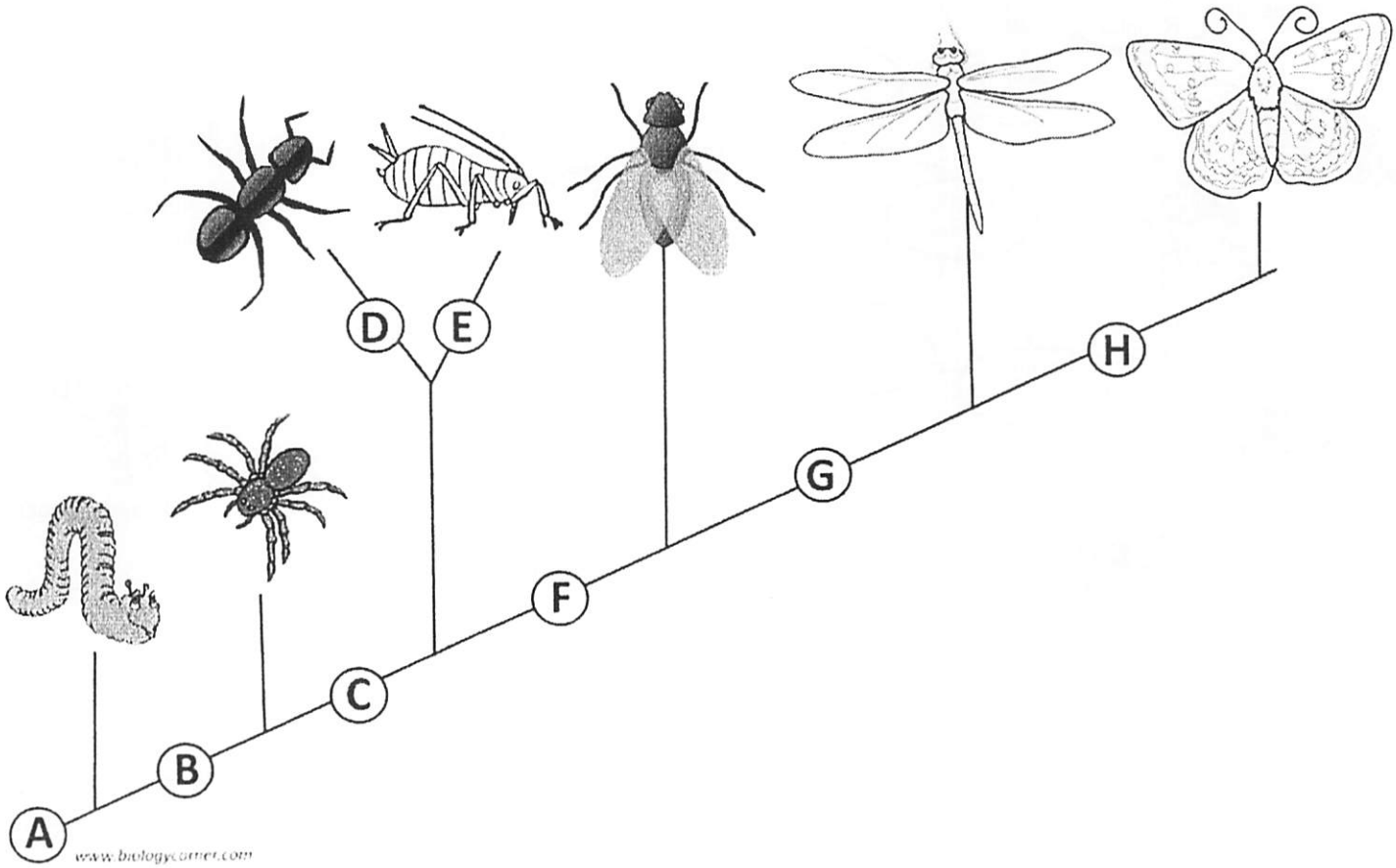
What is a cladogram? It is a diagram that depicts evolutionary relationships among groups. It is based on **PHYLOGENY**, which is the study of evolutionary relationships. Sometimes a cladogram is called a phylogenetic tree (though technically, there are minor differences between the two).

In the past, biologists would group organisms based solely on their physical appearance. Today, with the advances in genetics and biochemistry, biologists can look more closely at individuals 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. (Think about what the word "innovation" means in regular language.) 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. _____ Cerci (abdomenal appendages)
6. _____ Crushing mouthparts
7. _____ Legs
8. _____ Curly Antennae

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. Based on that chart, create a cladogram like the one pictured above.

	Cells	Backbone	Legs	Hair	Opposable Thumbs
Slug					
Catfish					
Frog					
Tiger					
Human					

DRAWING OF YOUR CLADOGRAM