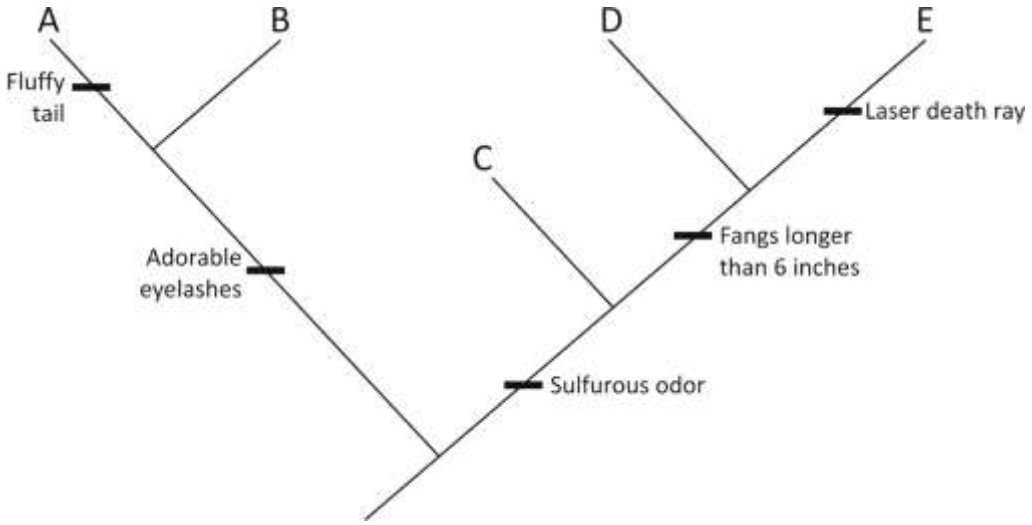
Earth 101 –Cladistics Exercise

Write your answers on a separate sheet and turn them in at the end of class. You may want to work on a rough draft of the cladogram (in part 3) before writing a clean, final version on your answers.

Part 1. Examine the following cladogram and answer the questions.



1. What is the synapomorphy of the clade containing species D and E?

2. What is a plesiomorphic character of that clade?

3. What is the synapomorphy of the clade containing species A and B?

4. Which taxa have a sulfurous odor?

5. What character distinguishes species D from species E?

6. Are adorable eyelashes a synapomorphy or an autapomorphy?

Part 2. Use the previous cladogram to answer the questions.

7. Traditionally, the five taxa are grouped into three families. Family 1 contains species A. Family 2 contains species B and C. Family 3 contains species D and E. Determine if each family is monophyletic, paraphyletic, or polyphyletic.

8. More recently, species A has been grouped in a family with species D and E. Is this advisable? Why or why not?

9. Determine if the following groups are monophyletic, paraphyletic, or polyphyletic. Species A, B, C. Species C, D, E. Species C and D. Species A and B. Species B, D, E.

Part 3. Use the data matrix to construct the most parsimonious cladogram for the eight species. Species 1 (Sp 1) is the outgroup taxon.

	Sp 1	Sp 2	Sp 3	Sp 4	Sp 5	Sp 6	Sp 7	Sp 8
Circle (0)/Square (1)	0	0	0	1	0	1	1	0
Central circle	0	1	0	0	1	0	0	0
Side lobe	0	1	0	1	0	0	1	0
Triangle spines	0	0	1	0	0	1	1	1
Blue (0)/Yellow (1) color	0	0	0	1	0	1	1	1
Central diamond	0	0	0	1	0	0	0	0

10. What is the synapomorphy of the clade defined by the most recent common ancestor of species 4 and 8 and all of its descendants?

11. List the apomorphies that distinguish species 4 from all other species.

12. What is the synapomorphy of the clade defined by the most recent common ancestor of species 6 and 7 and all of its descendants?

13. List the plesiomorphic characters found in the clade defined by the most recent common ancestor of species 3 and 4.

14. What traits would you predict in the common ancestor of species 4 and 6?

15. What character evolved independently in different clades (convergent evolution)?

16. Is the group of taxa sharing the character “triangle spines” monophyletic, paraphyletic, or polyphyletic?