

ASMCUE 2010
Learn Something New: Molecular Phylogenetics
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The PowerPoint Presentation from today's session is available at
http://www.msu.edu/user/jimsmith/asmcucue_2010.pdf

1. What is a Phylogeny? (Talk to your neighbor!)

2. Which of the two phylogenies is "better"? (Work with your neighbor!)
(Use the worksheet on the back of this page.)

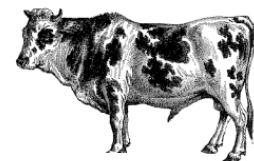


Salmon

3. Which two of the three taxa (shown at right) are closest relatives? Why? (Work with your neighbor!)



Lungfish



Cow

4. Check out the web site of the Molecular Evolution course that I teach at MSU.
The emphasis is on molecular phylogeny and there is a lot of reference material available there.



<https://www.msu.edu/course/zol/855/f09/>

5. If you still have questions or comments, please email me at: jimsmith@msu.edu

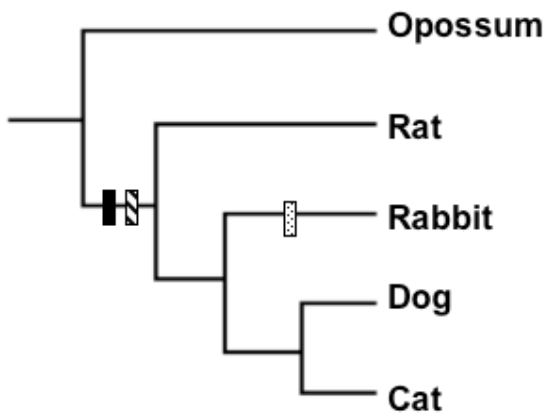
**ASMCUE 2010
Phylogenetics Exercise**

1. The table below lists six characteristics of the opossum, dog, rat, cat and rabbit. For each animal, a (+) indicates that the character is present and a (-) indicates that the character is absent.

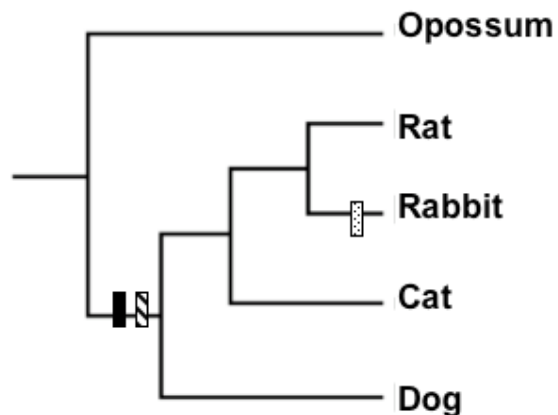
Character	Opossum	Dog	Rat	Cat	Rabbit
1. Placenta	-	+	+	+	+
2. Prehensile (grasping) tail	+	-	-	-	-
3. Hopping locomotion	-	-	-	-	+
4. Large canine teeth	+	+	-	+	-
5. Expanded metatarsals (foot bones)	-	+	-	+	+
6. Large incisor teeth	-	-	+	-	+

a) For the two phylogenetic trees (diagrams that depict evolutionary relationships between organisms) below, we have mapped characters 1, 2 & 3 onto each tree. Now evaluate these two trees by mapping characters 4, 5 & 6 onto each tree. Be sure to use clear labels and provide a key to your proposed changes as shown for characters 1, 2 & 3.

Tree I.



Tree II.



Key

- Placenta (-) → (+)
- ▨ Prehensile tail (+) → (-)
- ▤ Hopping (-) → (+)

- b) Which of the two phylogenetic trees (Tree I or Tree II) do you think is a better hypothesis of the evolutionary relationships of opossums, dogs, rats, cats and rabbits?
- c) Explain the reasoning that you used in your answer for part (b). In other words, how did you decide that one tree was better than the other?
- d) In the tree that you chose in part (b) above, which of the two animals are closest relatives?
- e) Explain the reasoning that you used in your answer for part (d). In other words, how did you decide which two animals were closest relatives?