

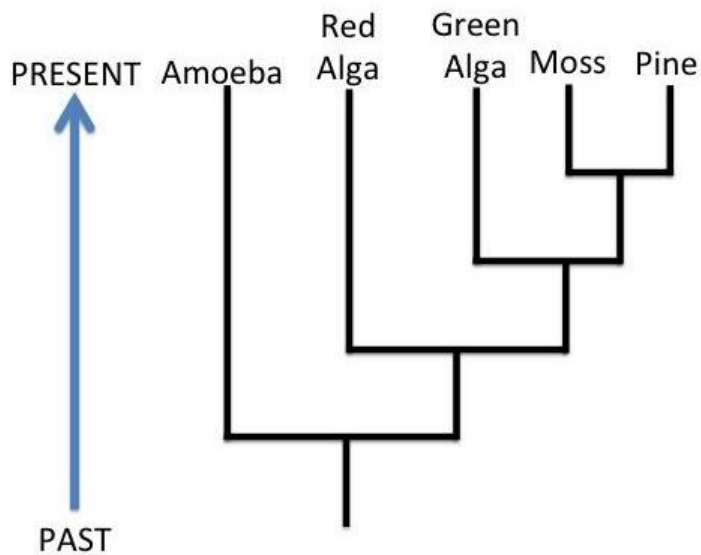
Tree Thinking Survey

Biologists represent evolutionary relationships between organisms as phylogenies or “evolutionary trees.” Evolutionary relationships are similar to genealogies, but evolutionary relationships are between groups rather than individuals and also typically represent vast amounts of time. As with all graphic representations of information, users need to understand how to “read” a tree. This assessment measures your ability to read a tree and apply the information to evolutionary problems. Questions about your experience include your entire biology education back through middle and high school.

- 1) What previous experience do you have with phylogenies?
 - a) I have never seen a phylogeny.
 - b) I may have seen one or two phylogenies in a class or in my textbook.
 - c) I have seen several phylogenies in previous biology classes.
 - d) I have encountered phylogenies frequently and have used them to help understand biological examples.

- 2) Have you been taught how to interpret a phylogeny?
 - a) YES
 - b) NO

- 3) How comfortable are you with reading phylogenies?
 - a) Do not feel confident
 - b) Somewhat confident
 - c) Fairly confident
 - d) Confident
 - e) Dead sure of myself

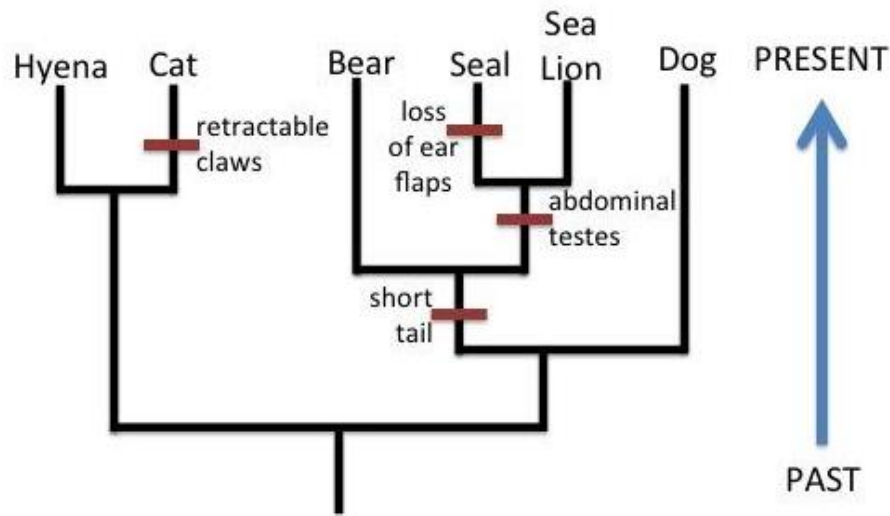


4) In reference to the tree above, which of the following is an accurate statement of relationships?

- a) A green alga is more closely related to a red alga than to a moss
- b) A green alga is more closely related to a moss than to a red alga
- c) A green alga is equally related to a red alga and a moss
- d) A green alga is related to a red alga, but is not related to a moss
- e) None of these organisms are related.

5) Three students are arguing over the correct interpretation of the tree in Question 4 above. Which student is correct?

- a) Student A insists that pine is the most highly evolved living species because it evolved most recently and is more complex than the other species.
- b) Student B says the amoeba is the most highly evolved living species because it is older than the other species.
- c) Student C says that no living species is more highly evolved than another because all living species have been evolving for the same amount of time from their common ancestor.
- d) None of the students are correct.
- e) I do not know how to interpret the tree.

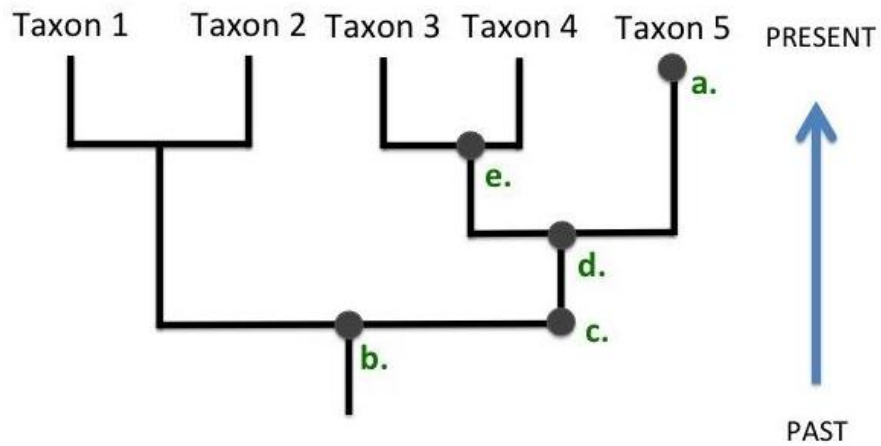


6) In the above tree, assume that the ancestor had a long tail, ear flaps, external testes, and fixed claws. Based on the tree and assuming that all evolutionary changes in these traits are shown, what traits does a sea lion have?

- a) long tail, ear flaps, external testes, and fixed claws
- b) short tail, no ear flaps, external testes, and fixed claws
- c) short tail, no ear flaps, abdominal testes, and fixed claws
- d) short tail, ear flaps, abdominal testes, and fixed claws
- e) long tail, ear flaps, abdominal testes, and retractable claws

7) Looking at the tree above in Question 6, two students are discussing the evolutionary relationship between sea lions, seals and dogs. Which student do you think is correct?

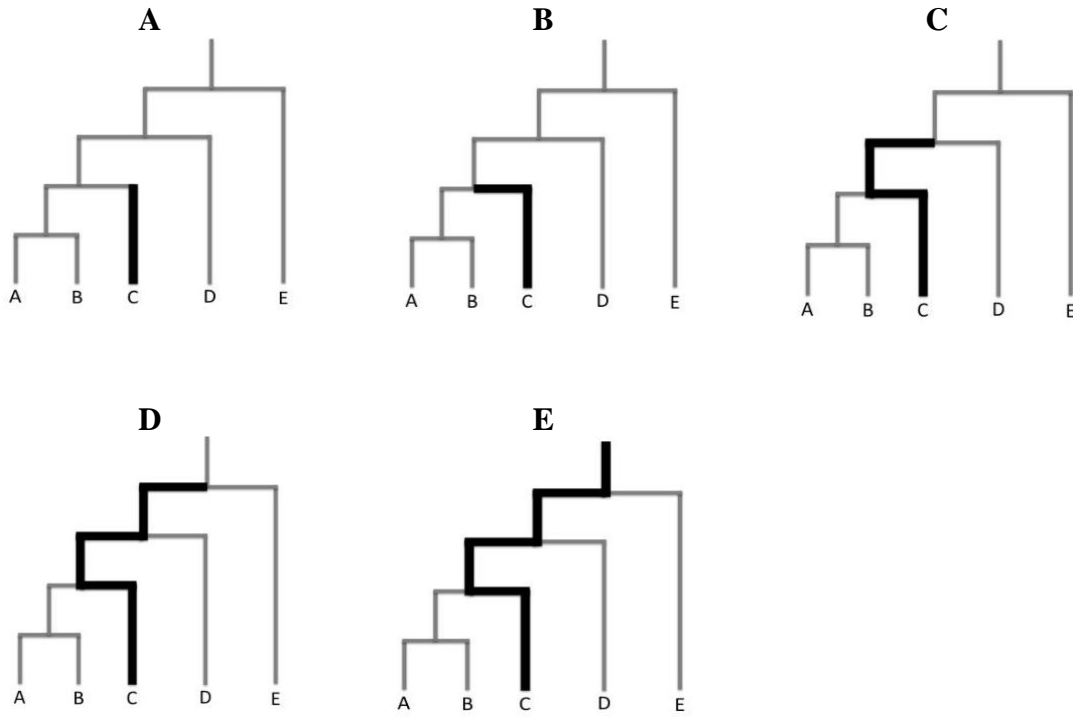
- a) Student A says seals and sea lions are equally related to dogs because the lineages of seals and sea lions share the same common ancestor with dogs.
- b) Student B says that sea lions are more closely related to dogs than seals are because there are fewer trait differences between sea lions and dogs, and sea lions are next to dogs in the diagram.
- c) Neither student is correct.
- d) I do not know how to interpret the tree.



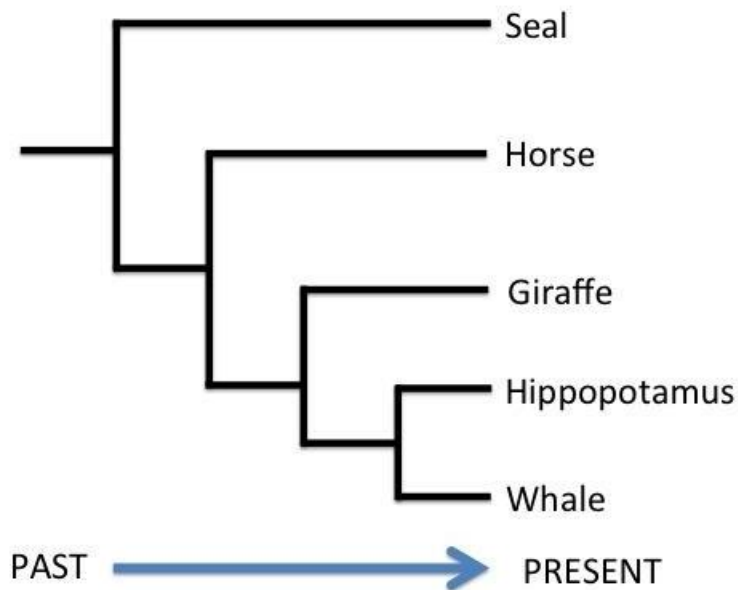
8) Which of the five marks on the tree above corresponds to the most recent common ancestor of taxon 3 and taxon 5?

- a. A
- b. B
- c. C
- d. D
- e. E

9) A lineage refers to the entire evolutionary history of a species or taxon. Using this definition, which image tree below has correctly traced the Taxon C lineage, as indicated by the bolded thick black line.



10) Using the tree below, which of the following is an accurate statement?



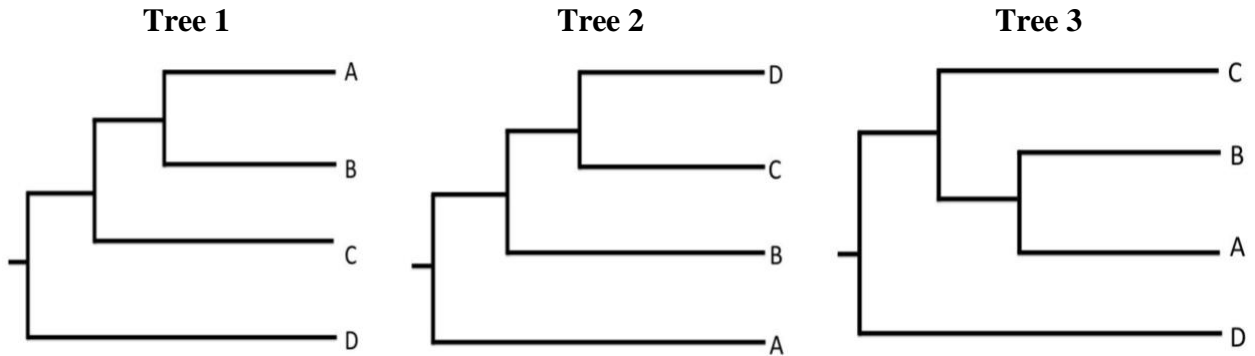
- a) A seal is more closely related to a horse than to a whale
- b) A seal is more closely related to a whale than to a horse
- c) A seal is equally related to a horse and a whale
- d) A seal is related to a whale, but is not related to a horse
- e) None of these organisms are related

11) Imagine you could travel backwards through time and examine the last common ancestor of a giraffe and a hippo. What would it be?

- a) A giraffe
- b) A hippo
- c) A horse
- d) A species that cannot be classified as any of the above.
- e) There is no common ancestor between a giraffe and a hippo.

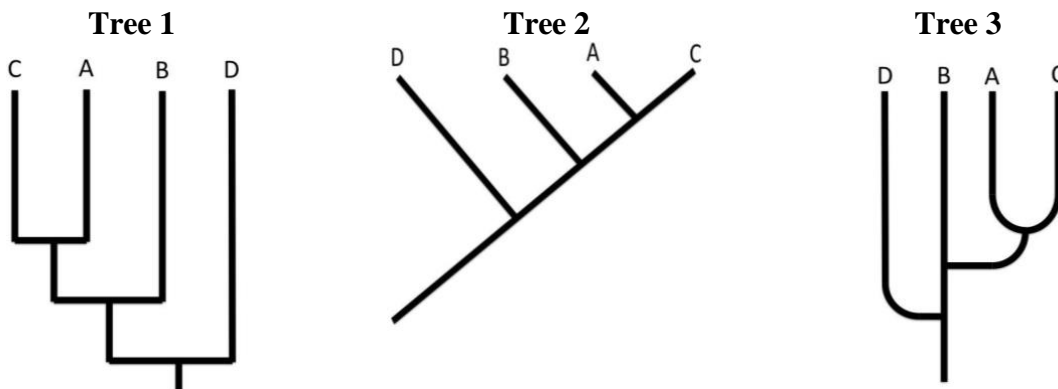
12) Which of the following trees provides different information about the evolutionary relationships among the groups?

- a. Tree 1
- b. Tree 2
- c. Tree 3
- d. They are all the same.
- e. They are all different



13) Which of the following trees provides different information about the evolutionary relationships among the groups?

- a. Tree 1
- b. Tree 2
- c. Tree 3
- d. All trees are the same.
- e. All trees are different.



14. Which of the following trees provides different information about the evolutionary relationships among the groups?

- a. Tree 1
- b. Tree 2
- c. Tree 3
- d. They are all the same.
- e. They are all different

