Basic Tree Thinking Assessment

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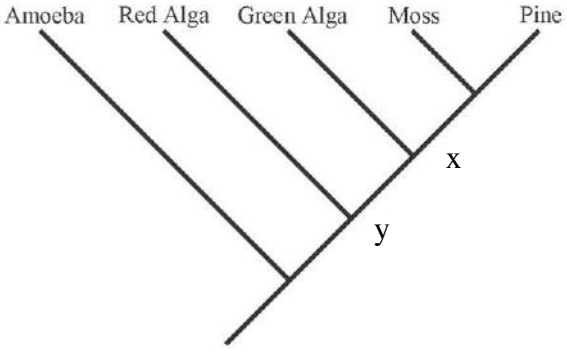
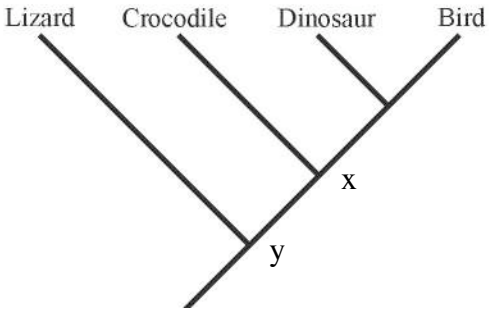
This quiz includes a number of multiple-choice questions you can use to test yourself on your ability to accurately interpret evolutionary trees. Insofar as real biological examples have been used they are accurate based on current knowledge.



'b' is correct. The most recent common ancestor of a green alga and a moss is at node x whereas the most recent common ancestor of a red alga and a moss is at the "deeper" node, y. If you picked 'c' you might be reading along the tips.

1) By 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

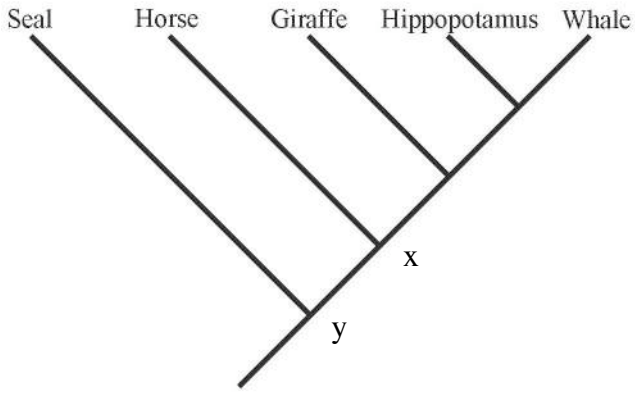


'b' is correct. The most recent common ancestor of a crocodile and a bird is at node x whereas the most recent common ancestor of a crocodile and a lizard is at the "deeper" node, y. If you picked 'a' you might be reading along the tips.

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

a) A crocodile is more closely related to a lizard than to a bird
b) A crocodile is more closely related to a bird than to a lizard
c) A crocodile is equally related to a lizard and a bird
d) A crocodile is related to a lizard, but is not related to a bird

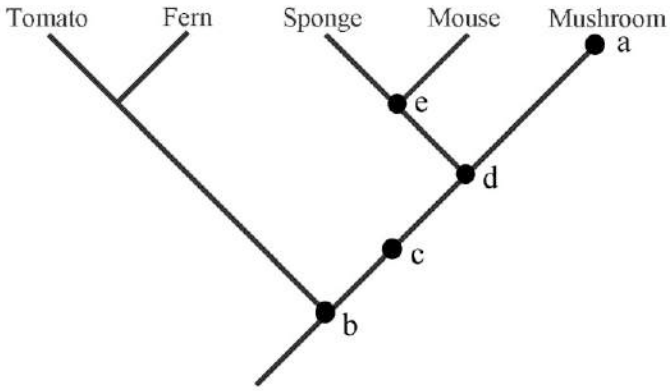
‘c’ is correct. The most recent common ancestor of a seal and a whale is at node y, as is the most recent common ancestor of a seal and a horse. All descendants of node x are equally related to the seal. If you picked ‘a’ you might be reading along the tips.



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

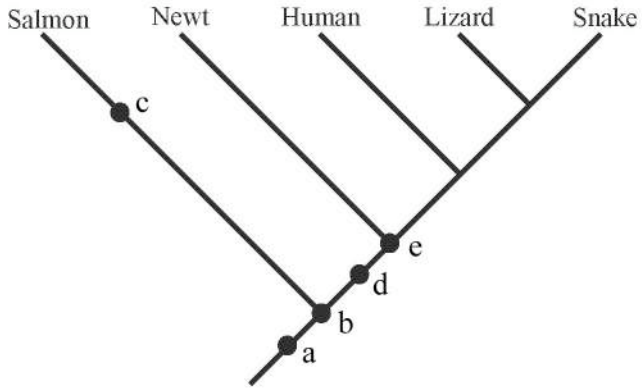
a) A seal is more closely related to a horse than to a whale
b) A seal is more closely related to a whale than to a horse
c) A seal is equally related to a horse and a whale
d) A seal is related to a whale, but is not related to a horse

‘d’ is the correct answer. ‘a’ is a living species and is not an ancestor. ‘e’ is an ancestor of a sponge but not of a mushroom. ‘b’ and ‘c’ are common ancestors of a sponge and a mushroom, but they are more ancient common ancestors than ‘d’.



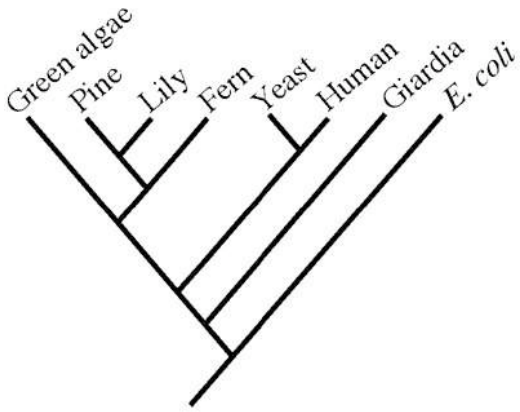
4) Which of the five dots in the tree above corresponds to the most recent common ancestor of a mushroom and a sponge?

'c' is the correct answer. This depends on only the knowledge that a salmon and a trout are very closely related. Therefore they must share a more recent common ancestor with each other than with any other included species. Position 'c' is the only place such an ancestor could be.

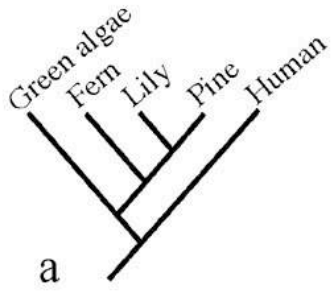


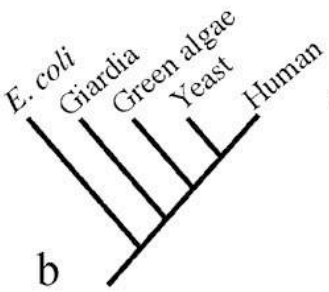
5) If you were to add a trout to the phylogeny shown above, where would its lineage attach to the rest of the tree?

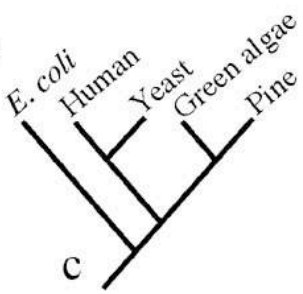
'd' is the correct answer. 'd' shows yeast being more closely related to plants than it is to animals. The true phylogeny (right) shows that yeast is more closely related to human than to any of the plants (green algae, lily, and fern).

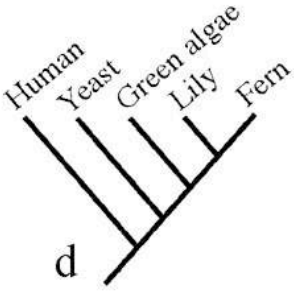


6) Which of the trees below is false given the larger phylogeny above?

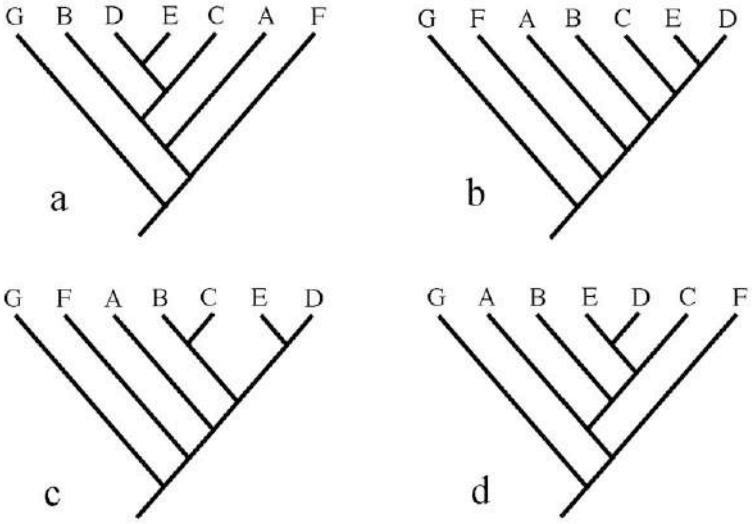






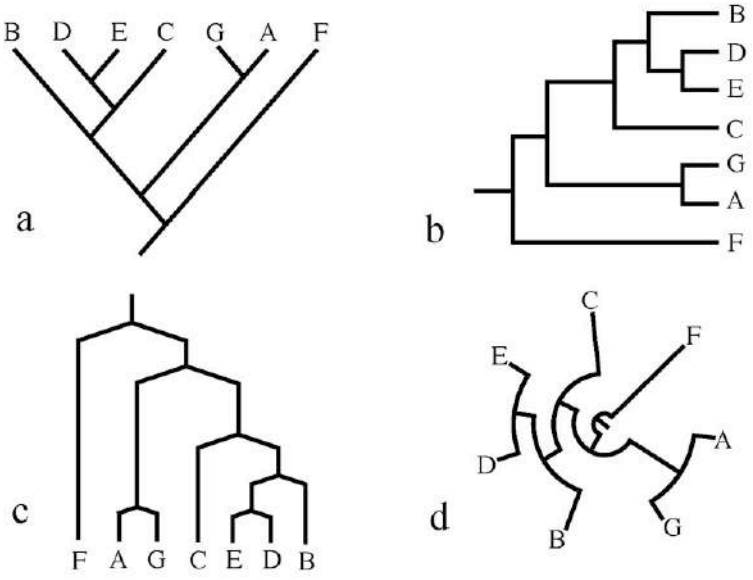


‘c’ is the correct answer. In all the other trees C is more closely related to E and D than to B. In ‘c,’ C is more closely related to B than to E or D.

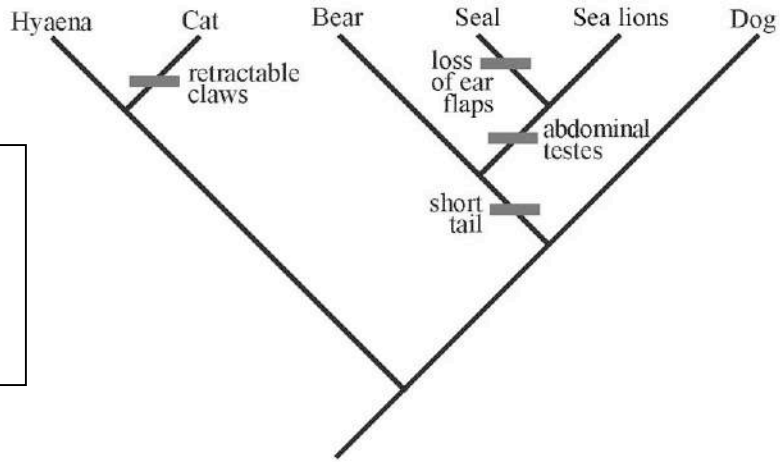


7) Which of the four trees above depicts a different pattern of relationships than the others?

‘a’ is the correct answer. In all the other trees B is more closely related to D and E than is C. In ‘a,’ C is more closely related to D and E than is B.



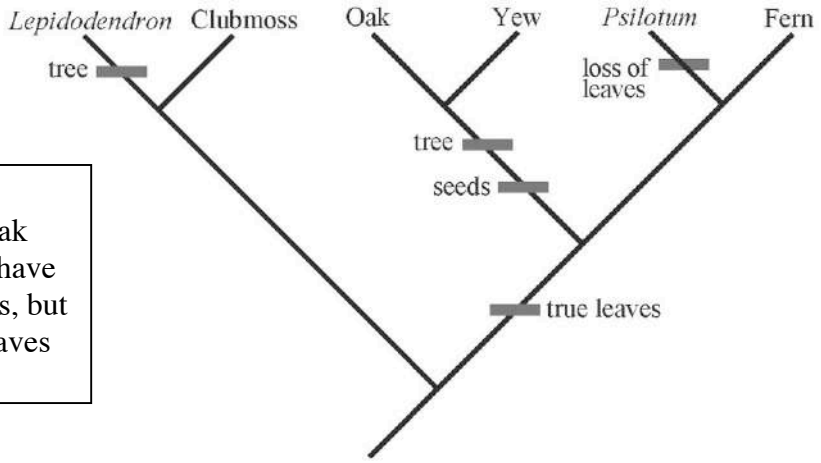
8) Which of the four trees above depicts a different pattern of relationships than the others?



'd' is the correct answer. Tracing up from the ancestor to sea lions, one sees that the only changes are in tail length and testes position. For the other traits, they have retained the ancestral condition.

9) 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



'a' is the correct answer. Clubmosses are not trees. Oak (and yew) are trees but they have leaves. *Psilotum* lacks leaves, but it is not a tree. A fern has leaves and is not a tree.

10) In the above tree, assume that the ancestor was an herb (not a tree) without leaves or seeds. Based on the tree and assuming that all evolutionary changes in these traits are shown, which of the tips has a tree habit and lacks true leaves?

a) *Lepidodendron*
b) Clubmoss
c) Oak
d) *Psilotum*
e) Fern