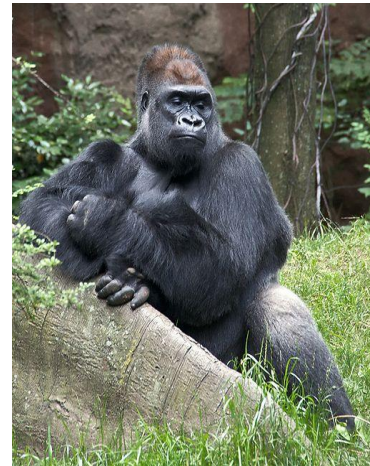
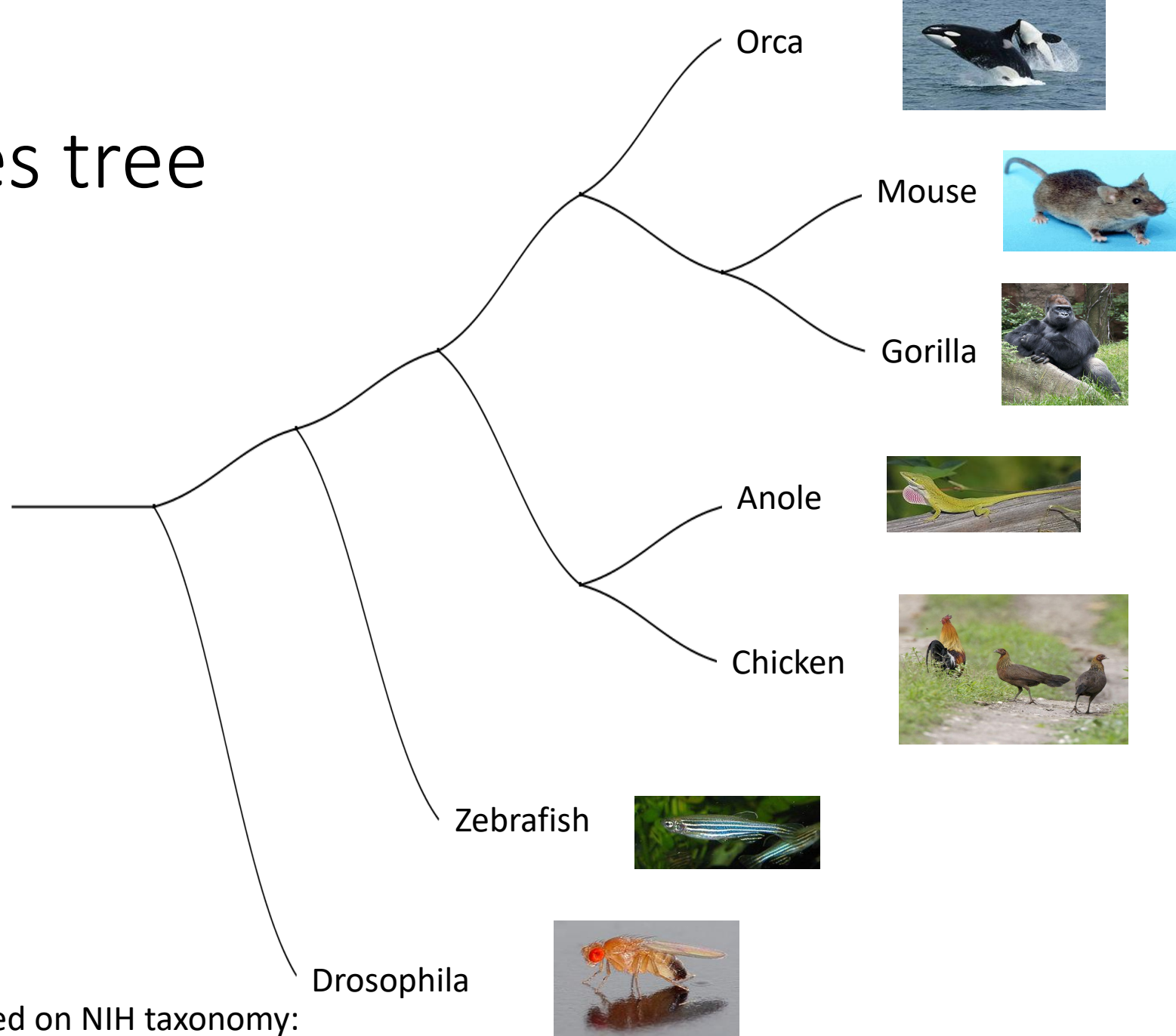


How to read (and write) a phylogenetic tree





Species tree

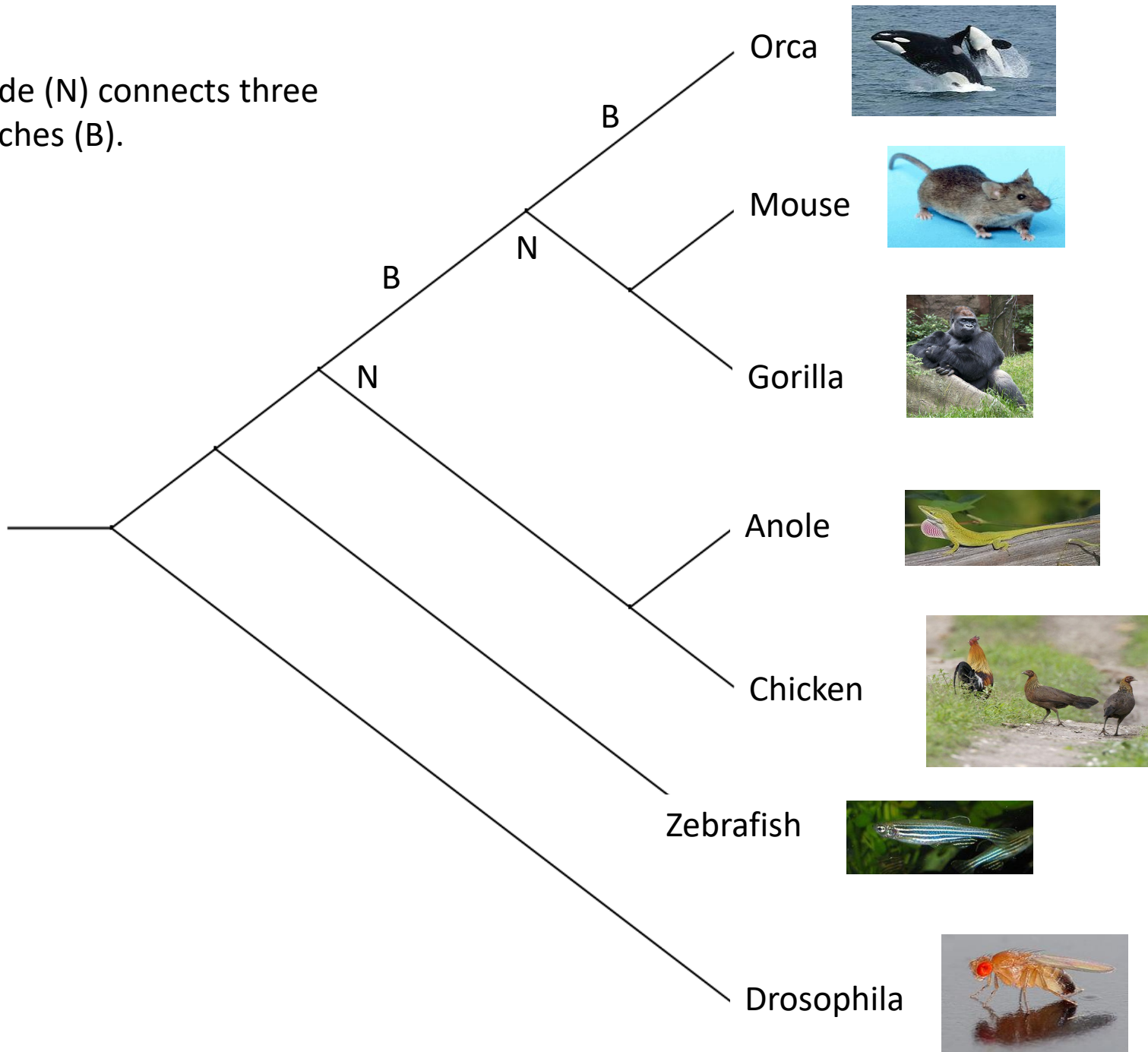


Build a species tree based on NIH taxonomy:

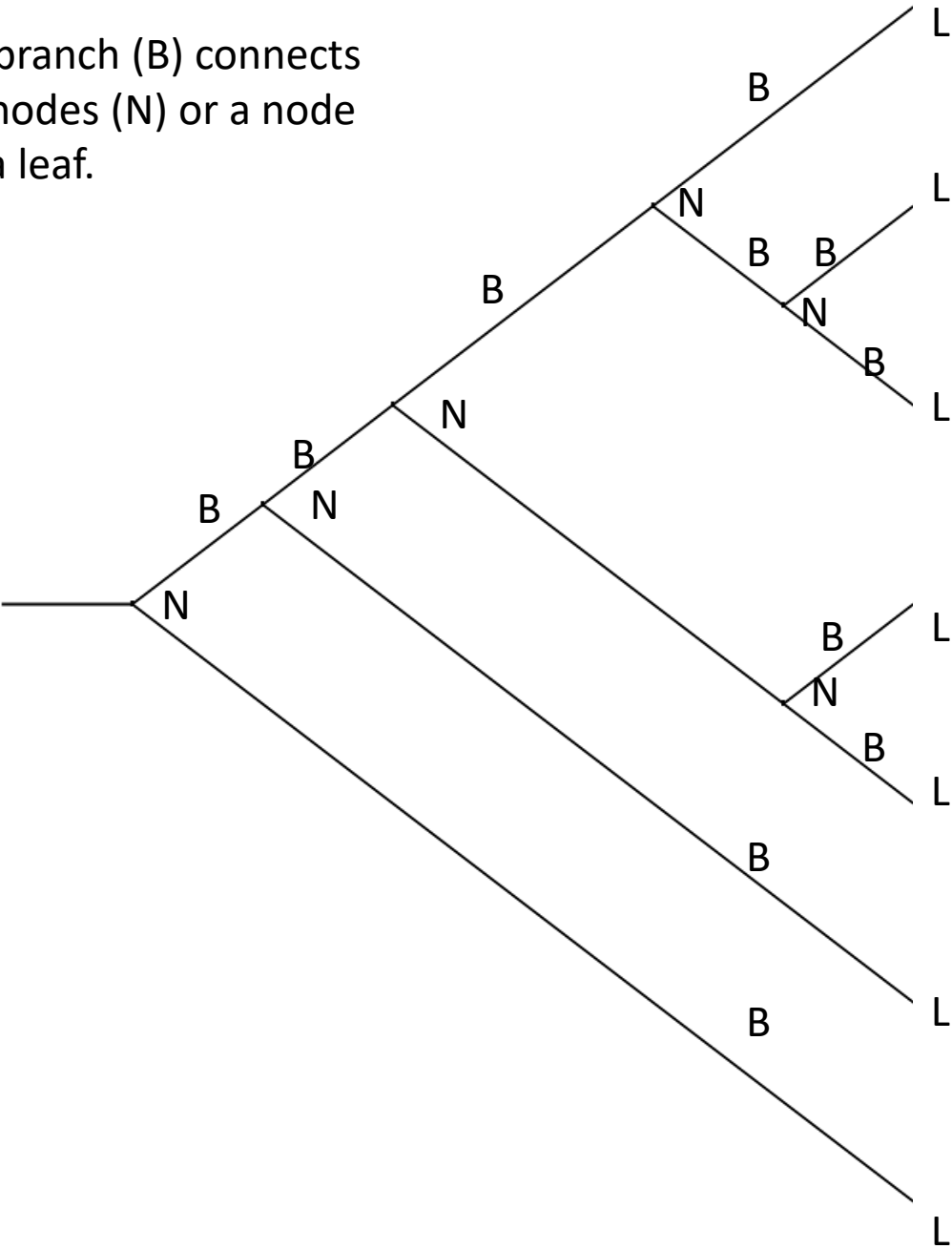
<http://www.ncbi.nlm.nih.gov/Taxonomy/CommonTree/wwwcmt.cgi>

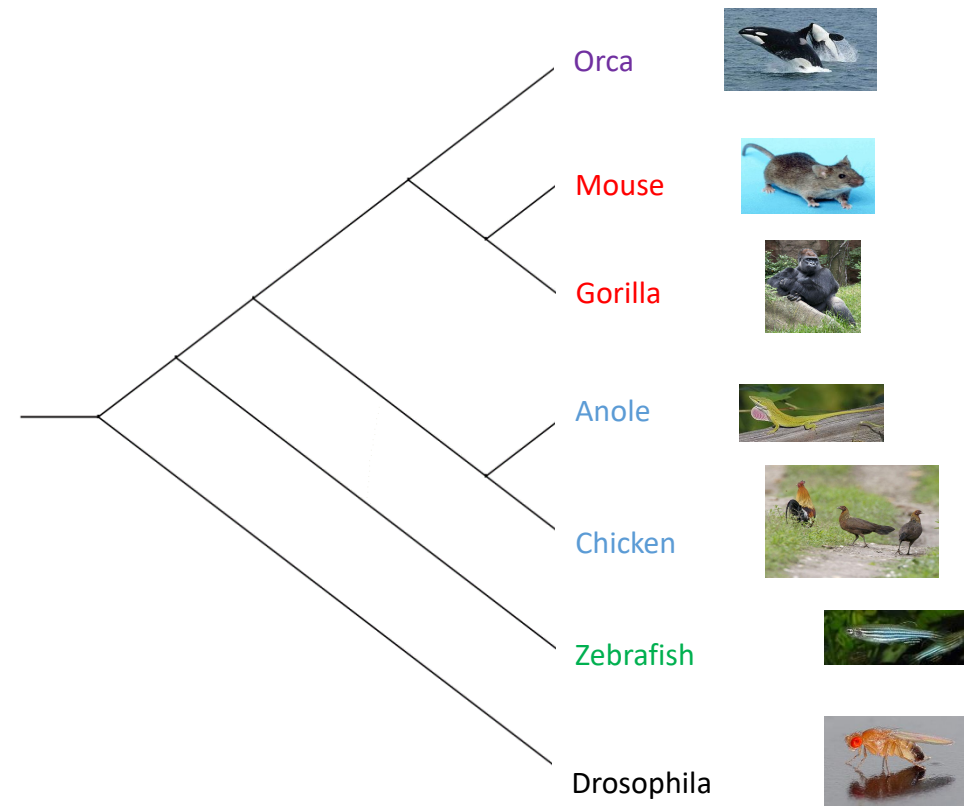
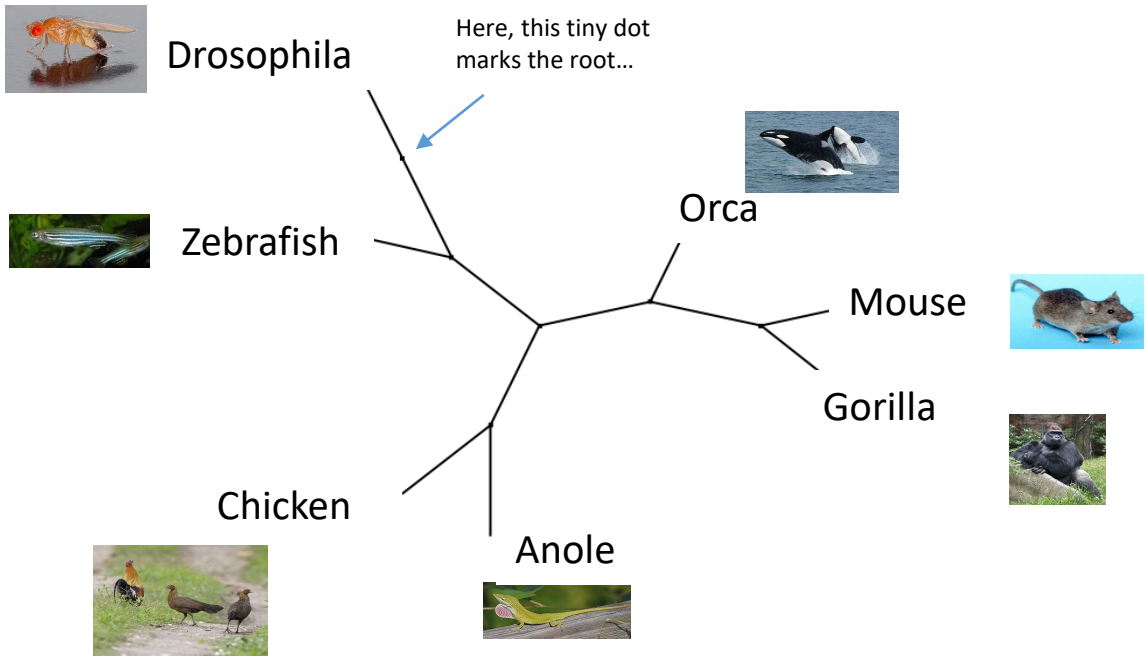


A node (N) connects three branches (B).



One branch (B) connects two nodes (N) or a node and a leaf.





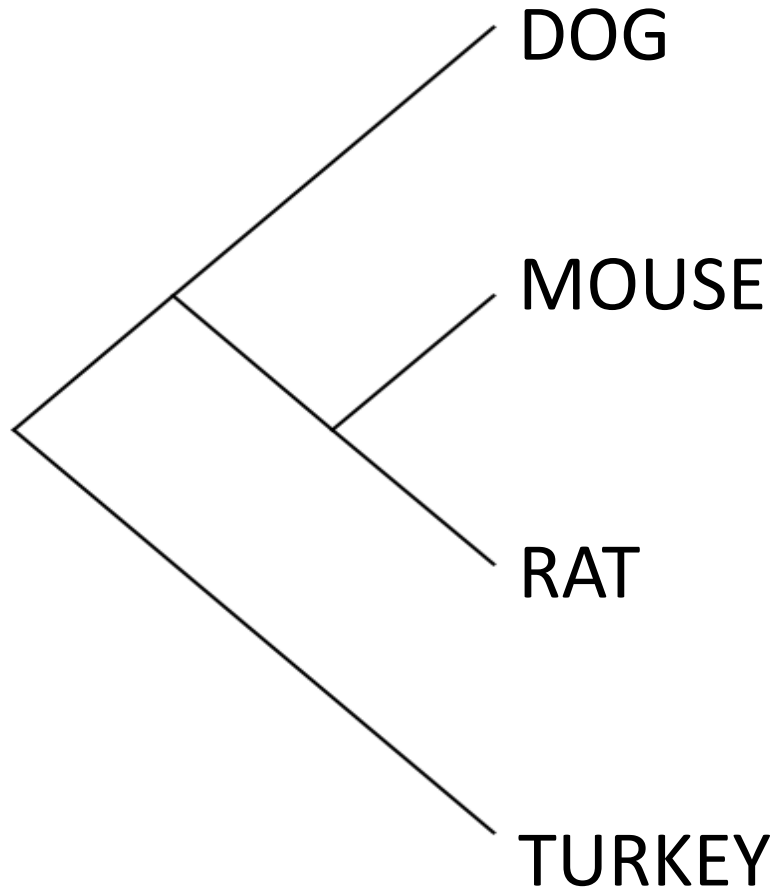
Chicken = Gallus

Tree format:

(((Orca,(Mouse,Gorilla)),(Anole,Gallus)),Zebrafish),Drosophila);



1. Write the tree format



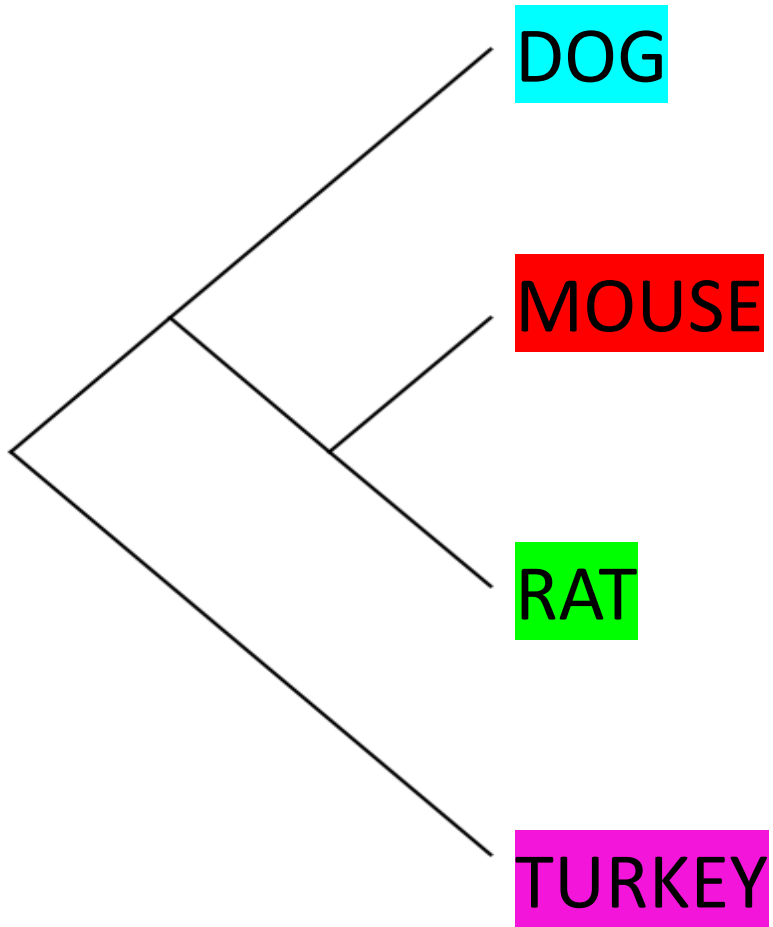
2. Draw the tree

$((1,2),3),4);$

Pause the video. Try to solve the questions before continuing.



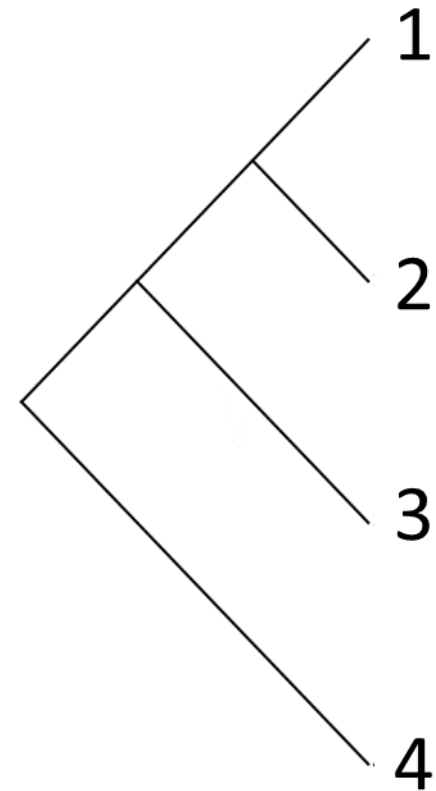
1. Write the tree format



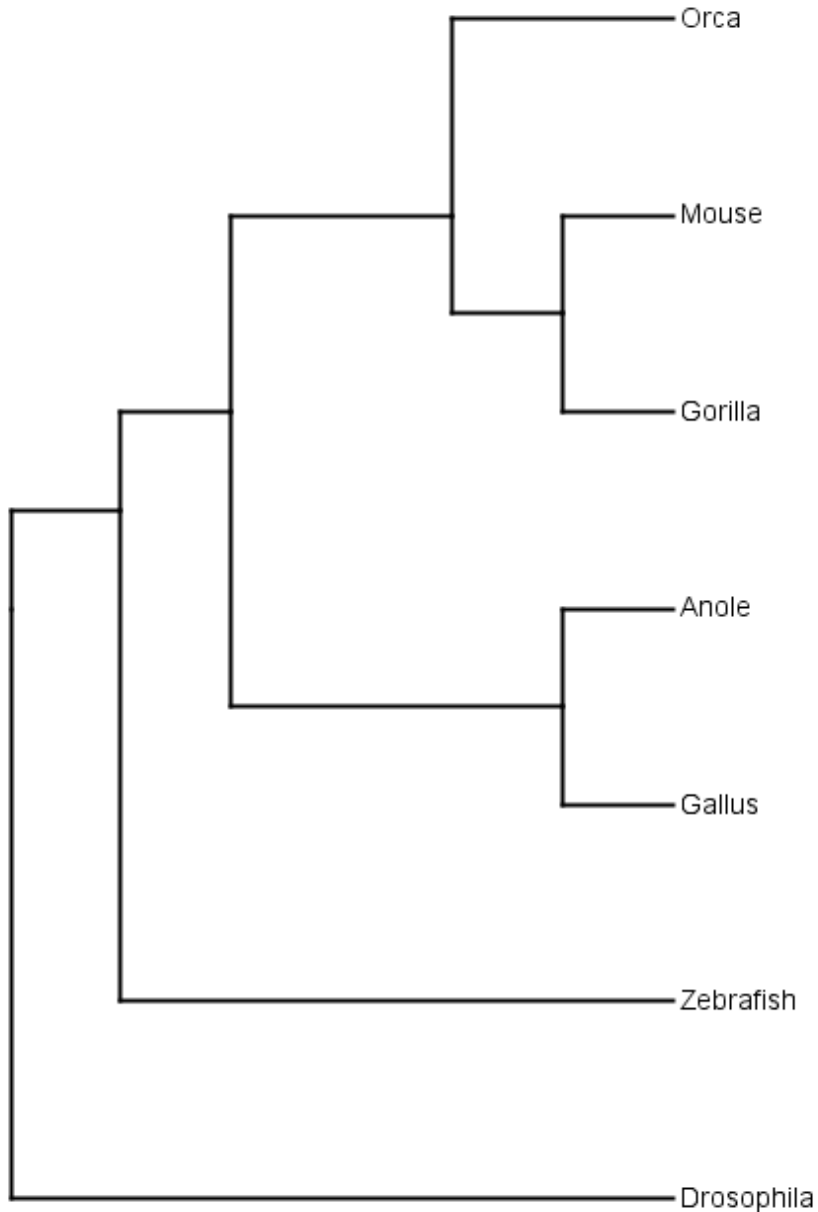
`((Dog,(Mouse,Rat)),Turkey);`

2. Draw the tree

`((1,2),3),4);`



Where is the root of the tree?



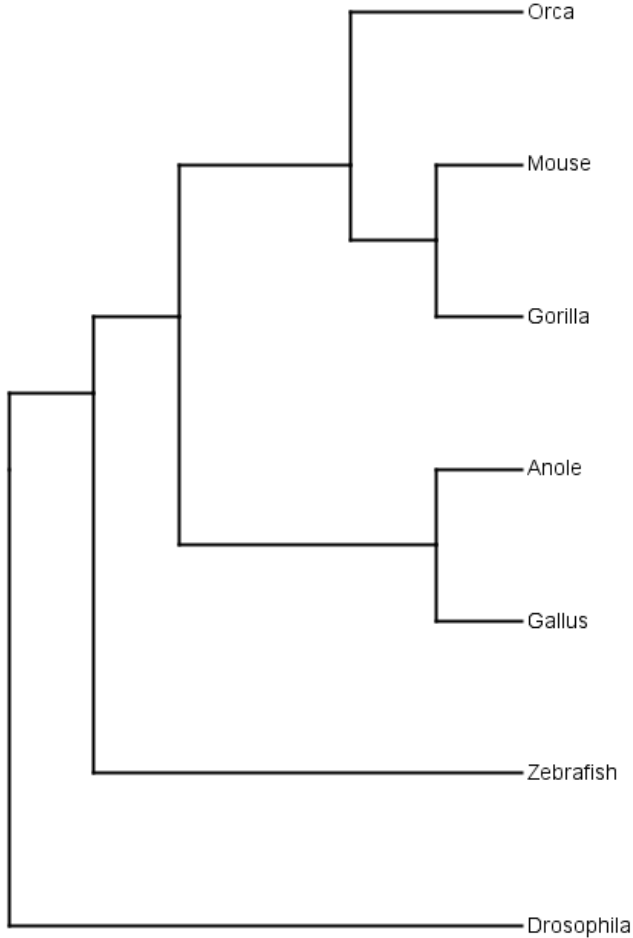
The root shows the point of the last common ancestor for all sequences or species in the tree.

If we want to root the tree, where should we place the root?

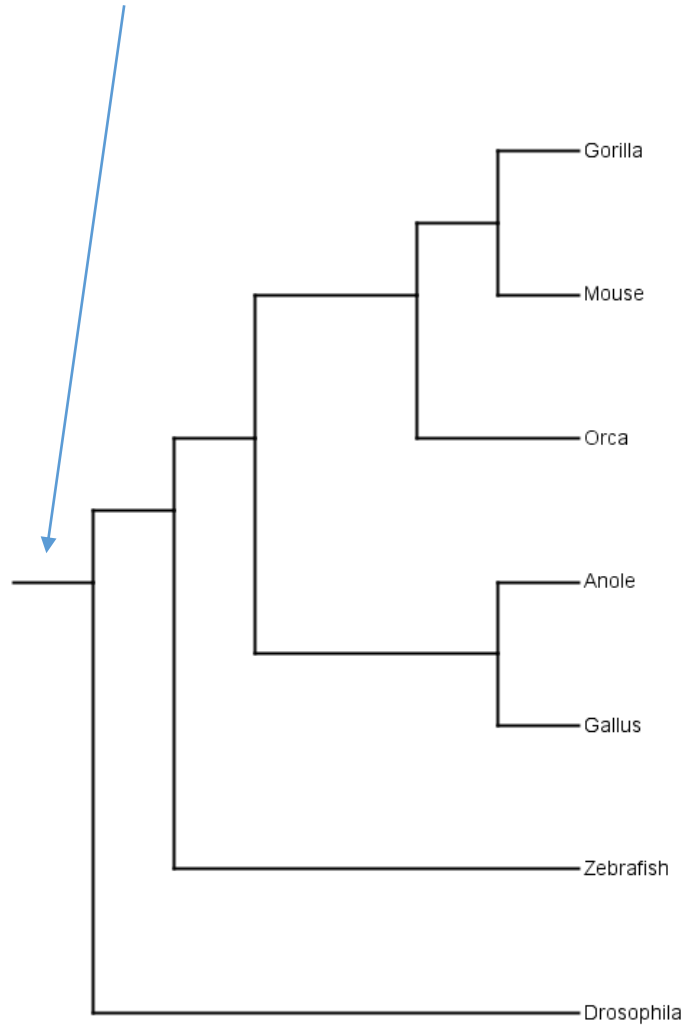
In order to root a tree – an OUTGROUP must be present in the data. An outgroup is a more distantly related species. Alternatively, a MIDPOINT ROOT could be used.



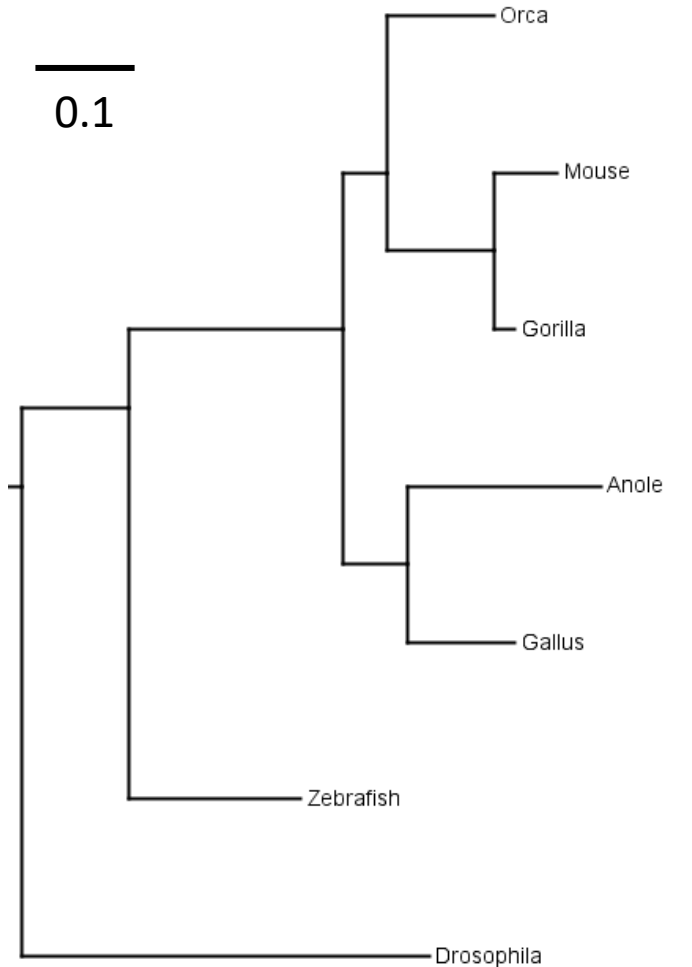
Unrooted



Rooted



Rooted with branch lengths and scale

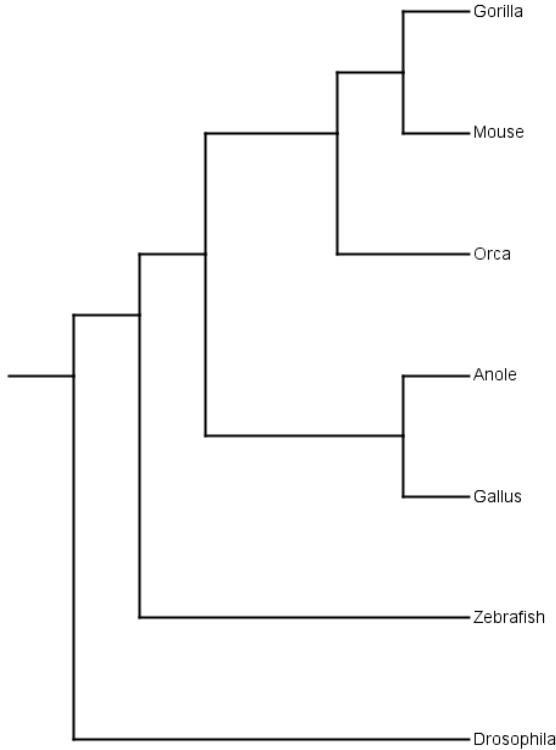


Horizontal lines tell SEQUENCE DIVERGENCE if branch lengths are plotted
 Vertical lines have no information – just spacers.

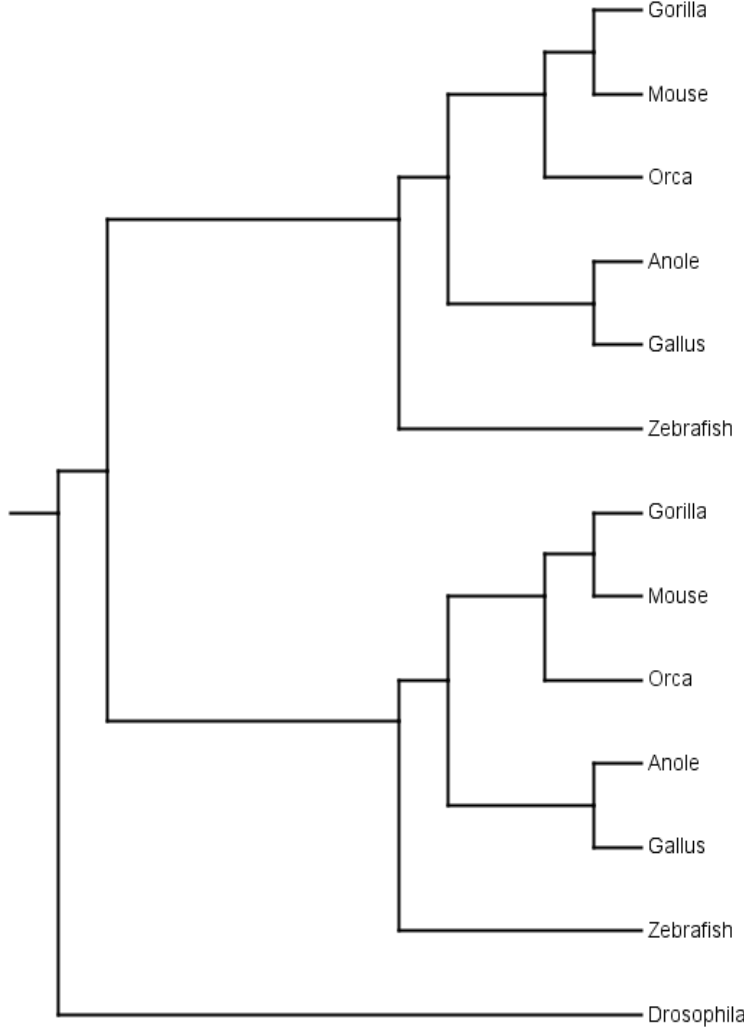


Which trees reveal a history of gene duplications?

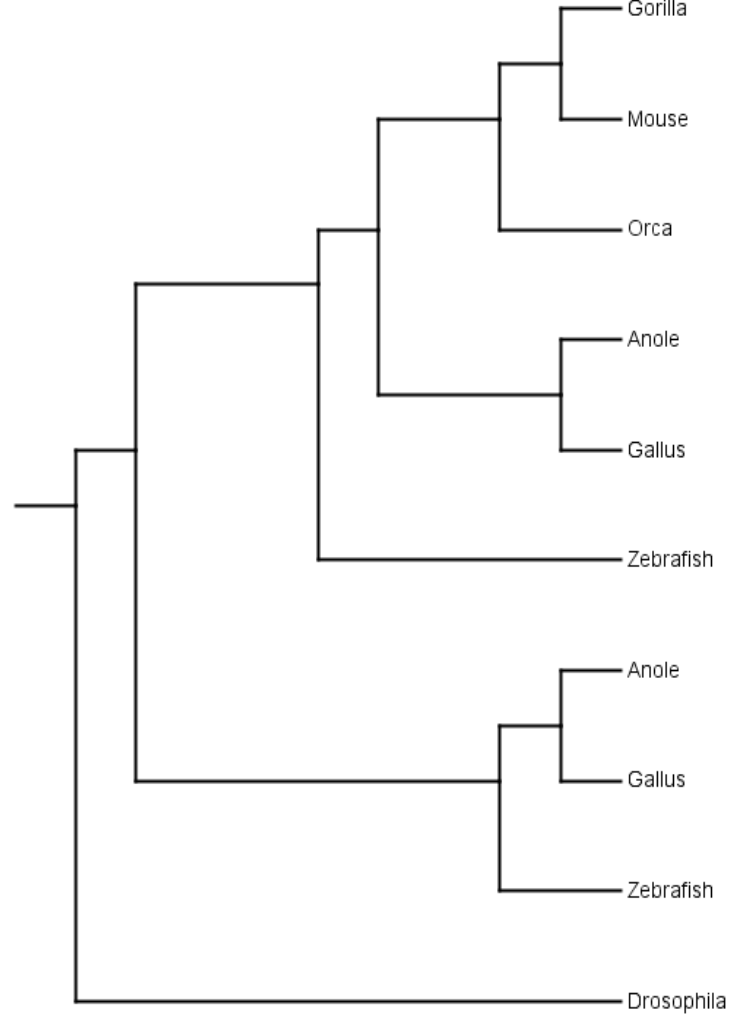
Use the species tree as a reference for how you would expect your tree to look.



A



B

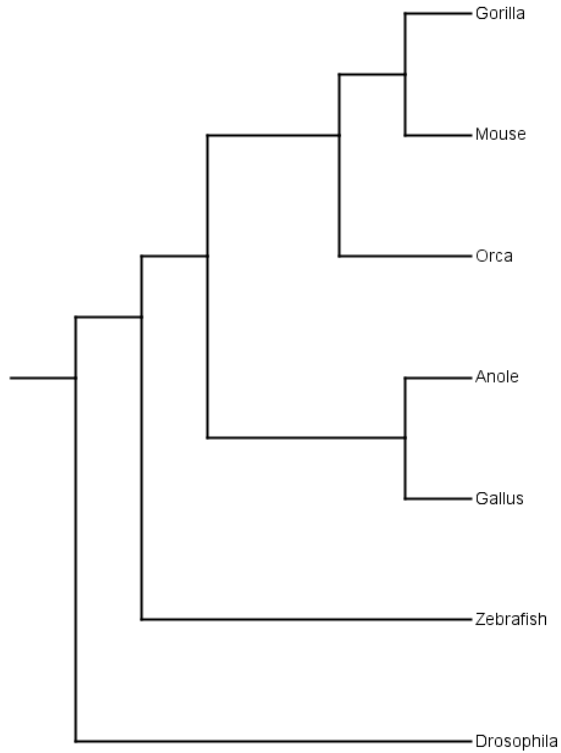


C



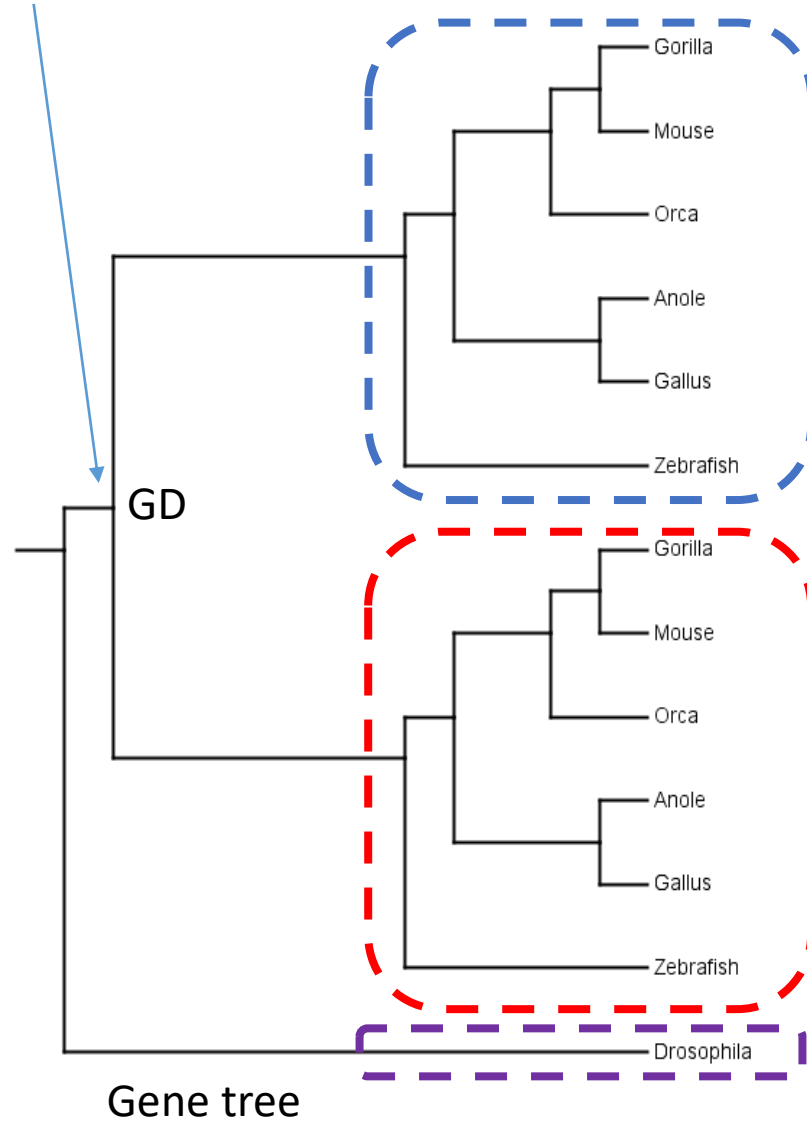
Which trees reveal a history of gene duplications?

Use the species tree as a reference for how you would expect your tree to look.



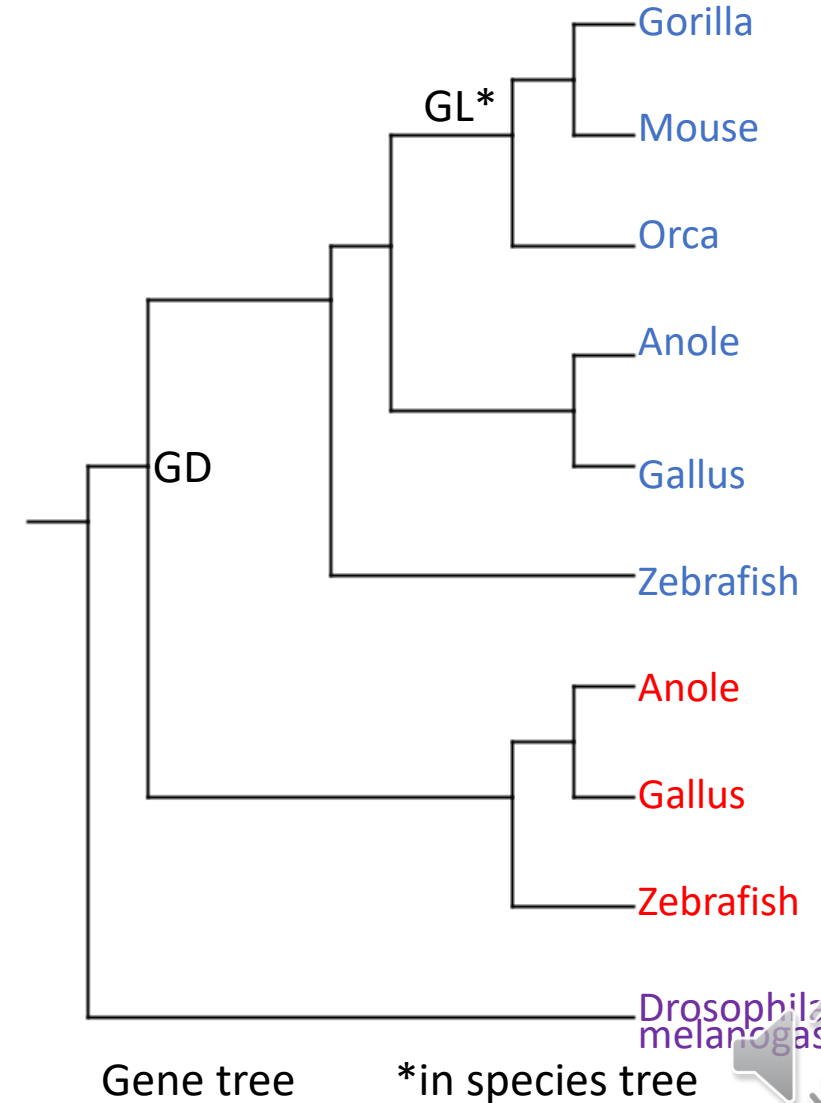
This is the expected species tree

Gene duplication along one branch is sometimes seen as a repeated species tree under a specific node.



Gene tree

Gene duplication (GD) along one branch followed by gene loss (GL) along another branch is sometimes seen as a repeated sub-species tree under a specific node.



Gene tree

*in species tree



THE END

Next video: how to build a phylogenetic tree

