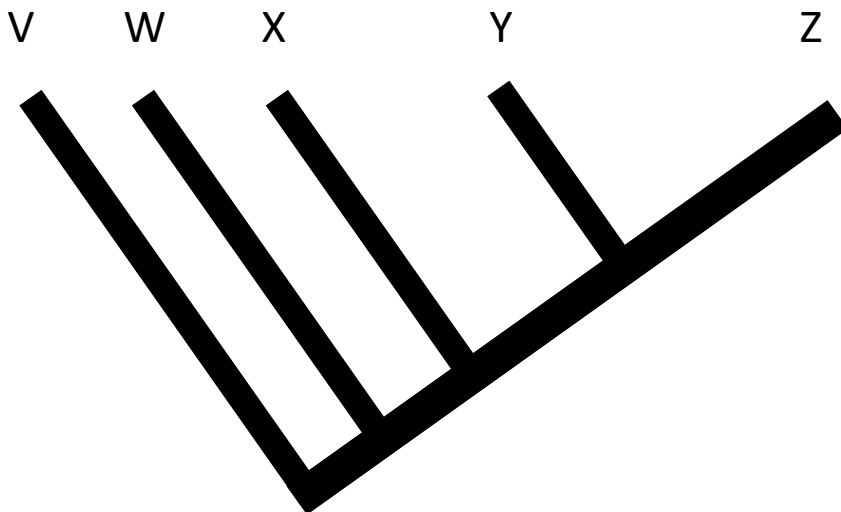


April 16<sup>th</sup> Activities – Intro to phylogenetics

- Read – The tree thinking challenge (10 mins)
  - <https://digitalcommons.unl.edu/cgi/viewcontent.cgi?article=1104&context=bioscifacpub>
- Watch – Dr. McAssey’s introduction to phylogenetics video
  - [https://youtu.be/G\\_HBw8\\_D5vo](https://youtu.be/G_HBw8_D5vo)
- Watch – Dr. McAssey’s video on phylogeny building and analysis
  - <https://youtu.be/-O7Kg6lznMI>
- Complete – the practice quiz associated with ‘The tree thinking challenge’ (20 mins)
  - I encourage you to review your readings and resources before taking the quiz
  - I suggest working on only the first 10 questions. The remainder of the questions are more challenging, but feel free to test yourself!
  - <https://science.sciencemag.org/content/sci/suppl/2005/11/07/310.5750.979.DC1/Baum.SOM.pdf>
- Read - Assigned reading: Chapter 21, Sections 1 and 2
- Read – Two perspectives on HIV and phylogenetics (5 mins each)
  - Phylogenetics as evidence to suggest innocence
    - [https://evolution.berkeley.edu/evolibrary/news/070101\\_libya](https://evolution.berkeley.edu/evolibrary/news/070101_libya)
  - Phylogenetics as evidence to suggest guilt
    - <https://www.sciencemag.org/news/1998/10/dna-strain-analysis-debuts-murder-trial#>
- Watch - TED-Talk on tree building (9 mins)
  - <https://www.youtube.com/watch?v=5qXz9X-rltE>
- Review Questions
  - Define a monophyletic group. (easy)
  - Label on this diagram the common ancestor of X, Y, and Z. (easy)

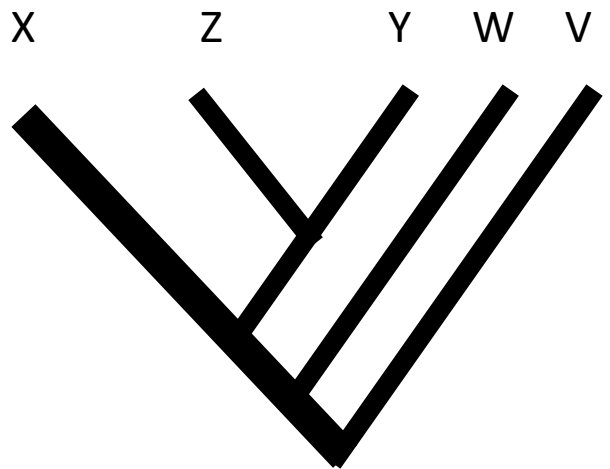
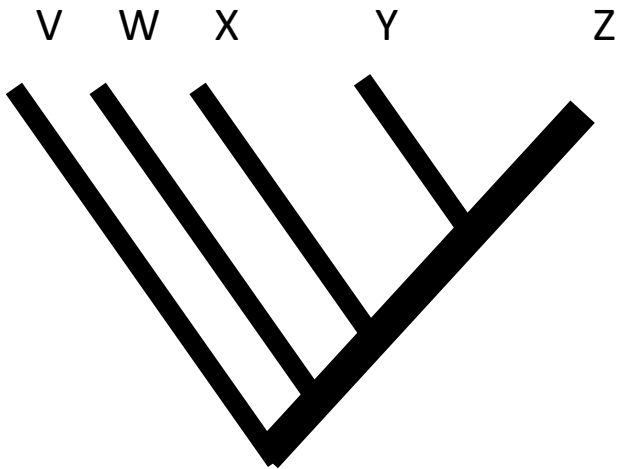


- Which group on the above phylogenetic tree is the sister taxon of Y? (easy)
- Explain the differences between homologous and analogous structures. (easy)
  - Which would be more useful to someone building a phylogenetic tree?

- Build a phylogenetic tree with the following dataset: (hard). Consider species 2 to be the 'outgroup', the species most distantly related to the other three.

Species	Sharp teeth	Aquatic	Large
1	-	+	-
2	-	-	-
3	+	+	-
4	+	+	+

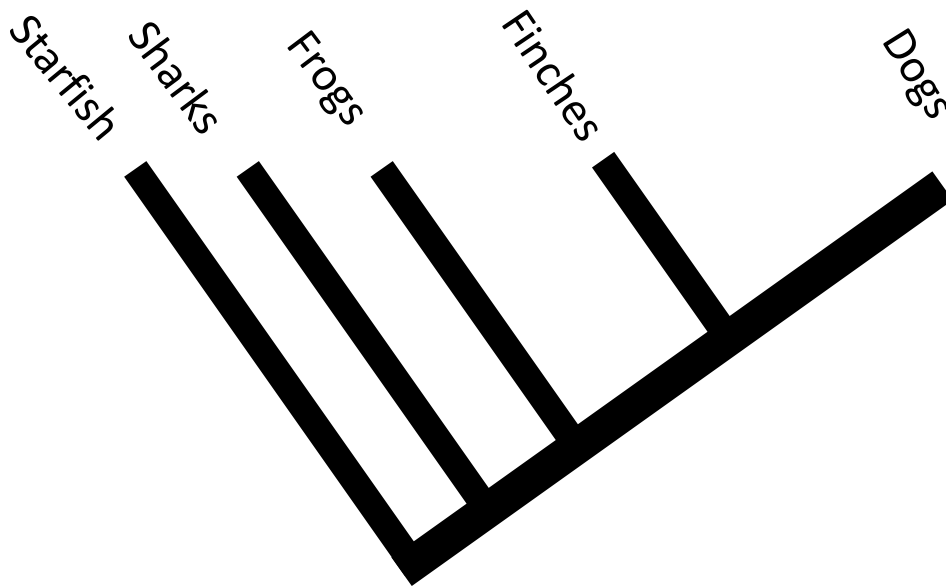
- Do the two trees below depict the same evolutionary relationships? Why or why not? (medium)



- Describe how parsimony is used as a general strategy for building a phylogenetic tree. See section 21.2 in the OpenStax online textbook. (easy)
- If you haven't done so yet... do the phylogenetics review questions (easy, medium, and hard!)

(<https://science.sciencemag.org/content/sci/suppl/2005/11/07/310.5750.979.DC1/Baum.SOM.pdf>)

- Why are computer programs used to help build phylogenetic trees? Imagine if you had to construct a tree depicting the relationships of 30 species. (medium)
- Describe the relationships depicted on the following tree. Use the terms: clade, common ancestor, time, tips, and nodes. (medium)



- Draw the above phylogenetic tree two different ways without affecting the evolutionary history that is being depicted. (medium)
- Imagine four different companies were working on genetically engineering different species of corn to produce a compound that prevents a particular type of disease. One of these companies accidentally released their genetically modified corn seeds without getting the proper government approval. Describe how you would use phylogenetics to determine which company was at fault. (hard)