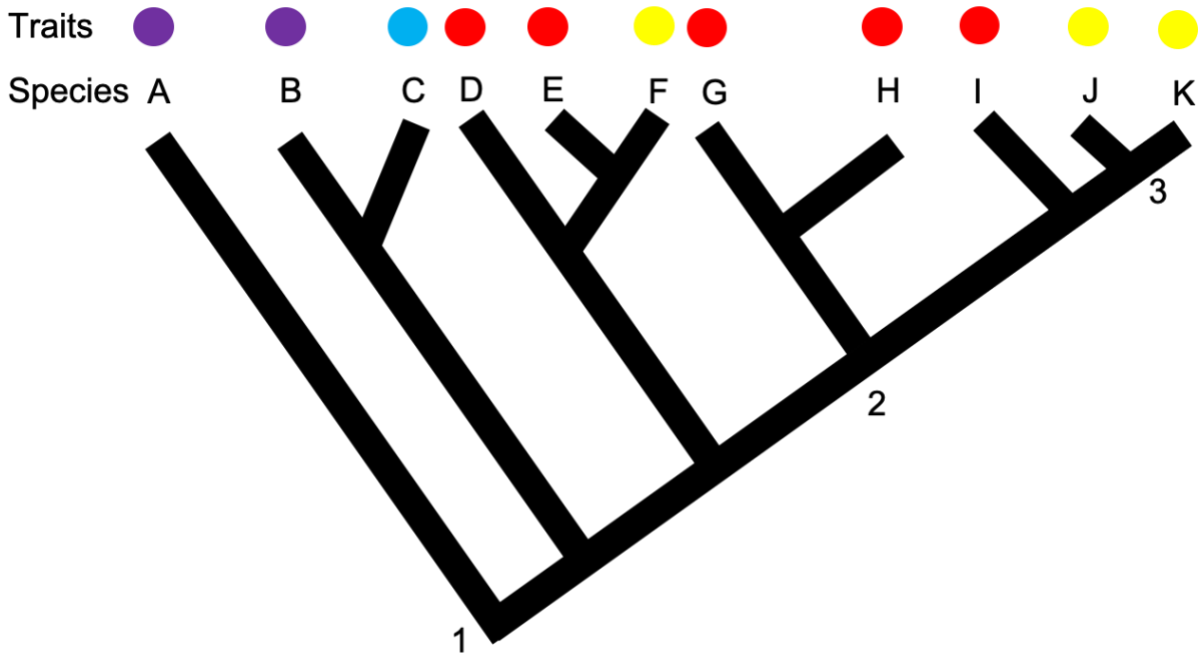
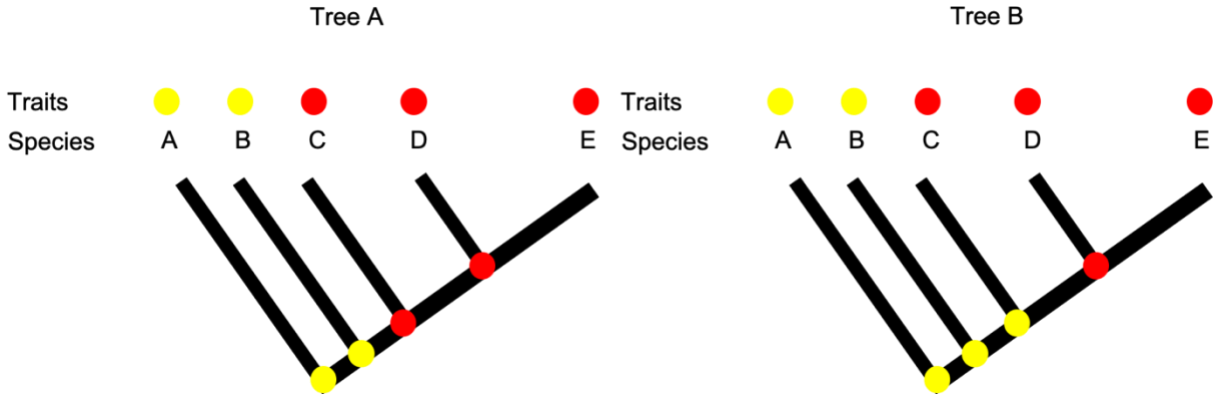
Phylogenies and the history of life - Apr 21

- Science Friday, the story of Archaea (25 minute podcast)
  - https://www.sciencefriday.com/segments/how-a-humble-microbe-shook-the-evolutionary-tree/
- New York Times article about the discoveries of Woese
  - https://www.nytimes.com/2018/08/13/magazine/evolution-gene-microbiology.html
  - Consider:
    - What was the importance of the discovery of Archaea?
    - What is horizontal gene transfer?
    - How does horizontal gene transfer (HGT) affect our understanding of a phylogenetic tree?
- 3 min iBiology video on microbial phylogenetics
  - https://youtu.be/jsr00dkjgIo
- Dr. Zenil-Ferguson's coronavirus phylogeny video (10 mins)
  - https://www.youtube.com/watch?v=SAKGMc7h8cA
- Dr. McAssey's video on Ancestral State Reconstruction
  - Using phylogenetic trees to infer what ancestors looked like
  - https://youtu.be/jvlc4h8ouzk
- Co-speciation example
  - Quick example describing gopher and lice co-speciation
    - https://evolution.berkeley.edu/evolibrary/article/evo_46
    - Follow up video from Dr. McAssey - https://youtu.be/C2HqAbCSe1k
- Review Q's
  - What are some environments where Archaea can be found? (easy)
  - Carl Woese studied what kind of nucleotides to compare archaea, bacteria, and eukaryotes, and make phylogenetic trees? (easy)
    - Related to the above question: what shared feature between archaea, bacteria, and eukaryotes is used to produce polypeptides (easy)
  - What organelles within eukaryotes can trace their origin to a different domain of life? (easy)
  - Search online for a real example of horizontal gene transfer. If you like sweet potatoes, I suggest you find out how they are an example of horizontal gene transfer. (medium)
  - The tree of life is a useful analogy for the relationship of organisms. Describe a modification of this analogy that takes into account important processes like horizontal gene transfer. (medium)
  - What sequences are compared to create the Coronavirus phylogenetic tree? (easy)
  - What process creates genetic variation in Coronavirus strains? (easy)
    - How many basepairs are in the Coronavirus genome? (easy)
  - What do the colors on the Coronavirus phylogeny represent? How does this information help scientists understand virus transmission? (medium)
  - Describe some reasons why a researcher would construct a phylogenetic tree. (medium)
  - Looking at the below phylogenetic tree, what is the most likely color of the common ancestor located at 1? (medium)
    - What is the most likely color of the common ancestor located at 2? 3? (hard)
    - How many times did the yellow trait most likely evolve on this phylogenetic tree? (medium)



- Below are two phylogenetic trees, each containing predictions of the phenotypes of common ancestors. Which collection of ancestral phenotypes is more likely and why? (hard)



- What types of organisms tend to undergo co-speciation? (easy)
- What evidence is there for co-speciation? (medium)