

Topic Review Guide: Phylogeny (Videos #8 and #9)

To Think About: How do phylogenetic trees and cladograms graphically model evolutionary history among species? How is biological evolution supported by evidence from many disciplines?

Watch:

First: [Mr. Andersen's "Phylogenetics" video.](#)

Next: [Mr. Andersen's "Cladograms" video.](#)

Read: Chapter 16, Hillis Principles of Life, pages 315-329 (you can split the reading, but you must read all pages)

Supplementary Resources: Click the links below for more information to help you learn more about this lesson.

- Crash Course: ["Taxonomy"](#)
- Kimball's Biology Pages: [Taxonomy and Phylogeny](#)
- UC Berkeley's Understanding Evolution: [The History of Life—Looking at Patterns](#)
- UC Berkeley's Understanding Evolution: [Understanding Phylogenies](#)
- University of Utah Learn.Genetics: [All Living Things are Related](#)
- DNA From the Beginning: [Living Things Share Common Genes](#)
- Scitable: [Reading a Phylogenetic Tree—The Meaning of Monophyletic Groups](#)
- HHMI Biointeractive: [Biodiversity and Evolutionary Trees—An Activity on Biological Classification](#)

Listen and Look: Here is a list of key terms you will hear and see during these podcasts. Get to know them! Be able to connect them to one another using a concept map.

KEY TERMS

Speciation	Phylogeny	Phylogenetics	Cladogram
Clades	Fossils	Phylogenetic tree	DNA sequence alignment
Morphology	Monophyletic	Paraphyletic	Polyphyletic
Synapomorphies	Taxonomy	Analogous structures	Homologous structures

Recall and Review: Use the lecture in the video and your textbook reading to help you answer these questions in your BILL.

1. **Explain** what Darwin meant when he talked about the common descent of all life, and what the significance is of the branch points on a phylogenetic tree.
2. **Describe** the following pieces of evidence that can be used to construct phylogenetic trees and provide two examples of each:
 - a. Morphological
 - b. Molecular
 - c. Developmental
 - d. Behavioral
3. **Explain** why the fossil record is incomplete and why fossils are not the only evidence that should be used in determining phylogeny of a species.



4. In the video, Mr. Andersen describes what a clade is and what it looks like on a cladogram. **Explain** why the green section of the cladogram is not a true clade.
5. **Explain** why synapomorphies are critically important in the construction of a cladogram.
6. **Describe** the relationship between convergent evolution and analogy. **Explain** how this is different from homology. **Describe** how biological analogies develop. Give an example of analogous structures. Provide examples of homologous structures.
7. **Describe** the relationships between the following pairs of words:
 - a. Monophyletic and polyphyletic
 - b. Paraphyletic and polyphyletic
 - c. Ingroup and outgroup
8. **Explain** how scientists are using phylogenetics to study HIV.
9. **Compare and contrast** phylogeny with genealogy. How are these two disciplines similar? How are they different?
10. **Describe** the relationship between taxonomy and phylogeny.

Learn More: For more examples of phylogeny and taxonomy, use the links below:

- BBC's GCSE Bitesize Biology: [Similarities and Differences](#)
- TalkOrigins.org: [29 Evidences for Macroevolution](#)
- [Taxonomy of the Armadillo](#)
- UC Berkeley Understanding Evolution: [Nested Hierarchies, the Order of Nature: Carolus Linnaeus](#)

