Topic Review Guide: Speciation (Videos #6 and #7)

To Think About: How is natural selection a major mechanism of evolution? In what ways does natural selection act on phenotypic variations in a population? What changes in genotype may affect phenotypes that are subject to natural selection?

Watch: **You do NOT need to watch both of these at once; keep an eye on the calendar to determine which video should be watched on what day!**

First: Mr. Andersen's "Reproductive Isolation and Speciation" video.

Next: Mr. Andersen's "Speciation and Extinction" video

Read: Chapter 17, Hillis, Principles of Life, pages 333-345 (you may 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: "Speciation"
- Kimball's Biology Pages: Speciation
- UC Berkeley's Understanding Evolution: Speciation
- UC Berkeley's Understanding Evolution: Evo-Devo
- *Nature* article: "Darwin's Finches Tracked to Reveal Evolution in Action."
- University of Utah Learn.Genetics: Stickleback Evolution
- University of Utah Learn.Genetics: Foundational Toolkit Genes (Building an Eye)
- DNA From the Beginning: Master Genes Control Basic Body Plans
- University of Miami: Reproductive Isolation

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	Extinction	Reproductive isolation	Adaptive radiation
Species	Pre-zygotic barrier	Geographic isolation	Post-zygotic barrier
Polyploidy	Gene flow	Allopatric speciation	Sympatric speciation
Temporal isolation	Behavioral isolation	Mechanical isolation	Hybrid
Gradualism	"evo-devo"	Punctuated equilibrium	Hybrid sterility

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 the biological species concept is. Why is this species concept inapplicable to asexually reproducing organisms?
2. In the "Speciation and Extinction" podcast, Mr. Andersen discusses speciation of two varieties of stickleback fish. **Describe** the environmental pressure that drove the process of speciation in these fish and the role that natural selection played in this process.
3. **Explain** why island systems are ideal locations for the process of adaptive radiation to take place. **Describe** other situations that could create ideal conditions for adaptive radiation to occur.

4. **Explain** what makes reproductive isolation such an important component of the species concepts discussed in the chapter.
5. **Draw** an example of each of the following examples of reproductive isolation. Your drawing should explain how each type of isolation leads to the formation of a new species **without** using any words.
    a. Geographic isolation
    b. Behavioral isolation
    c. Temporal isolation
    d. Mechanical isolation
6. **Explain** why reproductive barriers evolve. **Describe** an example of the evolution of a prezygotic barrier and the evolution of a postzygotic barrier.
7. **Explain** why polyploidy is much more common in plant species than in animal species. How can polyploidy lead to reproductive isolation?
8. Recall that sexual selection is the process by which females of a species seeking a mate select the males of their species based on an attractive appearance or behavior. **Explain** how sexual selection could lead to reproductive isolation.
9. **Distinguish** between allopatric and sympatric speciation. Give two examples of each type of speciation.
10. **Discuss** the differences between the two schools of thought regarding the tempo of evolutionary change: punctuated equilibrium versus gradualism.
11. Look at the "DNA From the Beginning" link that discusses the role of genetics in development of embryos. Homeotic genes (*Hox*) are genes that control the basic body plan of an organism. How do you think natural selection coupled with the expression of *Hox* genes in early animal embryos played a role in tetrapod evolution?

Learn More: For more examples of speciation, use the links below:

- BBC's GCSE Bitesize Biology: Natural Selection and Speciation
- TalkOrigins.org: Examples of Speciation
- Brown University: Case Histories of Speciation
- UC Berkeley: Evidence for Speciation