

Module 17: Speciation and Macroevolution

Keys to Success & Study Guide

Learning Objectives

By the end of this module, you should be able to: 1. **Define** biological species and identify limitations of the concept. 2. **Categorize** reproductive isolating mechanisms (Pre-zygotic vs Post-zygotic). 3. **Contrast** Allopatric and Sympatric speciation. 4. **Explain** macroevolutionary patterns like Adaptive Radiation and Convergent Evolution.

Key Terminology Checklist

Define these terms in your own words to ensure mastery. - [] **Speciation:** The origin of new species. - [] **Macroevolution:** Large-scale evolutionary changes that take place over long periods of time. - [] **Hybrid:** Offspring of two different species (e.g., Mule, Liger). - [] **Polyplody:** Having extra sets of chromosomes (Common cause of Sympatric speciation in plants). - [] **Analogous Traits:** Similar features evolved independently (Convergence).

Concept Check

1. Defining "Us" vs "Them"

- **Question:** How does the biological species concept work?
- **Deep Dive:** "Groups of actually or potentially interbreeding natural populations which are reproductively isolated from other such groups."
 - Simple test: Can they make a healthy baby?
 - Yes = Same species.
 - No = Different species.

2. Walls of Separation

- **Question:** What are pre-zygotic barriers?

- **Deep Dive:** Barriers BEFORE the zygote (fertilized egg) forms.
 - **Habitat:** Don't live nearby.
 - **Temporal:** Mate at different times.
 - **Behavioral:** Wrong mating song/dance.
 - **Mechanical:** Parts don't fit.
 - **Gametic:** Sperm/Egg don't fuse.

3. How it Happens

- **Question:** Describe the two modes of speciation.
- **Deep Dive:**
 - **Allopatric:** Physical barrier (Grand Canyon squirrels). Most common.
 - **Sympatric:** No barrier. Gene flow stops due to behavior or polyploidy (Plant suddenly becomes 4n).

Study Tips

- **Mnemonic for Barriers:** **B.M.G.T.H.** (Big Men Get Tall Hats?) -> Behavioral, Mechanical, Gametic, Temporal, Habitat. (Okay, make up a better one).
- **Don't Confuse:**
 - **Homologous** (Shared Ancestor) -> **Divergent** Evolution.
 - **Analogous** (Different Ancestor) -> **Convergent** Evolution.