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 including adaptive radiation and convergent evolution.

Key Terminology Checklist

Define these terms in your own words to ensure mastery.

- [ ] **Speciation**: The formation of new species.
- [ ] **Macroevolution**: Large-scale evolutionary changes occurring over long time periods.
- [ ] **Hybrid**: Offspring of two different species.
- [ ] **Polyploidy**: Having more than two complete sets of chromosomes; common mechanism of sympatric speciation in plants.
- [ ] **Analogous Traits**: Similar features that evolved independently (convergent evolution).

Concept Check

1. Biological Species Concept

- **Question**: How is a species defined biologically?
- **Key Answer**: A group of organisms capable of interbreeding and producing viable, fertile offspring, reproductively isolated from other such groups.

2. Reproductive Barriers

- **Question**: What are pre-zygotic barriers?
- **Key Answer**: Mechanisms that prevent mating or fertilization:
    - Habitat isolation
    - Temporal isolation
    - Behavioral isolation
    - Mechanical isolation
    - Gametic isolation

3. Modes of Speciation

- **Question**: Compare allopatric and sympatric speciation.
- **Key Answer**:
    - **Allopatric**: Geographic barrier separates populations (most common).
    - **Sympatric**: Speciation without geographic separation (e.g., polyploidy, habitat differentiation).