

Module 15: Darwin and Evolution

Keys to Success & Study Guide

Learning Objectives

By the end of this module, you should be able to: 1. **Describe** the key components of Darwin's theory of Natural Selection. 2. **Contrast** Homologous and Analogous structures as evidence for evolution. 3. **Explain** how fossil and biochemical evidence supports the theory of common descent. 4. **Apply** the concept of "fitness" to evolutionary scenarios.

Key Terminology Checklist

Define these terms in your own words to ensure mastery. - [] **Adaptation:** A trait that increases survival/reproduction in a specific environment. - [] **Biogeography:** The study of the distribution of species across the planet. - [] **Transitional Fossil:** A fossil that shows intermediate states between an ancestral form and its descendants. - [] **Convergent Evolution:** Different species independently evolving similar traits (Analogous structures). - [] **Industrial Melanism:** The classic example of moths changing color due to soot pollution.

Concept Check

1. Misconception Busting

- **Question:** What is the most basic definition of evolution?
- **Deep Dive:** "Change in allele frequency over time."
- **Important:** Individuals do NOT evolve. You cannot change your DNA. Populations evolve over generations.

2. Darwin's Inspiration

- **Question:** How did the Galapagos finches inspire Darwin?
- **Deep Dive:** He noticed distinct beak shapes on different islands.
 - Big beaks = Nut crackers (Dry islands).

- Small beaks = Insect eaters.
- Conclusion: One ancestor arrived, and they adapted to different niches (*Adaptive Radiation*).

3. Old Bones

- **Question:** What are homologous structures?
- **Deep Dive:** Same Bone Structure, Different Job.
 - Whale flipper, Human hand, Bat wing.
 - They all have 1 bone -> 2 bones -> little bones format.
 - Proof they are related.

Study Tips

- **Lamarck vs Darwin:**
 - **Lamarck** (Wrong): "The giraffe stretched its neck, so its baby had a long neck." (Inheritance of Acquired Characteristics).
 - **Darwin** (Right): "Giraffes with slightly longer necks survived better and had more babies. Short neck giraffes died."
- **"Theory":** Remember, in science, a Theory is a massive explanation supported by facts (Gravity, Cell Theory, Evolution). It is not a hunch.