Module 16: Evolution of Populations (Microevolution)

Comprehension & Critical Thinking Questions

Part 1: Understanding Core Concepts

1. **Defining Microevolution**
    - Evolution is "change in allele frequency." If a population is 50% Brown Eye Alleles and 50% Blue Eye Alleles, and 100 years later it is 90% Brown/10% Blue, has evolution occurred?

2. **Hardy-Weinberg Equilibrium**
    - What does the Hardy-Weinberg principle state?
    - List the **Five Conditions** required for a population NOT to evolve (No mutation, No gene flow, etc.). Are these conditions common in nature?

3. **Genetic Drift**
    - Define **Genetic Drift**. Does it have a stronger effect on Large or Small populations?
    - Distinguish between the **Bottleneck Effect** (disaster) and the **Founder Effect** (colonization).

Part 2: Applying Biological Principles

1. **Types of Selection**
    - Draw three graphs representing:
        - **Directional Selection** (Shift to one extreme).
        - **Stabilizing Selection** (Average is favored).
        - **Disruptive Selection** (Both extremes favored).
    - Give a real-world example of each (e.g., Birth weight, Beak size).

2. **Heterozygote Advantage**

    - Sickle Cell Anemia is a deadly recessive disease. Why is the allele so common in parts of Africa?
    - **Apply**: How does this demonstrate that "Fitness" depends on the environment? (Malaria presence).

Part 3: Analyzing & Evaluating

1. **Sexual Selection**

    - Peacocks have giant tails that make them slow and visible to predators. **Analyze**: How can Natural Selection (survival) allow this trait to exist? (Hint: Reproduction vs Survival).

2. **Gene Flow**

    - Two populations of deer are separated by a mountain. A tunnel is built, allowing them to mix.
    - **Analyze**: Will the two populations become more similar or more different genetically? Does this increase or decrease the chance of them becoming separate species?