# What Is Evolution?

Worksheet

Evolution is the process by which populations of organisms change over successive generations through mechanisms like natural selection, genetic drift, mutation and gene flow.

## Questions

1. What is the main driving mechanism of adaptive evolution?

A) Genetic drift
B) Natural selection
C) Gene flow
D) Mutation rate alone

2. In Hardy-Weinberg equilibrium, if p = 0.6, what is q?

A) 0.2
B) 0.4
C) 0.6
D) 1.0

3. Which of these is NOT a mechanism of evolution?

A) Natural selection
B) Genetic drift
C) Photosynthesis
D) Gene flow

4. A population in Hardy-Weinberg equilibrium is best described as...

A) actively evolving rapidly
B) not evolving (allele frequencies stable)
C) going extinct
D) undergoing rapid mutation

5. In a population of 1,000 people, the recessive allele frequency is q = 0.3. How many people are expected to be homozygous recessive?

6. If the recessive allele frequency is q = 0.2, what is the dominant allele frequency p, and what fraction of the population is heterozygous?

7. A moth population starts with 50% dark-colored moths. After pollution increases predation on light moths over 10 generations, dark moths rise to 90%. What evolutionary mechanism explains this?

8. Define: What is natural selection?

9. Define: What is genetic drift?

10. Define: What does the Hardy-Weinberg equilibrium describe?

# Answer Key

1. B) Natural selection - Natural selection favors traits that improve survival and reproduction, driving adaptive change.

2. B) 0.4 - p + q = 1, so q = 1 0.6 = 0.4.

3. C) Photosynthesis - Photosynthesis is a metabolic process, not an evolutionary mechanism.

4. B) not evolving (allele frequencies stable) - Hardy-Weinberg equilibrium is the theoretical no-evolution baseline.

5. Homozygous recessive frequency = q q = 0.3 = 0.09 Expected individuals = 0.09 1000 = 90 people

6. p + q = 1 p = 1 0.2 = 0.8 Heterozygous frequency = 2pq = 2 0.8 0.2 = 0.32 So 32% of the population is heterozygous

7. Predators selectively remove light moths (lower survival/reproduction) Dark-color allele frequency increases each generation This directional shift in allele frequency due to differential survival is natural selection (industrial melanism)

8. The process where organisms with traits better suited to their environment survive and reproduce more, passing those traits on.

9. Random changes in allele frequency, especially strong in small populations, not driven by fitness.

10. A population NOT evolving - allele and genotype frequencies stay constant across generations under ideal conditions.