

What is Evolution?

Worksheet

Evolution is the change in allele frequencies in populations over generations, driven by natural selection (survival of the fittest), mutation, genetic drift, and gene flow.

Questions

1. Natural selection requires which of these?
 - A) Variation
 - B) Inheritance
 - C) Differential reproduction
 - D) All of these
2. Which mechanism is random?
 - A) Natural selection
 - B) Genetic drift
 - C) Adaptation
 - D) Gene flow
3. What does 'survival of the fittest' mean?
 - A) Strongest wins
 - B) Best adapted survives
 - C) Random winners
 - D) Fastest reproduces
4. Example of rapid evolution?
 - A) Finch beaks
 - B) Antibiotic resistance
 - C) Peppered moths
 - D) All
5. Peppered Moths: explain industrial melanism.
6. Darwin's Finches: how did 13 species evolve from one ancestor?
7. Antibiotic resistance in bacteria: why does it spread so quickly?
8. Define: What is natural selection?
9. Define: What is genetic drift?
10. Define: Define adaptation.

Answer Key

1. D) All of these - All three conditions must be met for natural selection to act.
2. B) Genetic drift - Drift is random sampling; selection is non-random.
3. B) Best adapted survives - Fitness = ability to survive and reproduce in the environment.
4. D) All - All three show evolution in observable timescales.
5. Pre-industrial: light moths camouflaged on lichen-covered trees light moths dominated. Industrial England: trees covered in soot, light moths became visible. Predators ate more light moths dark moths survived more. Result: dark moths became 90%+ of the population in polluted areas (selection in action).
6. Ancestor: one finch species colonized the Galpagos. Geographic isolation: different islands different populations. Different food sources per island (seeds, insects, cactus) different selection pressures. Beak size diverged reproductive isolation separate species evolved.
7. Before antibiotic: bacteria population has genetic variation (some resistant genes). Antibiotic exposure: kills non-resistant bacteria. Resistant survivors reproduce population becomes resistant. Result: within weeks to months, the population is dominated by resistant strains (rapid evolution).
8. The mechanism by which organisms with favorable traits survive and reproduce more, increasing trait frequency.
9. Random changes in allele frequency, especially strong in small populations.
10. A trait that increases an organism's fitness (survival and reproduction) in its environment.

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