

The Evolution of Populations Chapter 23

1. Explain why genetic variation within a population is a prerequisite for evolution.
2. Describe how new alleles are formed.
3. Why are only a small fraction of mutations preserved and become widespread in a population?
4. If a population stopped reproducing sexually, but still reproduced asexually, predict how the genetic variation would change over time.
5. Suppose that in a particular pea population, flowers with the white phenotype are favored by natural selection. Predict what would happen over time to the frequency of the p allele in the population. Justify your response.
6. In order for a population to be in Hardy-Weinberg equilibrium, five conditions must be met. Make a general statement to explain why these five conditions must be met.
7. A population has 700 individuals, 85 of genotype AA, 320 of genotype Aa, and 295 of genotype aa. State the frequencies of alleles A and a.
8. The frequency of allele a is 0.45 for a population in Hardy-Weinberg equilibrium. Calculate the expected frequencies of genotypes AA, Aa, and aa.
9. A gene that affects susceptibility to a degenerative brain disease has two alleles, V and v. In a population, 16 people have genotype VV, 92 have genotype Vv, and 12 have genotype vv. Make a claim about the evolution of this population. Justify your claim.
10. A person claims that natural selection is more “predictable” than genetic drift. Provide reasoning to justify the claim.
11. Distinguish between genetic drift and gene flow in terms of how they occur and their effects on future genetic diversity.
12. Suppose two plant populations exchange pollen and seeds. In one population, individuals of genotype AA are more common (9,000 AA, 900 Aa, 100 aa), while the opposite is true in the other population (100 AA, 900 Aa, 9,000 aa). If neither allele has a selective advantage, predict what will happen to the allele and genotype frequencies of these two populations over time.
13. A population of birds lives on a coastal island and some individuals are blown by a storm to a nearby island where no birds of that species lived previously. Identify this event as an example of The Bottleneck Effect or The Founder Effect.
14. Consider a species of ant in which individuals heterozygous for a gene controlling antenna length have antennae that are longer than homozygotes. Longer antennae make it easier for the ants to find food. Identify this as directional, disruptive, or stabilizing selection. Justify your response.
15. Explain how sexual selection can contribute to sexual dimorphism.