Important Questions and Learning Objectives

Define natural selection. Understand that it keeps the disorganizing effects of other evolutionary mechanisms in check.

List the four main postulates of natural selection and provide evidence for these postulates in nature (e.g., Grant’s research with finches).

Understand that you can have selection without having an evolutionary response to selection (=phenotypic selection). A trait must be heritable in order to get an evolutionary response to selection.

Define or explain relative fitness. Be sure to understand why it’s a relative measure of reproductive efficiency of phenotypes. Understand how to calculate the relative fitness of phenotypes for a population.

Understand how selection against recessive defects (recessive deleterious alleles) can affect equilibrium genotype and allele frequencies for a population.

Explain the interplay between selection and mutation.

Understand how selection against dominant defects (dominant deleterious alleles) can affect equilibrium genotype and allele frequencies for a population.

Understand how selection on heterozygotes (heterozygote advantage) can affect equilibrium genotype and allele frequencies for a population.

Explain how frequency dependent selection and environmental heterogeneity can lead to multiple niche polymorphisms for populations.

Distinguish between the three major modes of selection. Be sure to provide an example of each.

Important Terms

Natural selection, stabilizing selection
Heritability, Directional selection
Phenotypic selection, Disruptive selection
Relative fitness
Balanced polymorphism
Heterozygote advantage
Frequency-Dependent Selection
Environmental Heterogeneity