

Bio. 3302 Introduction to Evolution
Study Guide
Quantitative Traits, Modes of Selection

Important terms and Concepts

Abiotic factor
Additive Effects
Artificial Selection
Biotic Factor
Common Garden Experiment
Directional Selection
Disruptive Selection
Dizygotic twins
Fitness
Heritability
Heritable trait
J.B.S. Haldane
Mean
Monozygotic (Identical) twins
Natural Selection
Neo-Darwinists
Normal Distribution
 $P = G + E$
Peppered Moth Example
Polygenic Inheritance
Polygenic Traits
Quantitative Trait
Quantitative Trait Loci
Ronald Fisher
Sewall Wright
Stabilizing Selection
Survival of the Fittest
Variance

Discussion Questions

1. What are quantitative (polygenic) traits? How do they differ from the traits Mendel used in his pea experiments? How are they measured?
2. What kinds of traits are quantitative (polygenic) in nature. List 5-8 examples of quantitative traits found in humans (physical, behavioral, medical).
3. What is the usual distribution of quantitative traits? What is the mean and variance?
4. How can you separate the contribution of genetics versus the contribution of environment in a complex, quantitative trait?
5. What is heritability? What is the basic, broad-sense, relationship? How does this differ from the narrow sense version of heritability? Why are plant and animal breeders interested in this subject?
6. Are quantitative traits in offspring always the average of those of the parents? Why or why not? How might you go about comparing parental traits with those of the offspring?

7. How are twins used to detect the influence of genes versus the environment? If there is a genetic basis for a behavior, do you expect there to be a higher correlation between monozygotic twins or dizygotic twins?
8. What is a Common Garden Experiment? What do they show you? Describe the experiment performed by Clausen, Keck, and Heisey in the 1940s in California.
9. What are QTL markers? Why are these marker alleles useful to study even though they do not actually affect the traits being studied? Explain in your own words the logic underlying QTL mapping.
10. What are biotic and abiotic agents of selection? Give 3 examples of each.
11. What is stabilizing selection and how does it differ from disruptive selection and directional selection? You should include in your answer some explanation of how the mean value for a trait changes in a population under each type of selective pressure.
12. Which type of selection is most common in nature? Give some examples of directional selection.
13. When scientists take measurements of natural selection, they make use of three terms: fitness, reproductive success, and selection coefficient. What are the differences between these terms and why is it important to make those distinctions?