

Chapter 23: The Evolution of Populations

This chapter begins with the idea that we focused on as we closed the last chapter: Individuals do not evolve! *Populations* evolve. The Overview looks at the work of Peter and Rosemary Grant with Galápagos finches to illustrate this point, and the rest of the chapter examines the change in populations over time. As in the last chapter, first read each concept to get the big picture and then go back to work on the details presented by our questions. Don't lose sight of the conceptual understanding by getting lost in the details!

Overview

1. What is *microevolution*?

Microevolution is evolutionary change below the species level; change in the allele frequencies in a population over generations.

2. What are the three main mechanisms that can cause changes in allele frequency?

Natural selection, genetic drift, and gene flow

3. What is the only mechanism that is adaptive, or improves the match between organisms and their environment?

Natural selection

Concept 23.1 Genetic variation makes evolution possible

4. Because Darwin did not know about the work of Gregor Mendel, he could not explain how organisms pass heritable traits to their offspring. In looking at genetic variation, what are *discrete characters*, and what are *quantitative characters*?

Discrete characters can be classified on an either-or basis.

Quantitative characters vary along a continuum within a population.

5. Using the techniques of molecular biology, what are the two ways of measuring genetic variation in a population?

Survey the protein products of genes using gel electrophoresis and compare the DNA sequences of two individuals in a population.

6. Geographic variation may be shown in a graded manner along a geographic axis known as a *cline*. What external factors might produce a *cline*? Why does the existence of a cline suggest natural selection?

Some clines are produced by a gradation in an environmental variable, such as temperature. The existence of a cline suggests natural selection because of the close association between the environmental variable and the frequency of the allele.

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