

AP Biology Laboratory 8

Population Genetics and Evolution

Objectives

- Estimate the frequency of alleles in a population using Hardy-Weinberg equations.
- Demonstrate that allele frequencies can change in a population over time.

Background

In the early 1900s, many biologists attempted to explain evolution in terms of the emerging science of genetics. Because the F_2 of monohybrid cross show a 3:1 ratio of dominant to recessive phenotypes many assumed that populations would evolve toward similar ratios of phenotypes. Two mathematicians, Godfrey Hardy and Wilhelm Weinberg, realized that the frequency of alleles in a population was independent of the alleles' inheritance pattern from parents to offspring. They postulated an ideal breeding population with the following properties:

1. Population size is infinite, or very large.
2. Mating is random. Mating pairs show no preference for one phenotype over another.
3. There is no mutation.
4. There is no exchange with other populations. No immigration or emigration occurs.
5. There is no selection for one phenotype over another. All phenotypes have an equal chance of reproducing.

If these conditions are met, the population's allele and genotype frequencies will remain statistically constant over time, a condition referred to as Hardy-Weinberg equilibrium. If we determine the frequency of a pair of alleles in a population, we can sample that population over several generations to determine if the frequency changes. If it does, we know that the population is evolving with respect to that pair of alleles.

Hardy and Weinberg developed mathematical formulas for estimating the frequencies of alleles in populations. Consider the following data on Rh blood type for a hypothetical human population of 6000:

Results of Testing for Human Rh Blood Type

Blood Type	Number of People
Rh+	4680
Rh-	1320
Total	6000

Assume that Rh blood type is inherited through two alleles: D , a dominant allele for Rh+ blood type, and d , a recessive allele for Rh- blood type.

Using Hardy-Weinberg equations, let

p = frequency of the dominant allele (D)

q = frequency of the recessive allele (d)

Each person is either Rh+ or Rh-, therefore,

$$p + q = 1 \text{ or } 100\% \text{ of the population.}$$

Since humans are diploid, individuals may be homozygous dominant (DD), heterozygous (Dd) or homozygous recessive (dd). The basic equation must be expanded to represent all the genotype frequencies. Thus,

$$(p + q)(p + q) = 1$$

Ap Biology Lab Eight Population Genetics Evolution Answers

R Bogdan



Ap Biology Lab Eight Population Genetics Evolution Answers :

This book delves into Ap Biology Lab Eight Population Genetics Evolution Answers . Ap Biology Lab Eight Population Genetics Evolution Answers is an essential topic that must be grasped by everyone, ranging from students and scholars to the general public. This book will furnish comprehensive and in-depth insights into Ap Biology Lab Eight Population Genetics Evolution Answers , encompassing both the fundamentals and more intricate discussions.

1. This book is structured into several chapters, namely:
 - Chapter 1: Introduction to Ap Biology Lab Eight Population Genetics Evolution Answers
 - Chapter 2: Essential Elements of Ap Biology Lab Eight Population Genetics Evolution Answers
 - Chapter 3: Ap Biology Lab Eight Population Genetics Evolution Answers in Everyday Life
 - Chapter 4: Ap Biology Lab Eight Population Genetics Evolution Answers in Specific Contexts
 - Chapter 5: Conclusion
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4. In chapter 3, this book will examine the practical applications of Ap Biology Lab Eight Population Genetics Evolution Answers in daily life. The third chapter will showcase real-world examples of how Ap Biology Lab Eight Population Genetics Evolution Answers can be effectively utilized in everyday scenarios.
5. In chapter 4, the author will scrutinize the relevance of Ap Biology Lab Eight Population Genetics Evolution Answers in specific contexts. This chapter will explore how Ap Biology Lab Eight Population Genetics Evolution Answers is applied in specialized fields, such as education, business, and technology.
6. In chapter 5, this book will draw a conclusion about Ap Biology Lab Eight Population Genetics Evolution Answers . This chapter will summarize the key points that have been discussed throughout the book.

The book is crafted in an easy-to-understand language and is complemented by engaging illustrations. It is highly recommended for anyone seeking to gain a comprehensive understanding of Ap Biology Lab Eight Population Genetics Evolution Answers .

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