

CHAPTER 9 Patterns of Inheritance

OBJECTIVES

Mendel's Principles

Introduction

Explain how studies of the dog breeding can provide insight into principles of genetics.

9.1 Describe the pangenesis theory and blending hypothesis. Explain why both ideas are now rejected.

9.2 Explain why Mendel's decision to work with peas was a good decision. Define and distinguish between true breeding organisms, hybrids, the P generation, the F₁ generation, and the F₂ generation.

9.3 Define and distinguish between the following pairs of terms: genotype vs. phenotype, dominant allele vs. recessive allele, and heterozygous vs. homozygous. Also define a monohybrid cross and a Punnett square.

9.3 Explain how Mendel's principle of segregation describes the inheritance of a single characteristic.

9.4 Describe the relationship between alleles for the same gene on separate homologous chromosomes.

9.5 Explain how Mendel's principle of independent assortment applies to a dihybrid cross. Illustrate this principle with examples of Mendel's work with peas and recent research on Labrador retrievers.

9.6 Explain how a testcross is performed to determine the genotype of an organism.

9.7 Explain when the rule of addition and the rule of multiplication should be used to determine the probability of an event. Explain why Mendel was wise to use large sample sizes in his studies.

9.8 Explain how family pedigrees can help determine the inheritance of many human traits.

9.9 Explain how recessive and dominant disorders are inherited. Provide examples of each.

9.10 Compare the health risks, advantages, and disadvantages of the following forms of fetal testing: amniocentesis, chorionic villus sampling, and ultrasound imaging.

Variations on Mendel's Principles

9.11-9.14 Describe the inheritance patterns of incomplete dominance, multiple alleles, and pleiotropy.

9.15 Define and distinguish between carrier testing, diagnostic testing, prenatal testing, newborn screening, and predictive testing.

9.16 Explain how a single characteristic can be influenced by many genes.

The Chromosomal Basis of Inheritance

9.17 Define the chromosome theory of inheritance. Explain the chromosomal basis of the principles of segregation and independent assortment.

9.18 Explain how linked genes are inherited differently from other nonlinked genes.

9.19-9.20 Describe T.H. Morgan's studies of crossing over and explain how Sturtevant created linkage maps.

Sex Chromosomes and Sex-Linked Genes

9.21 Explain how sex is genetically determined in humans and the significance of the *SRY* gene. Explain how sex is determined differently in other organisms.

9.22-9.23 Describe the patterns of sex-linked inheritance noting examples in fruit flies and humans.