

Chapter 3: Genetics: The Science of Heredity

I. Mendel's Work

- A. In all of Mendel's crosses, only one form of the trait appeared in the F_1 generation. However, in the F_2 generation, the "lost" form of the trait always reappeared in about one fourth of the plants.
- B. An organism's traits are controlled by the alleles it inherits from its parents. Some alleles are dominant, while other alleles are recessive.
- C. Terms
 - a. Heredity
 - b. Trait
 - c. Genetics
 - d. Fertilization
 - e. Purebred
 - f. Gene
 - g. Alleles
 - h. Dominant allele
 - i. Recessive allele
 - j. Hybrid

II. Probability and Heredity

- A. Probability is the likelihood that a particular event will occur.
- B. In a genetic cross, the allele that each parent will pass on to its offspring is based on probability.
- C. An organism's phenotype is its physical appearance, or visible traits. An organism's genotype is its genetic makeup, or allele combinations.
- D. In codominance, the alleles are neither dominant nor recessive. As a result, both alleles are expressed in the offspring.
- E. Terms
 - a. Probability
 - b. Punnett square
 - c. Phenotype
 - d. Genotype
 - e. Homozygous
 - f. Heterozygous
 - g. Codominance

III. The Cell and Inheritance

- A. According to the chromosome theory of inheritance, genes are carried from parents to their offspring on chromosomes.
- B. During meiosis, the chromosome pairs separate and are distributed to two different cells. The resulting sex cells have only half as many chromosomes as the other cells in the organism.

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- C. Chromosomes are made up of many genes joined together like beads on a string.
 - D. Term
 - a. Meiosis
- IV. The DNA Connection
- A. The order of the nitrogen bases along a gene forms a genetic code that specifies what type of protein will be produced.
 - B. During protein synthesis, the cell uses information from a gene on a chromosome to produce a specific protein.
 - C. Mutations can cause a cell to produce an incorrect protein during protein synthesis. As a result, the organism's trait, or phenotype, may be different from what it normally would have been.
 - D. Terms
 - a. Messenger RNA
 - b. Transfer RNA