

SECTION 3-3

SECTION SUMMARY

The Cell and Inheritance

Guide for Reading

- ◆ What role do chromosomes play in inheritance?
- ◆ What events occur during meiosis?

In the early 1900s, scientists were working to identify the cell structures that carried Mendel's hereditary factors, or genes. In 1903, Walter Sutton observed that sex cells in grasshoppers had half the number of chromosomes as the body cells. He also noticed that grasshopper offspring had exactly the same number of chromosomes in its body cells as each of the parents. He reasoned that the chromosomes in body cells actually occurred in pairs, with one chromosome in each pair coming from the male and the other coming from the female.

From his observations, Sutton concluded that genes are located on chromosomes. He proposed the chromosome theory of inheritance. **According to the chromosome theory of inheritance, genes are carried from parents to their offspring on chromosomes.**

Organisms produce sex cells during meiosis. **Meiosis** is the process by which the number of chromosomes is reduced by half to form male and female sex cells—**sperm** and **eggs**. During meiosis, the chromosome pairs are separated and distributed to produce two different sex cells. Each sex cell has only one chromosome from each pair. When they combine, each sex cell contributes half the number of chromosomes to produce offspring with the correct number of chromosomes.

Punnett squares show the results of meiosis. When chromosome pairs separate, so do the alleles of genes located on the chromosomes. One allele from each pair goes to each sex cell. Punnett squares show this in the separation of alleles that the parents can pass to the offspring.

Chromosomes are made up of many genes joined together, like beads on a string. Each chromosome contains a large number of genes, each controlling a particular trait. Each chromosome pair has the same genes. The genes are lined up in the same order from one end to the other. However, the alleles for some of the genes might be different, making the organism heterozygous for some traits. If the alleles are the same, the organism is homozygous for those traits.