CHAPTER 15
THE CHROMOSOMAL BASIS OF INHERITANCE

Learning objectives:

Relating Mendelian Inheritance to the Behavior of Chromosomes

1. Describe the chromosome theory of inheritance.

Sex Chromosomes

2. Describe how sex is genetically determined in humans and explain the significance of the *SRY* gene.
3. Explain why sex-linked diseases are more common in human males.
4. Perform a Punett square of calculation of probabilities for a sex-linked disorder or trait.
5. Describe the process of X inactivation in female mammals. Explain how this phenomenon produces the tortoiseshell coloration in cats.

Linked Genes

6. Distinguish between unlinked genes, linked genes and sex-linked genes.
7. Describe the independent assortment of chromosomes during Meiosis I. Explain how independent assortment of chromosomes produces genetic recombination of unlinked genes.
8. Explain why linked genes do not assort independently. Explain how crossing over can unlink genes.
9. Explain the difference between a physical and linkage map. Define the map units for each.

Errors and Exceptions in Chromosomal Inheritance

10. Explain how nondisjunction can lead to aneuploidy.
11. Define polyploidy. Explain how these major chromosomal changes occur and describe possible consequences.
12. Distinguish among deletions, duplications, inversions, and translocations.
13. Describe the type of chromosomal alterations responsible for the following human disorders: Down syndrome, Klinefelter syndrome, Turner syndrome, *cri du chat* syndrome, and chronic myelogenous leukemia.
14. Define genomic imprinting.
15. Explain why extranuclear genes (e.g., genes in the mitochondrial genome) are not inherited in a Mendelian fashion.