CHAPTER 13
MEIOSIS

Figure 13.1 The asexual reproduction of a hydra

Figure 13.3 Preparation of a human karyotype (Layer 4)

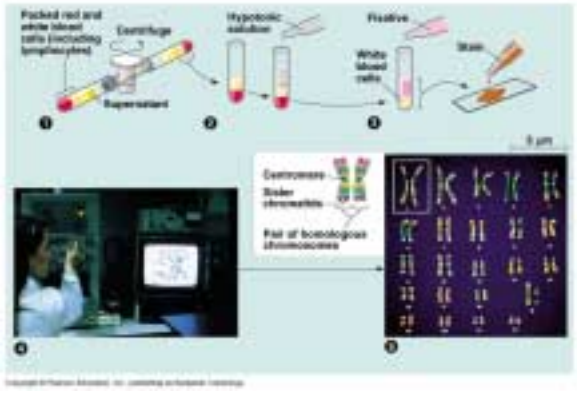


Figure 13.4 The human life cycle

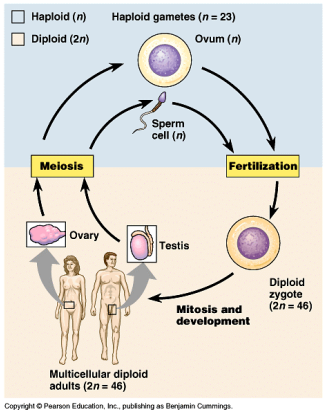
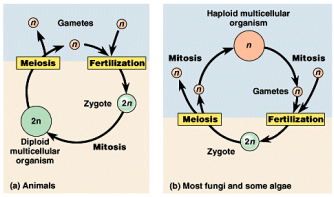


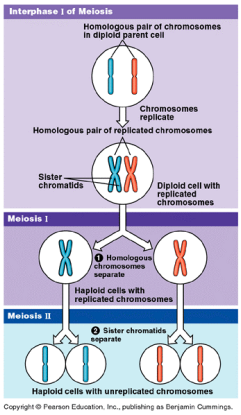
Figure 13.5 Three sexual life cycles differing in the timing of meiosis and fertilization (syngamy)



OVERVIEW OF MEIOSIS

- **OCCURS IN SEX CELLS**
- **BEGINS WITH DIPLOID CELL, 2N**
- **SORTS OUT DNA INTO PARCELS TO DISTRIBUTE TO PROGENY CELLS.**
- **MEIOSIS I = 2 CELLS**
- **MEIOSIS II = 4 CELLS**
- **REDUCTION DIVISION OF CHROMOSOMES**

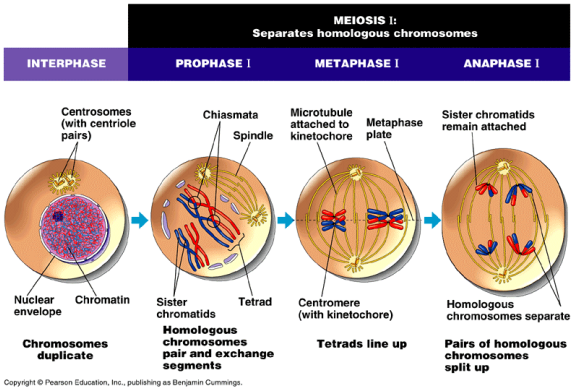
Figure 13.6 Overview of meiosis: how meiosis reduces chromosome number



MEIOSIS I

- **DIPLOID PARENT CELL (2N)**
- **DIVIDES TO PRODUCE 2 PROGENY CELLS, WITH PACKETS OF CHROMATIDS**
- **PROPHASE I; HOMOLOGS LINE-UP,SYNAPSIS,CROSSING OVER OF CHROMOSOMES**

Figure 13.7 The stages of meiotic cell division: Meiosis I



MEIOSIS I - CONT'D

- **METAPHASE I**:
- CHROMOSOMES LINE UP AT CENTER
- **ANAPHASE I:**
- HOMOLOGOUS CHROMOSOMES ARE PAIRED, CHROMOSOMES SEPARATE
- **TELOPHASE I:**
- CELLS REORGANIZE

Figure 13.7 The stages of meiotic cell division: Meiosis II

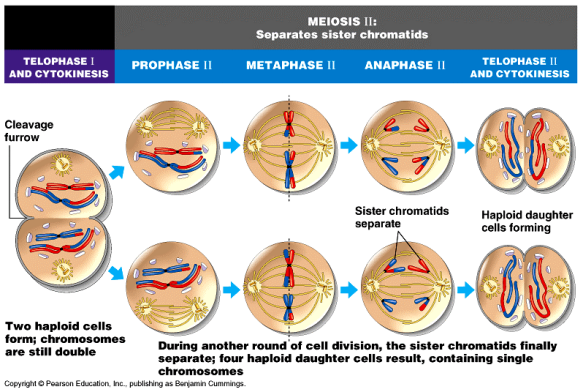
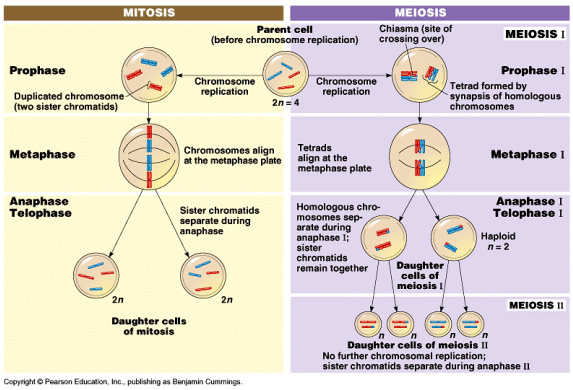


Figure 13.8 A comparison of mitosis and meiosis



MEIOSIS II

- **SISTER HOMOLOGS SEPARATE**
- **KINETOCHORE SPLITS AT ANAPHASE II**
- **CHROMOSOMES MIGRATE**
- **CYTOKINESIS, CELLS DIVIDE**

Figure 13.8 A comparison of mitosis and meiosis: summary

SUMMARY

Event	Mitosis	Meiosis
DNA replication	Occurs during interphase before nuclear division begins	Occurs once, during the interphase before meiosis I begins
Number of divisions	One, including prophase, metaphase, anaphase, and telophase	Two, each including prophase, metaphase, anaphase, and telophase
Synapsis of homologous chromosomes	Does not occur	Synapsis is unique to meiosis: During prophase I, the homologous chromosomes join along their length, forming tetrads (groups of four chromatids); synapsis is associated with crossing over between nonsister chromatids
Number of daughter cells and genetic composition	Two, each diploid ($2n$) and genetically identical to the parent cell	Four, each haploid (n), containing half as many chromosomes as the parent cell; genetically nonidentical to the parent cell and to each other
Role in the animal body	Enables multicellular adult to arise from zygote; produces cells for growth and tissue repair	Produces gametes; reduces chromosome number by half and introduces genetic variability among the gametes

Figure 13.9 The results of alternative arrangements of two homologous chromosome pairs on the metaphase plate in meiosis I

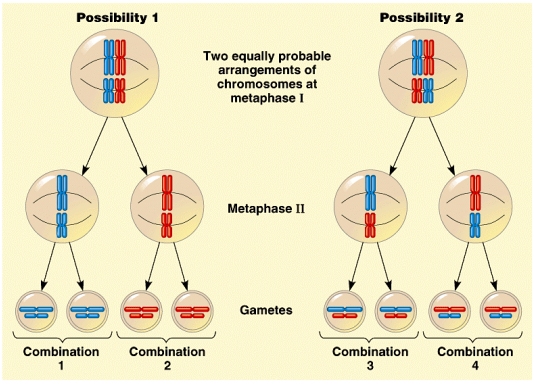


Figure 13.10 The results of crossing over during meiosis