

Mendel and Meiosis

Chapter 12 & 13
p.318-323,343-365

Reproduction

- Asexual reproduction- uses mitosis to produce offspring that are genetically identical (clones) via binary fission, budding, fragmentation, vegetative reproduction.
- Sexual Reproduction- two parents contribute 1/2 of their chromosomes the offspring.
 - Every species has a specific number of chromosomes.
 - Somatic cells are diploid ($2n$)- two sets of homologous chromosomes (one from each parent).
 - Gametes (reproductive cells-sperm and eggs) are haploid (n)- one set of chromosomes.

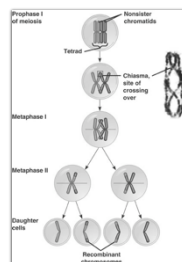
Meiosis

- Sexual reproduction form gametes by the process of meiosis to produce haploid gametes.
- Fertilization is the combination of gametes, creates a diploid zygote.
- Meiosis will produce 4 haploid nuclei.

Meiosis

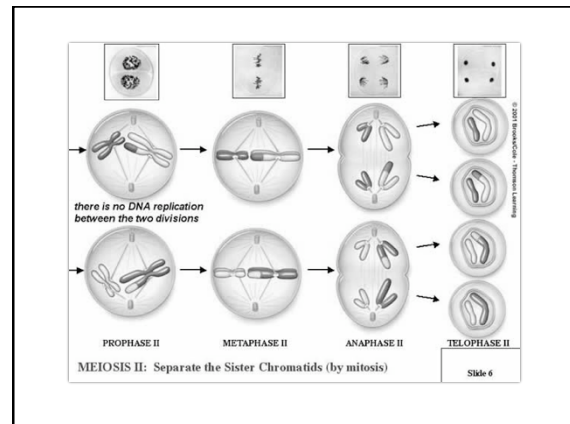
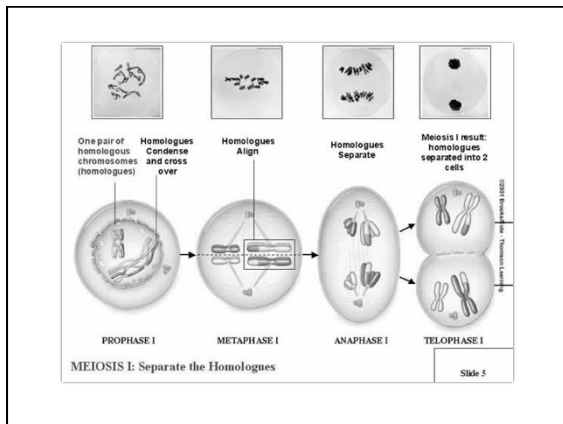
- Meiosis involves 1 DNA replication and 2 nuclear divisions.
- Meiosis I
 - Prophase I
 - Crossing-over- chromatids of homologous chromosomes exchange segment to produce unique genetic combinations.
 - Metaphase I
 - Random Alignment of Chromosomes- Homologous Chromosomes line up along the metaphase plate. Each homologous pair can lineup in one of two conformations.
 - Law of Independent Assortment- the arrangement of homologous pairs along the metaphase plate is independent of one another 2^{23} .

Crossing-Over



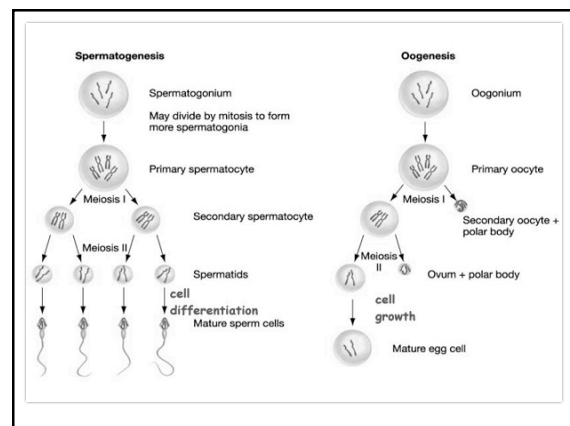
Meiosis

- Anaphase I
 - Homologous chromosomes are moved to opposite poles.
- Telophase I
 - Haploid cells are created
- Meiosis II
 - In Anaphase II the sister chromatids of each chromosome are separated.
 - Result in 4 Haploid cells



Differentiation of Gametes

- ♦ Spermatogenesis- in males testes, the 4 haploid nuclei will differentiate into 4 sperm for each diploid germ cell.
- ♦ Oogenesis- in female ovaries, the 4 haploid nuclei will differentiate into 1 egg and 3 polar bodies for each diploid germ cell.



Problems during Meiosis

- ♦ Alleles may not segregate during nondisjunction.
- ♦ Offspring who receive more or less chromosomes exhibit symptoms based on the chromosomes affect
 - ♦ Down Syndrome is caused by trisomy of chromosome pair 21
 - ♦ Trisomy of sex chromosomes can cause sterility and/or retardation.