



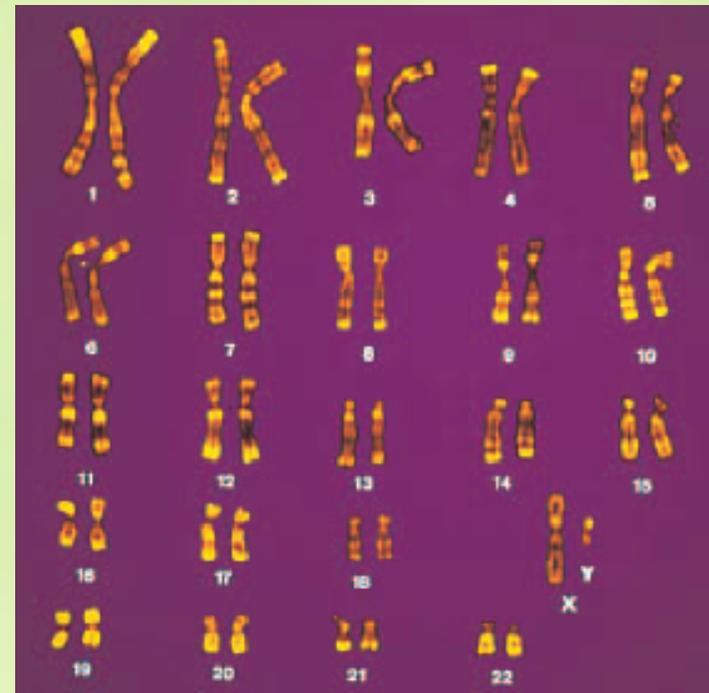
Objectives

- ✿ Explain homologous chromosomes.
- ✿ List and describe the phases of meiosis.
- ✿ Explain the concept of independent assortment.
- ✿ Compare and contrast meiosis and mitosis.
- ✿ Describe why meiosis is important.

Homologous Chromosomes

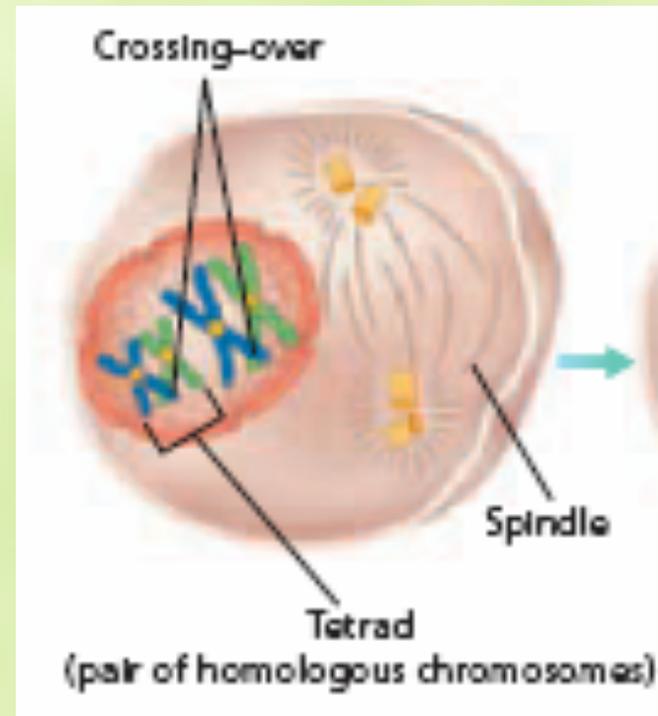
- ✿ **Homologous chromosomes** are 2 copies of a chromosome that contain the genetic information for the same traits.
- ✿ One half of a homologous pair is called an autosome.
- ✿ During sexual reproduction, the offspring receives one autosome from each parent, creating a homologous pair.

- ✿ This means that the offspring gets half the material from each parent.



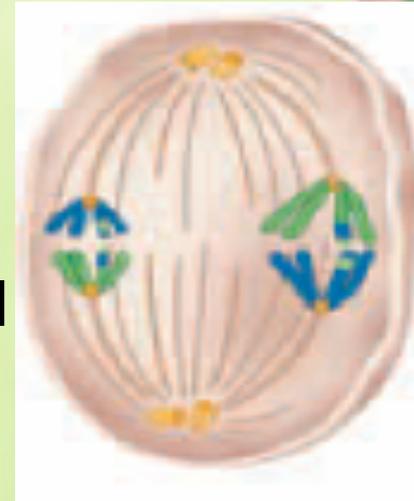
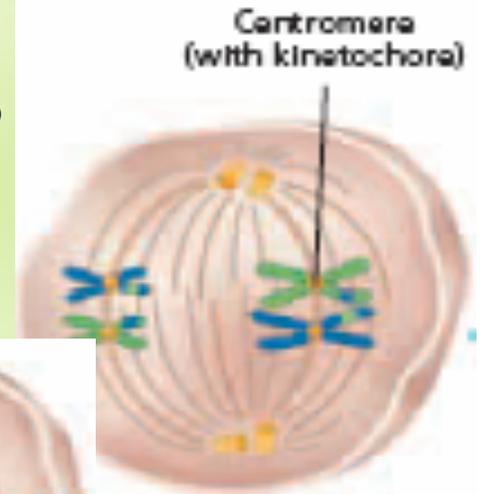
The Phases of Meiosis

- ✿ Meiosis, like mitosis, occurs in distinct phases.
- ✿ **Prophase I:** The chromosomes coil and the nuclear membrane breaks down. Chromosomes pair up into **tetrads** through the process of **synapsis**.
- ✿ During prophase I parts of one chromosome can switch places with its sister chromosome. This is called **crossing over**.
- ✿ Crossing over leads to new genetic variations.



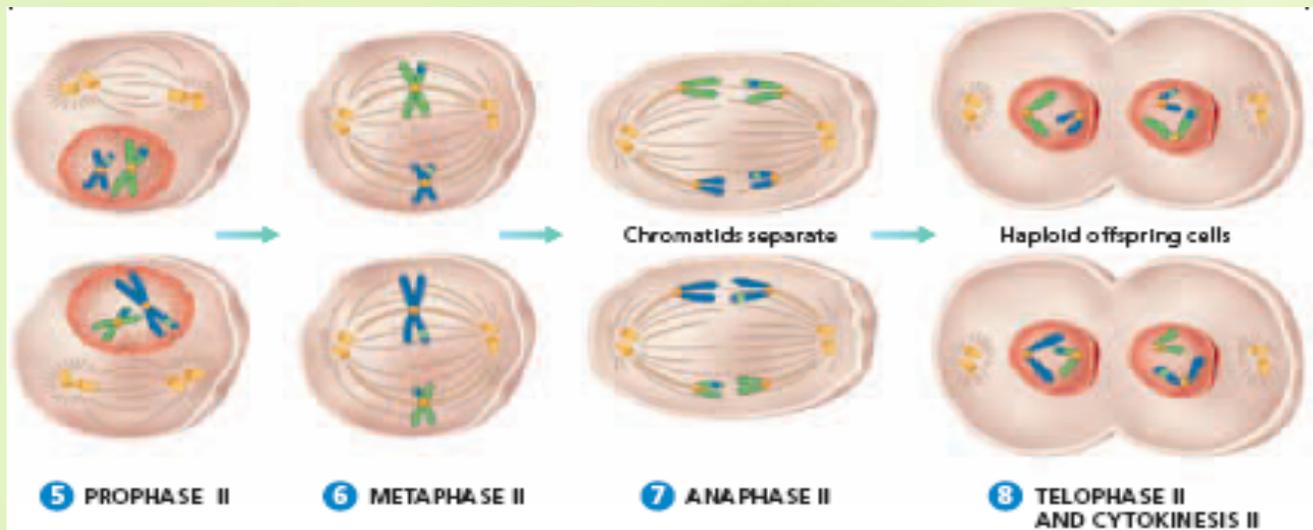
The Phases of Meiosis (Cont...)

- ✿ **Metaphase I:** The tetrads line up **RANDOMLY** at the center of the cell.
- ✿ **Anaphase I:** The chromosome pairs split and begin to move to the poles. The randomization of this process is called **independent assortment**.
- ✿ **Telophase I:** Here, the chromosomes reach the poles and cytokinesis begins.



Meiosis II

- ✿ The meiotic process continues in the same phases a second time.
- ✿ The resulting cells are **haploid** because they have half the number of chromosomes as they started with.
- ✿ When a haploid cell fuses with another haploid cell, the resulting embryo is diploid.





Gamete Production

- ✿ Meiosis is important for the production of **gametes**, or sexually reproductive cells like eggs and sperm.
- ✿ If gametes were to be produced by mitosis then the following generation would have double the chromosomes of the preceding generation.
- ✿ Female gametes and male gametes are produced differently from each other.

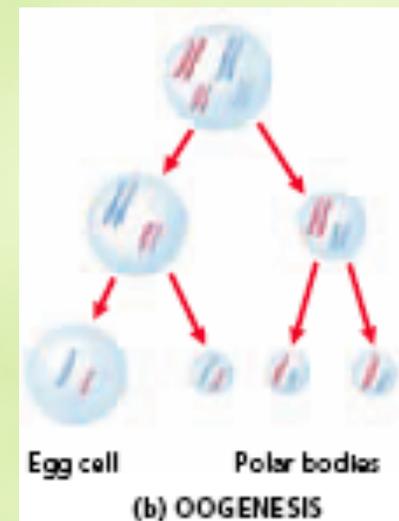
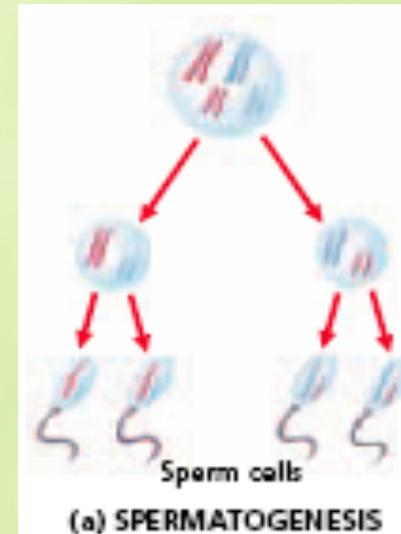
Meiosis Square Dance (Review)

**One More
Time !**



Sperm & Egg Production

- ✿ **Spermatogenesis** is the production of new sperm cells where one diploid cell gives rise to 4 haploid cells.
- ✿ **Oogenesis** is the production of a new egg cell where one diploid cell gives rise to one haploid egg and 3 **polar bodies** (which are eventually destroyed.)





Similarities b/w Mitosis & Meiosis

- ✿ Mitosis and Meiosis are similar in the following ways:
 - ✿ They are both forms of cell division.
 - ✿ They use roughly the same phases.
 - ✿ The main purpose of both is to create new cells that contain the genetic material from the parent cell.
 - ✿ Both processes are asexual.



Differences b/w Mitosis & Meiosis

- ✿ Mitosis and Meiosis are different in the following ways:
 - ✿ Mitosis ends with 2 diploid copies (exact) of the parent cells and meiosis ends with 4 haploid cells (that are different from the parent cell with only half the chromosomes.)
 - ✿ The cells in mitosis copy their DNA before mitosis begins, but cells undergoing meiosis do not.
 - ✿ Mitosis occurs in one stage consisting of 4 phases and meiosis occurs in 2 stages of the same 4 phases.



Objectives

- ✿ Explain homologous chromosomes.
- ✿ List and describe the phases of meiosis.
- ✿ Explain the concept of independent assortment.
- ✿ Compare and contrast meiosis and mitosis.
- ✿ Describe why meiosis is important.