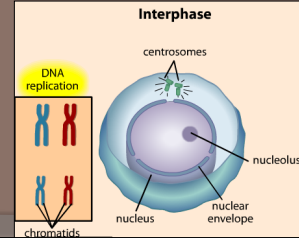


Meiosis I

- Separates homologous pairs of chromosomes, NOT sister chromatids of individual chromosomes.

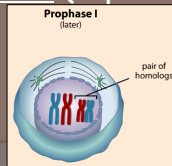
Interphase I

- Metabolic activities & replicate chromosomes

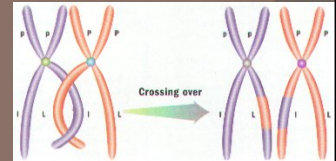


Prophase I

- Synapsis occurs- the pairing of homologous chromosomes
- Each pair of homologous chromosomes come together to form a **tetrad** (4 part structure)

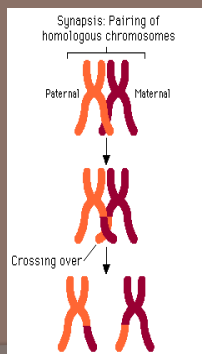


- Genetic material is exchanged in a process called crossing over (swapping portions of adjacent DNA)



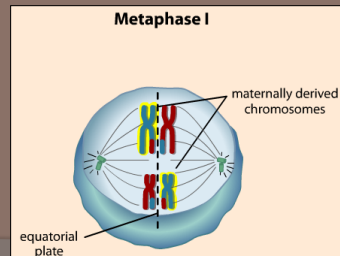
- Must be done with great precision so that neither chromatid gains or loses any genes!

Crossing Over:



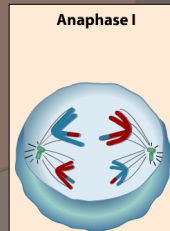
3. Metaphase I

- Homologous chromosomes line up at the equator in pairs



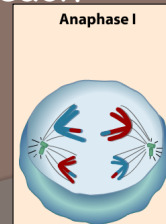
4. Anaphase I

- Homologous chromosomes separate and move to opposite ends of the cell.
- This occurs because the centromeres do NOT split like in mitosis



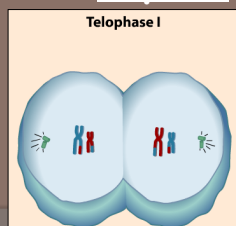
4. Anaphase I

- This ensures that each new cell will receive only one chromosome for each homologous pair.

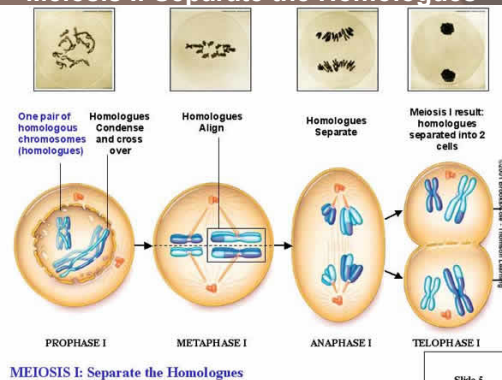


5. Telophase I

- The new cells are diploid so another division is required to create haploid cells



Meiosis I: Separate the Homologues



Meiosis II

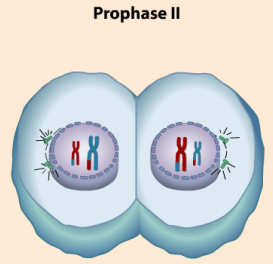
- The mechanisms of Meiosis II is almost the same as mitosis
 - However, the chromosomes DO NOT replicate between meiosis I and meiosis II, the final outcome of meiosis is halving the number of chromosomes per cell. (46 to 23)

1. Interphase II

- No replication
- Allows the new cells to become haploid

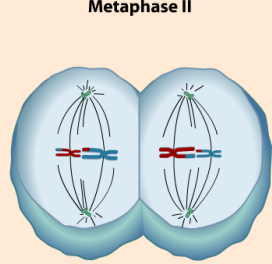
2. Prophase II

- Same as Prophase I except NO tetrads are formed



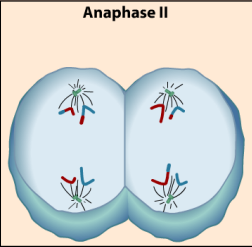
3. Metaphase II

- Chromosomes line up at the equator



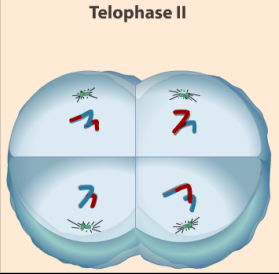
4. Anaphase II

- Sister chromatids move to the opposite ends of the cell

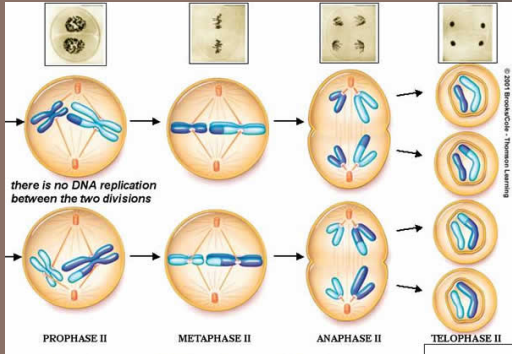


5. Telophase II

- Creates 4 haploid cells (gametes)



But wait...there's more! Meiosis II: Separate the Sister Chromatids



MEIOSIS II: Separate the Sister Chromatids (by mitosis)

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Slide 6

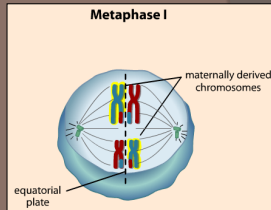
Meiosis Animation- w/ sound

- <http://www.sumanasinc.com/webcontent/animations/content/meiosis.html>

Meiosis provides genetic variation in 2 ways

1. Independent assortment of homologous chromosomes during meiosis I

- The amount of different chromosomes that can be produced increases greatly as the number of chromosomes an organism has.



Meiosis provides genetic variation in 2 ways

- A pea plant has 7 pairs of chromosomes. Each pair can line up 2 different ways. Therefore, each gamete can have $2^7 = 128$ possibilities!!



- Humans: $n=23$; so the number of different kinds of eggs or sperms a person can produce is more than 8 million (2^{23})



Meiosis provides genetic variation in 2 ways

- When fertilization occurs, $2^{23} \times 2^{23}$ zygotes are possible or 70 trillion!!

- No wonder brothers and sisters can be so different.



Meiosis provides genetic variation in 2 ways

2. Crossing over between homologous chromosomes during prophase of meiosis I

- Increases the number of genetic variations

Meiosis is NOT flawless

- It is estimated that from 10-20% of all human fertilized eggs contain chromosome abnormalities, and these are the most common cause of pregnancy failure (35% of the cases).

These chromosome abnormalities:

- Arise from errors in meiosis, usually meiosis I
- Occur more often (90%) during egg formation than during sperm formation
- Become more frequent as a woman ages.

Meiosis Animation- no sound

<http://www.johnkyrk.com/meiosis.html>

