

## Chapter 6: Mendel and Meiosis

### Meiosis Gamete Production Lecture Guide

#### Chromosomes and Meiosis

- Specialized cells in the body –
  - 2 types:
    - \_\_\_\_\_ (body cells)
      - Makes up your \_\_\_\_\_
      - DNA in your body cells \_\_\_\_\_ passed onto your children
    - \_\_\_\_\_ (Sex cells – turns into gametes)
      - Cells in your \_\_\_\_\_

#### Chromosomes

- Threadlike structure made up of \_\_\_\_\_ that carries genetic information (characteristics for an organism)
- \_\_\_\_\_ (deoxyribonucleic acid)
  - \_\_\_\_\_ carried by organisms

#### Human Body Cells

- Each of your body cells contains a set of \_\_\_\_\_ chromosomes
  - Comes in \_\_\_\_\_ pairs
- Cells are genetically identical to each other unless there is a \_\_\_\_\_

#### Human cells have autosomes and sex chromosomes

- We have a total of \_\_\_\_\_ chromosomes (\_\_\_\_\_ from mother and \_\_\_\_\_ from father)
- Human cells use \_\_\_\_\_ sets of chromosomes to function properly
- Each pair of chromosomes – \_\_\_\_\_
  - Homologous “\_\_\_\_\_ structure”
  - 2 chromosomes – one from mom and one from dad – that have the same length and general appearance

#### Homologous Chromosomes

- SAME SIZE
- SAME SHAPE
- CARRY GENES for the SAME TRAITS
- BUT \_\_\_\_\_! (Don't have to have the SAME CHOICES)

#### Homologous Chromosomes

- Have copies of the \_\_\_\_\_ genes
- Numbers are assigned to each pair of homologous chromosomes, ordered from \_\_\_\_\_
  - Largest pair is number \_\_\_\_\_
- Pairs 1 through 22 are \_\_\_\_\_
  - Not related to \_\_\_\_\_ of organism

## Sex chromosomes

- What about the 23<sup>rd</sup> pair?
  - Sex chromosomes
    - Directly control the development of \_\_\_\_\_
    - Human have \_\_\_\_\_ different chromosomes: \_\_\_\_\_
      - Sex in humans is determined by \_\_\_\_\_ system
      - \_\_\_\_\_ is a female
      - \_\_\_\_\_ is male

## Body Cells are diploid; gametes are haploid

- Sexual reproduction –
  - Involves the fusion of \_\_\_\_\_ that results in offspring that are a genetic \_\_\_\_\_ of both parents;
  - \_\_\_\_\_ genetically identical
- Fertilization –
  - \_\_\_\_\_ of egg and sperm

## DIPLOID & HAPLOID

- Most cells have 2 copies of each chromosome = \_\_\_\_\_ (one from mom; one from dad)
- All BODY (\_\_\_\_\_) cells are diploid

## DIPLOID & HAPLOID

- Some cells have only one copy of each chromosome = \_\_\_\_\_
- All sperm and egg cells are haploid

## Remember from Chapter 1: CHARACTERISTICS OF LIVING THINGS

• ALL LIVING THINGS \_\_\_\_\_

## ASEXUAL REPRODUCTION

- Bacteria reproduce using \_\_\_\_\_
- Budding & regeneration are used by plants and animals to reproduce asexually \_\_\_\_\_

## BINARY FISSION & MITOSIS

- Produces cells that are \_\_\_\_\_ copies of parent cell

## ADVANTAGES OF ASEXUAL REPRODUCTION

1. Can make offspring \_\_\_\_\_
2. Don't need a partner

## DISVANTAGES OF ASEXUAL REPRODUCTION

1. ALL \_\_\_\_\_
2. Species \_\_\_\_\_ change and adapt
3. One disease can wipe out whole population

## SEXUAL REPRODUCTION

- Combines genetic material from 2 parents (sperm & egg) so offspring are genetically \_\_\_\_\_ from parents

## ADVANTAGES OF SEXUAL REPRODUCTION

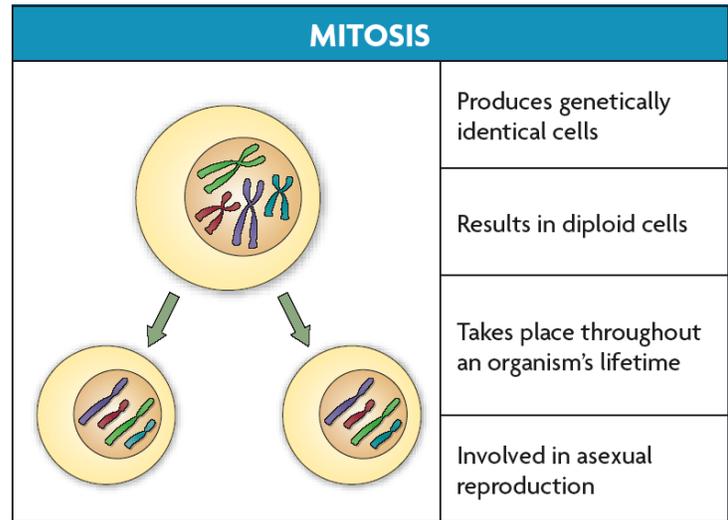
- Allows for \_\_\_\_\_ in population
- Individuals can be \_\_\_\_\_
- Provides foundation for \_\_\_\_\_
- Allow species adapt to changes in their environment

## Meiosis is the way....

- to make cells with \_\_\_\_\_ the number of chromosomes for sexual reproduction

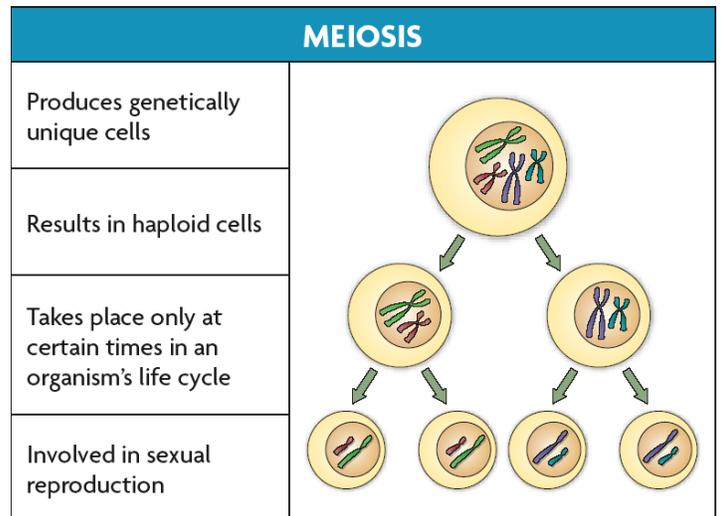
## REVIEW: MITOSIS

- Makes \_\_\_\_\_ cells genetically \_\_\_\_\_ to parent cell & to each other
- Makes \_\_\_\_\_ cells
- Makes \_\_\_\_\_
- Used by organisms to: increase size of organism, repair injuries, replace worn out cells



## MEIOSIS

- Makes \_\_\_\_\_ cells genetically different from parent cell & from each other
- Makes \_\_\_\_\_ cells
- Makes \_\_\_\_\_
- Used for \_\_\_\_\_



## WHAT MAKES MEIOSIS DIFFERENT?

- \_\_\_\_\_ (PROPHASE I)
- \_\_\_\_\_ (ANAPHASE I)
- Skip INTERPHASE II (NO S); CELL DIVIDES \_\_\_\_\_, BUT... ONLY COPIES DNA \_\_\_\_\_

## WHAT MAKES MEIOSIS DIFFERENT?

- Homologous chromosomes pair up during \_\_\_\_\_ = \_\_\_\_\_
  - This group of FOUR (4) chromatids is called a \_\_\_\_\_
- Exchange of DNA between homologous pairs = \_\_\_\_\_ during PROPHASE I
  - CROSSING OVER allows for \_\_\_\_\_ in different combinations

- b) After crossing over, chromatid arms are \_\_\_\_\_ anymore
3. Separation during ANAPHASE I
- a) \_\_\_\_\_
- b) Separates gene choices and allows shuffling of genetic material
4. Skip INTERPHASE II (No S) CELL DIVIDES \_\_\_\_\_, BUT ...ONLY COPIES ITS DNA \_\_\_\_\_
- a) Mitosis: \_\_\_\_\_
- b) Meiosis: \_\_\_\_\_
- c) \_\_\_\_\_

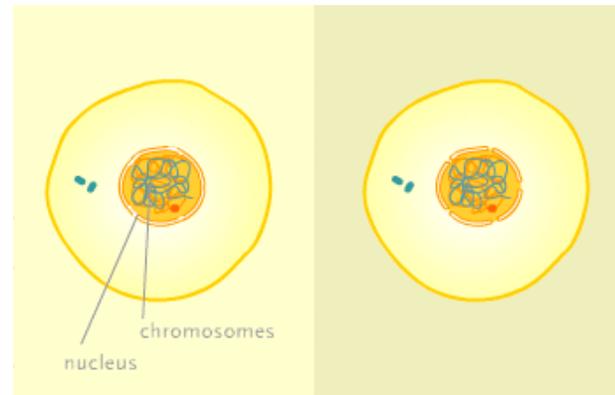
**WHAT MAKES MEIOSIS DIFFERENT?**

- Crossing over
- Segregation
- Independent assortment
- are ALL ways MEIOSIS results in \_\_\_\_\_ so daughter cells are \_\_\_\_\_ from parents and from each other

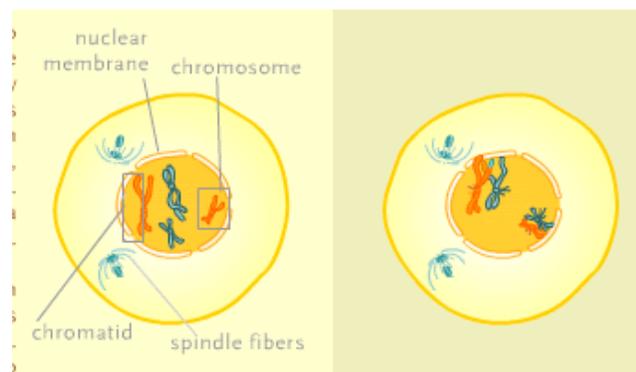
**Chapter 6: Mendel and Meiosis**  
**Meiosis Gamete Production, Day 2 Lecture Guide**

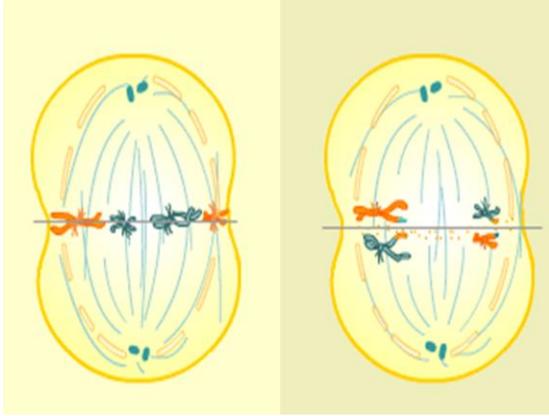
**MITOSIS versus MEIOSIS**

Interphase	Interphase I
• DNA is spread out as chromatin	•
• Nuclear membrane/nucleolus visible	
• DNA is copied during S phase	
• Makes stuff new cell needs in G <sub>2</sub>	



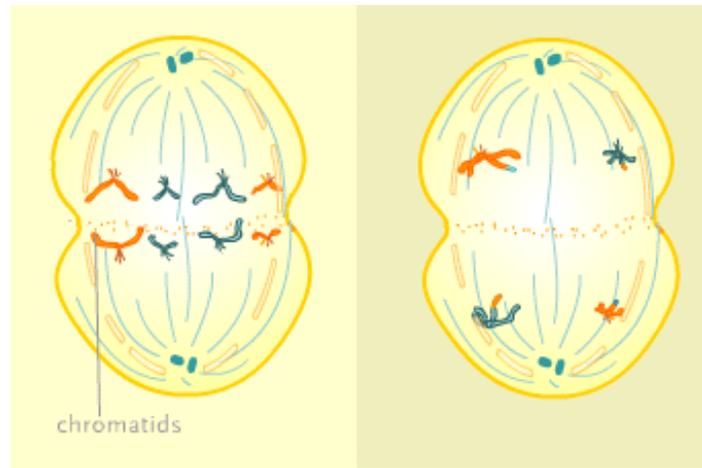
Prophase	Prophase I
• DNA scrunches into chromosomes	
• Nuclear membrane/nucleolus disappears	
• Centrioles/spindle fibers appear	
	<b>Difference:</b>



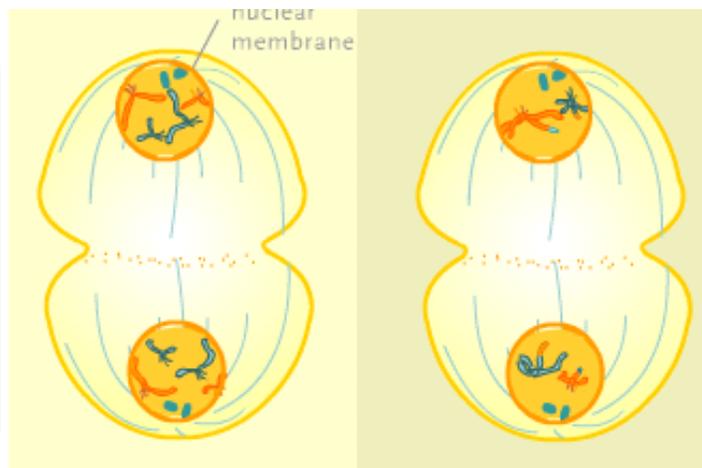


Metaphase	Metaphase I
<ul style="list-style-type: none"> <li>Chromosomes line up in the middle</li> </ul>	
	<b>Difference:</b>

Anaphase	Anaphase I
<ul style="list-style-type: none"> <li>APART: Chromatids split</li> </ul>	<ul style="list-style-type: none"> <li>APART:</li> <li></li> </ul>
	<ul style="list-style-type: none"> <li></li> </ul>

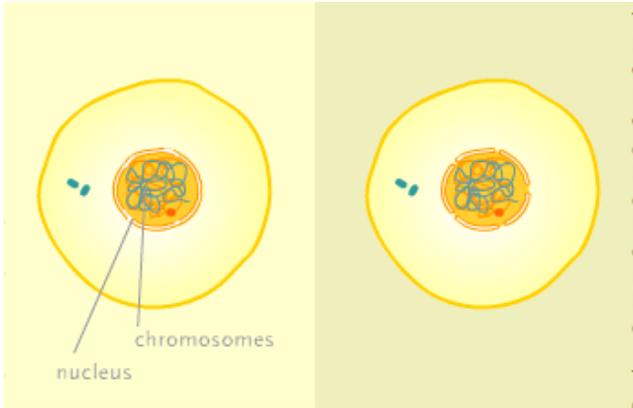


Telophase	Telophase I
<ul style="list-style-type: none"> <li>See TWO nuclei</li> </ul>	<ul style="list-style-type: none"> <li></li> </ul>
<ul style="list-style-type: none"> <li>Nuclear membrane/nucleolus returns</li> </ul>	
<ul style="list-style-type: none"> <li>DNA spreads out as chromatin</li> </ul>	
<ul style="list-style-type: none"> <li>Spindle/centrioles disappear</li> </ul>	

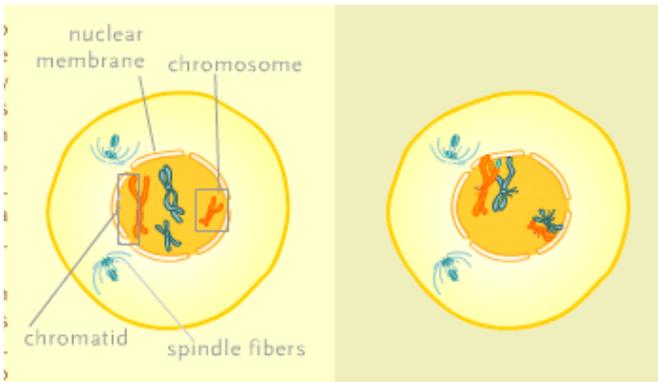


Cytokinesis	Cytokinesis I
<ul style="list-style-type: none"> <li>Cytoplasm splits into 2 cells</li> </ul>	



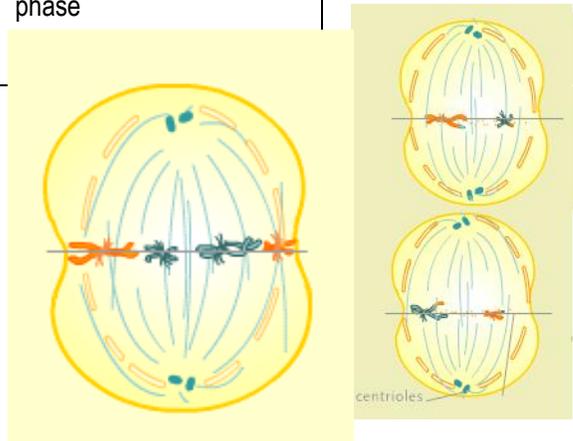


	Interphase II
<ul style="list-style-type: none"> <li>• DNA IS spread out as chromatin</li> <li>• Nuclear membrane/nucleolus visible</li> <li>• DNA is copied during S phase</li> </ul>	

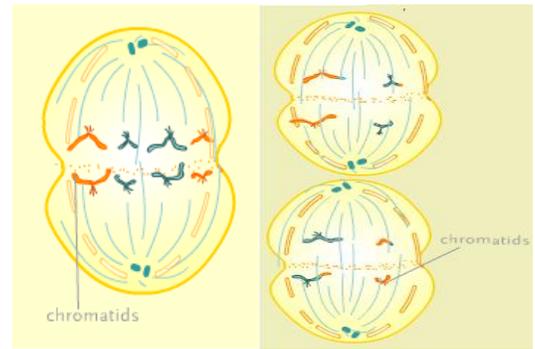


Prophase I	Prophase II
<ul style="list-style-type: none"> <li>• DNA IS spread out as chromatin</li> <li>• Nuclear membrane/nucleolus visible</li> <li>• DNA is copied during S phase</li> </ul>	

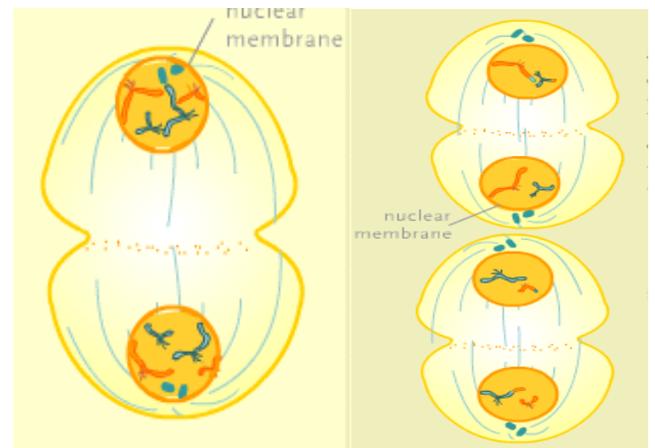
Metaphase	Metaphase II
<ul style="list-style-type: none"> <li>• Chromosomes line up in the middle</li> </ul>	



Anaphase	Anaphase II
<ul style="list-style-type: none"> <li>• APART: Chromatids split and move apart</li> </ul>	<ul style="list-style-type: none"> <li>•</li> </ul>



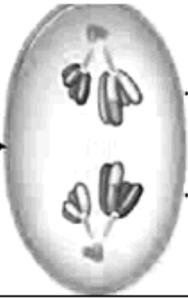
Telophase	Telophase II
<ul style="list-style-type: none"> <li>• See TWO nuclei</li> </ul>	<ul style="list-style-type: none"> <li>•</li> </ul>
<ul style="list-style-type: none"> <li>• Nuclear membrane/nucleolus returns</li> </ul>	
<ul style="list-style-type: none"> <li>• DNA spreads out as chromatin</li> </ul>	
<ul style="list-style-type: none"> <li>• Spindle/centrioles disappear</li> </ul>	



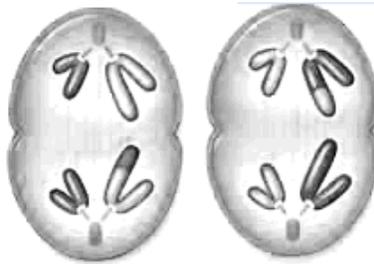
Cytokinesis	Cytokinesis I
<ul style="list-style-type: none"> <li>• Cytoplasm splits into 2 cells</li> </ul>	



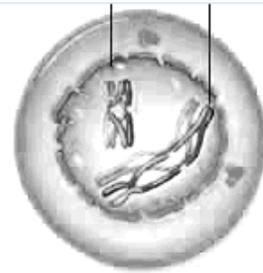
Name of Phase	Description
1.	Homologous chromosomes pair up and form tetrad
2.	Spindle fibers move homologous chromosomes to opposite sides
3.	Nuclear membrane reforms, cytoplasm divides, 4 daughter cells form
4.	Chromosomes line up along the equator, not in homologous pairs
5.	Crossing-over occurs
6.	Chromatids separate
7.	Homologs line up along the equator
8.	Cytoplasm divides, 2 daughter cells are formed



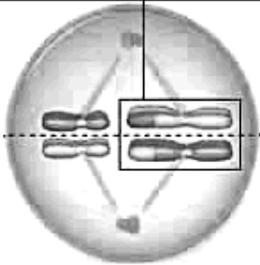
1.



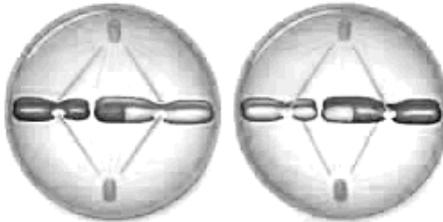
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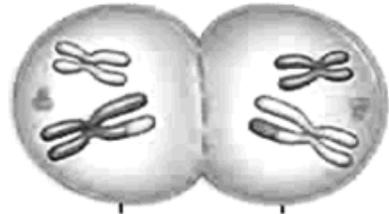
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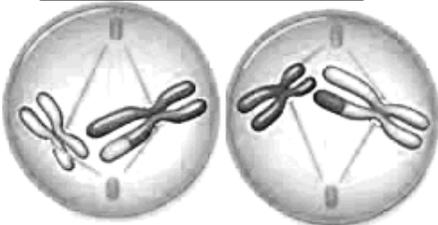
4.



5.



6.



7.



8.

- Prophase I
- Prophase II
- Metaphase I
- Metaphase II
- Anaphase I
- Anaphase II

- Telophase I
- Telophase II