



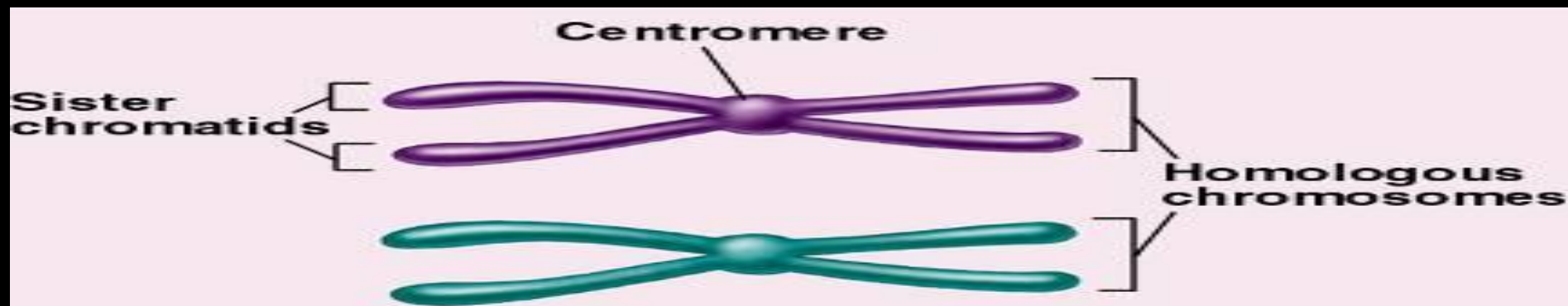
# ***MEIOSIS***

**Boarding Schools of Tatarstan R.F.**

- Cell division to form the **gametes**, sperm (male gamete) and egg (female gamete).
- Normal cells are **diploid**: 2 copies of every gene.
- Gametes are **haploid**: 1 copy of every gene
- Need to choose 1 copy of each gene randomly.

# CHROMOSOMES

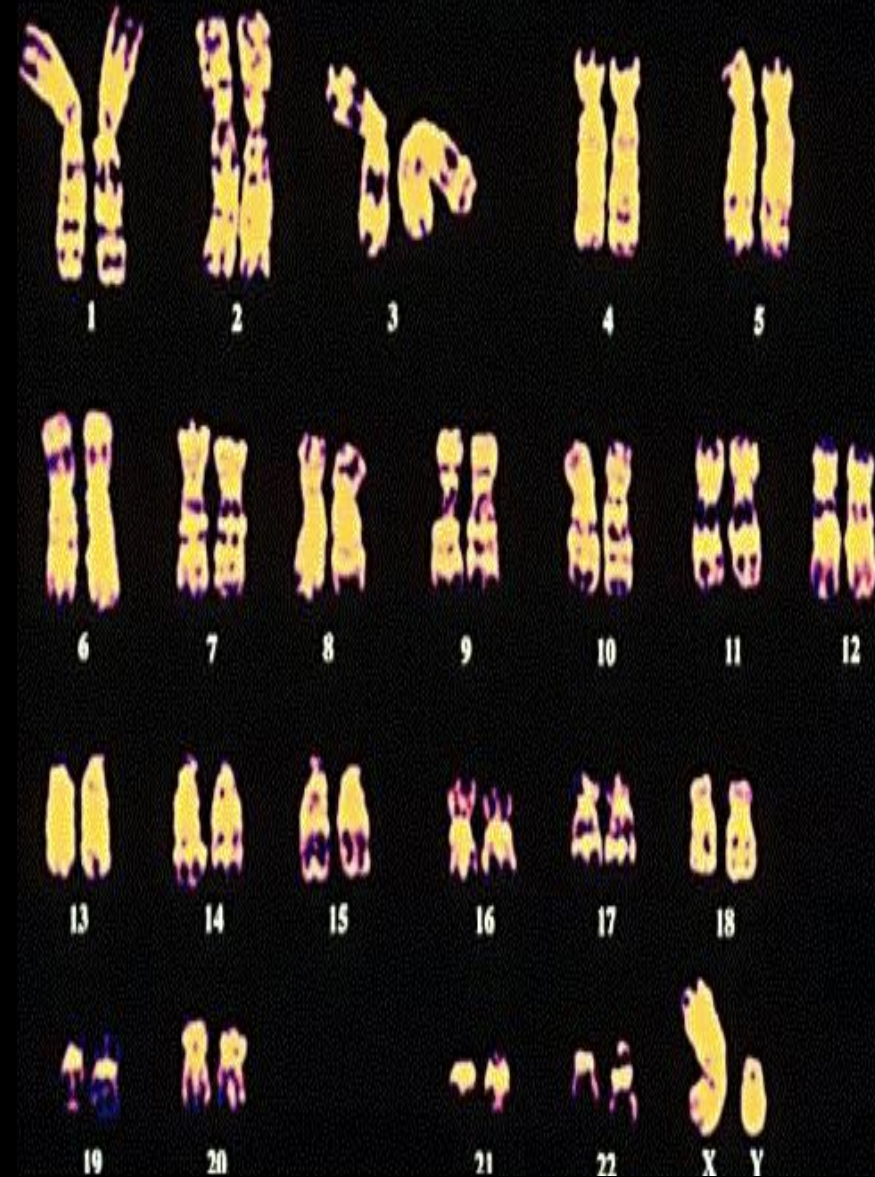
- Characters of living things are carried by means of a pair of chromosomes. One of them comes from father and other comes from mother.
- These pair of chromosomes is called **homologous chromosomes**.
- Homologous chromosomes carries similar characters in same order.



# CHROMOSOME

# Chromosome Number

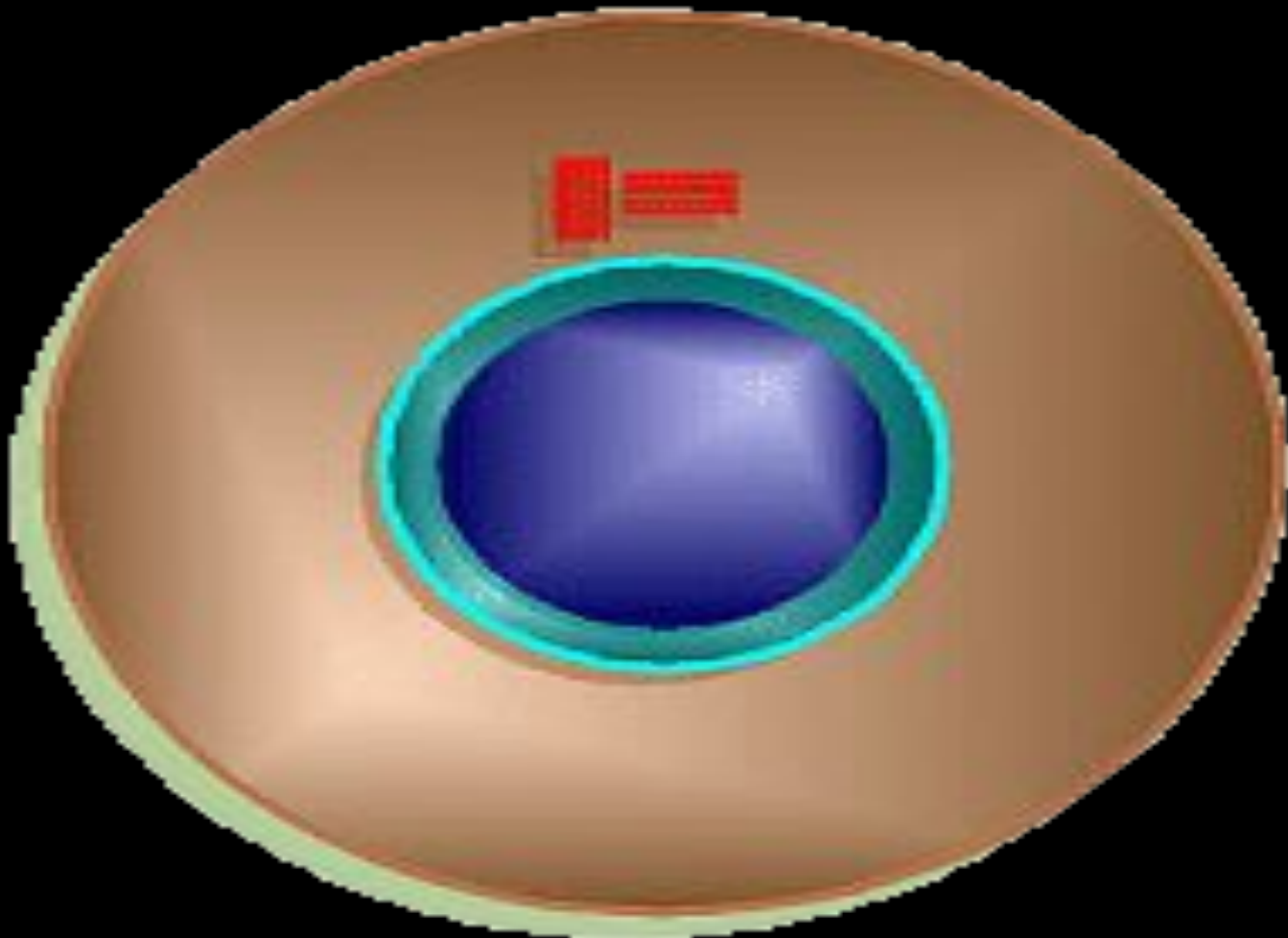
- **Homologous Chromosomes** are the sets of each pair
- 1 pair from mother
- 1 pair from father
- Humans= 23 pairs or 46 total chromosome





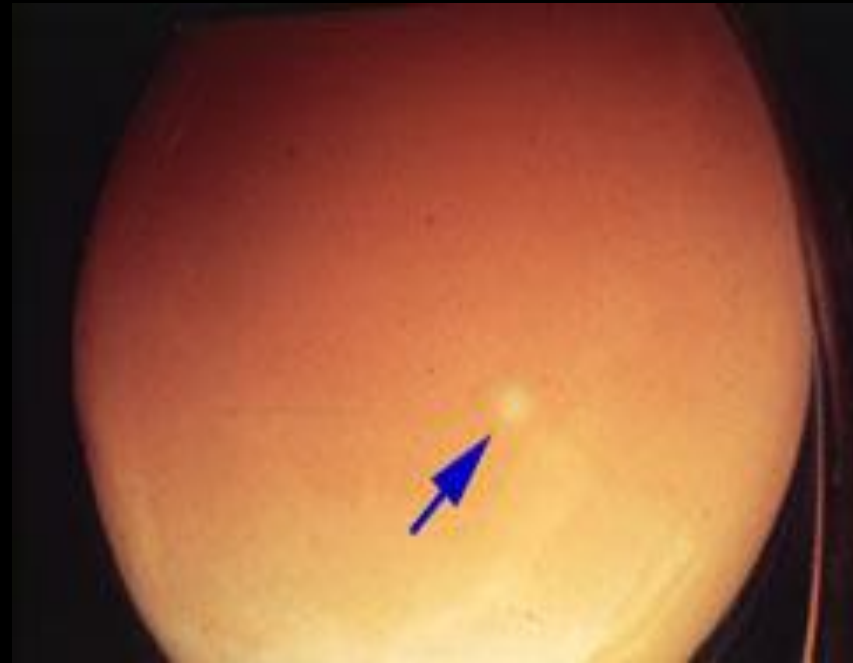
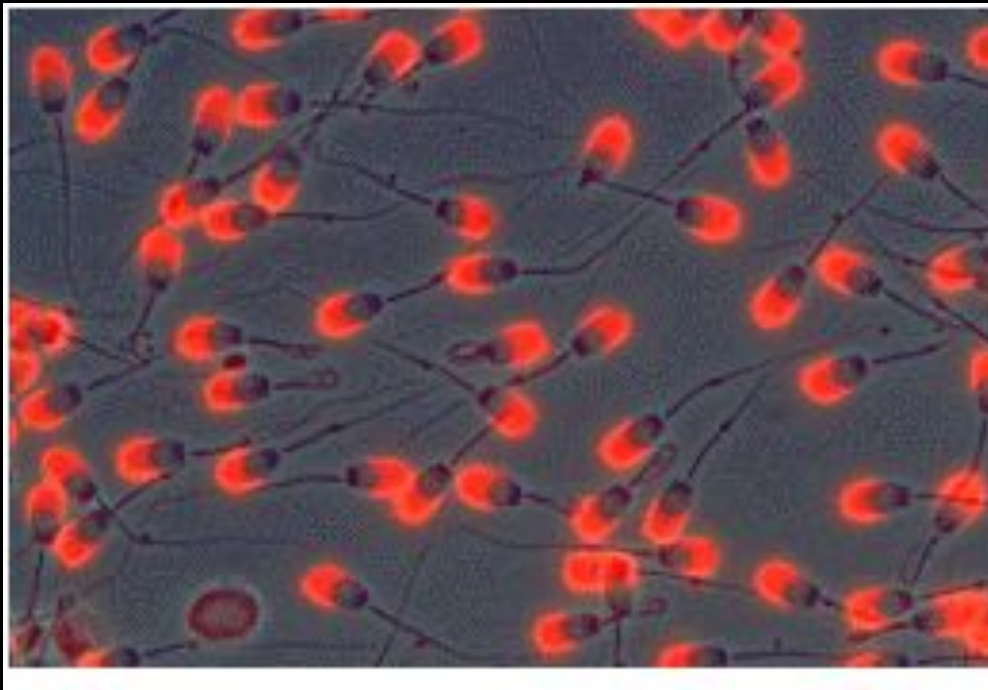


- **Meiosis** is a special cell division which takes place in reproductive organs such as gametes or spores of living things .





- **Meiosis needs two sex cells**
  - a. **Sperm: male sex cell**
  - b. **Egg: female sex cell**





**MIEIOSIS**

# Meiosis I

$2n$



$n$

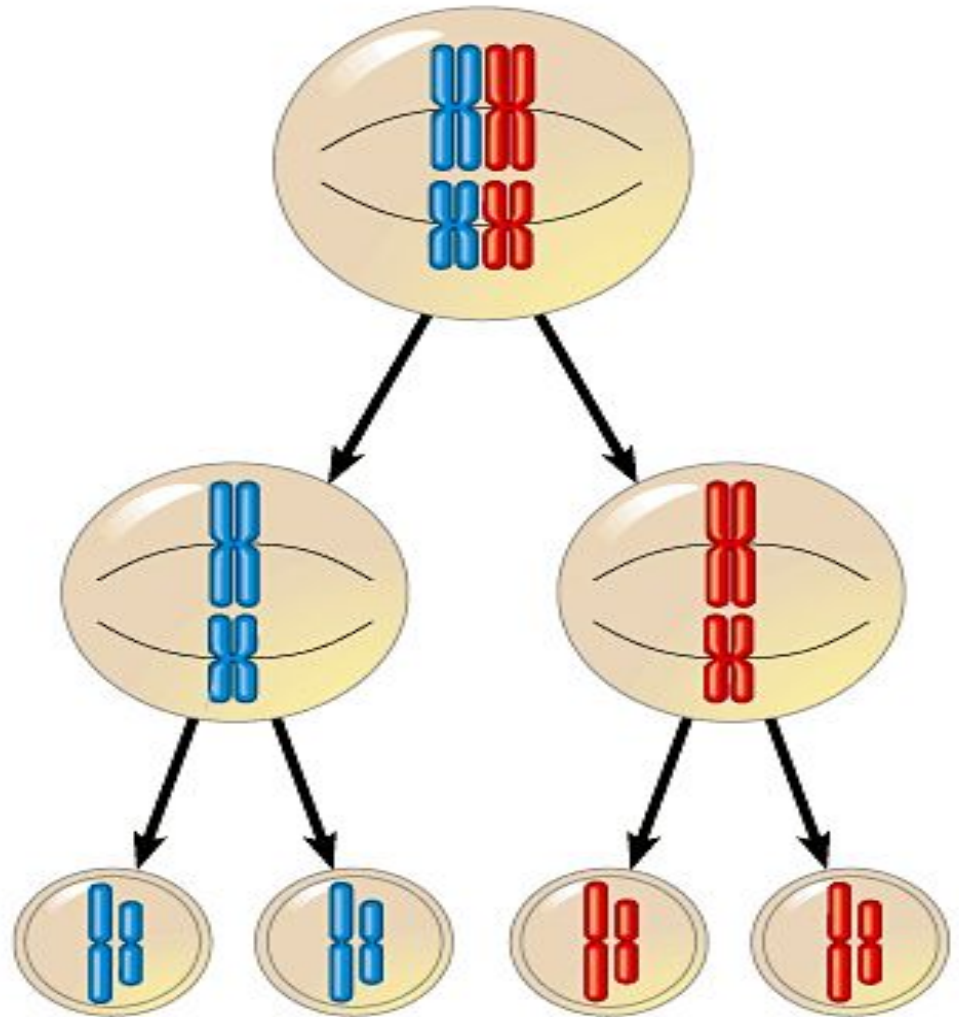
$n$

# STAGES OF MEIOSIS

- The Meiosis consists of two cell divisions:

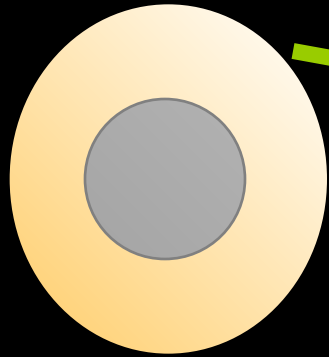
–MEIOSIS-I

–MEIOSIS-II

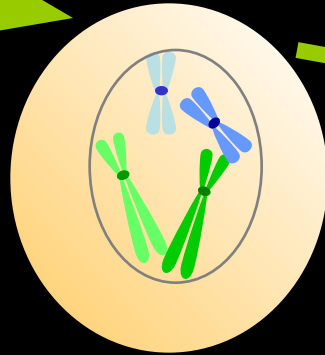


# Stages Of Meiosis:

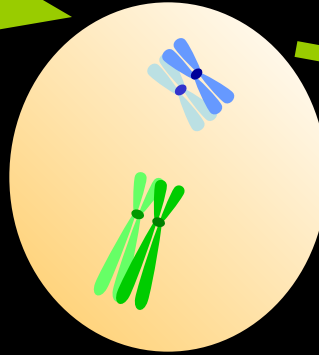
Mother cell



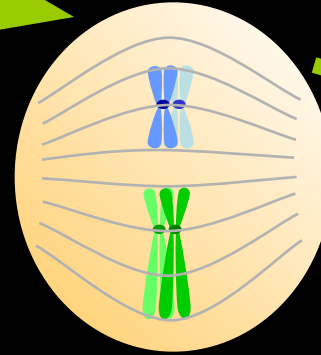
Interphase



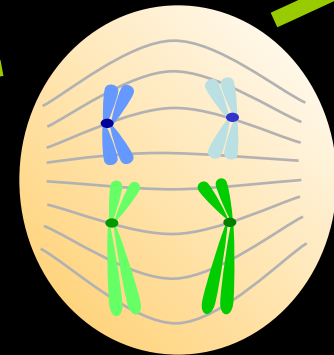
Prophase I:  
Condensing  
Chromosomes



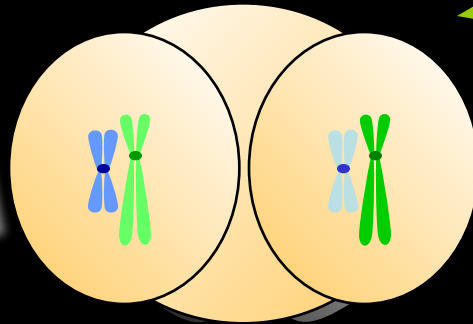
Prophase I:  
Tetrad formation/  
crossing over



Metaphase I

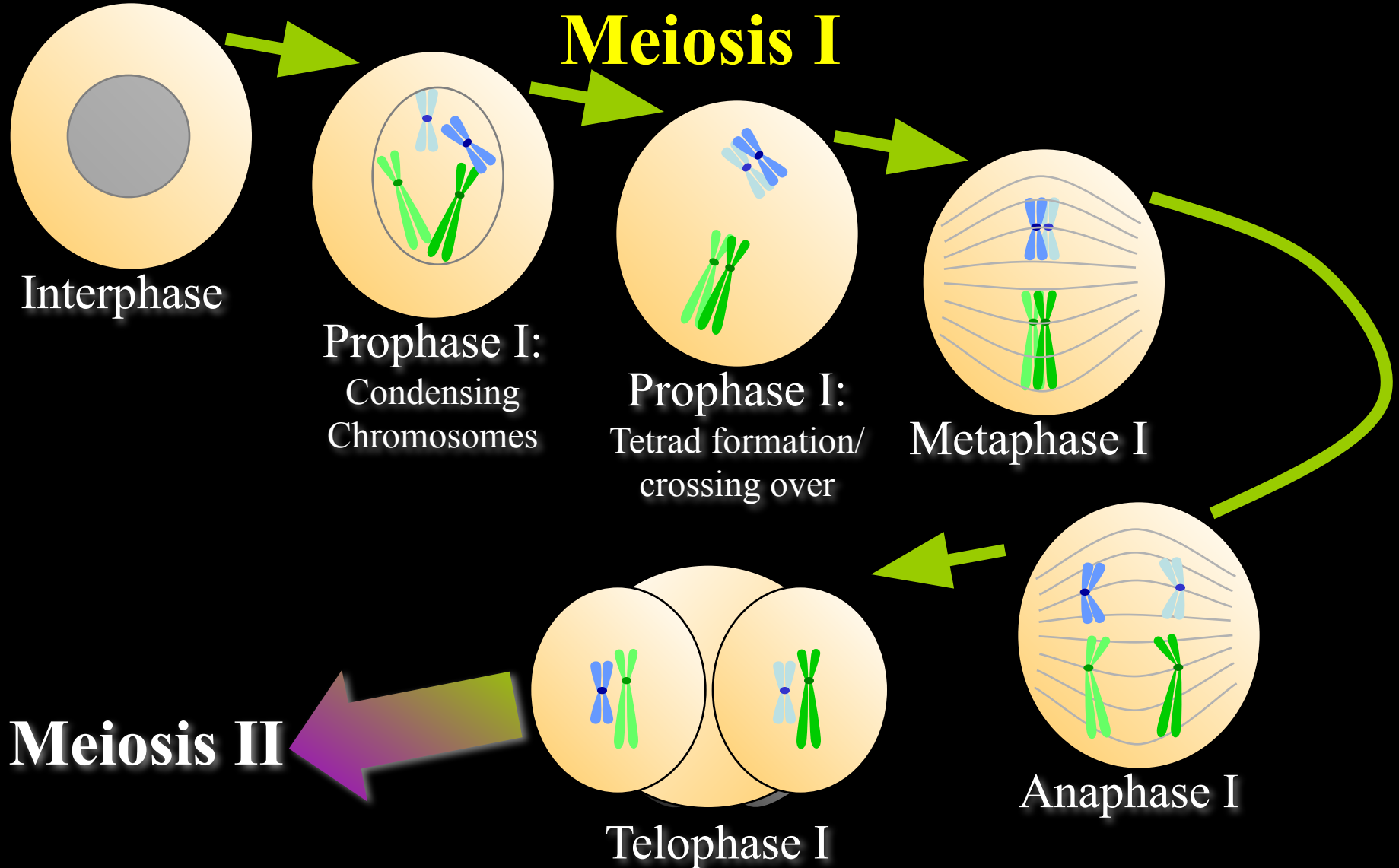


Anaphase I



Telophase I

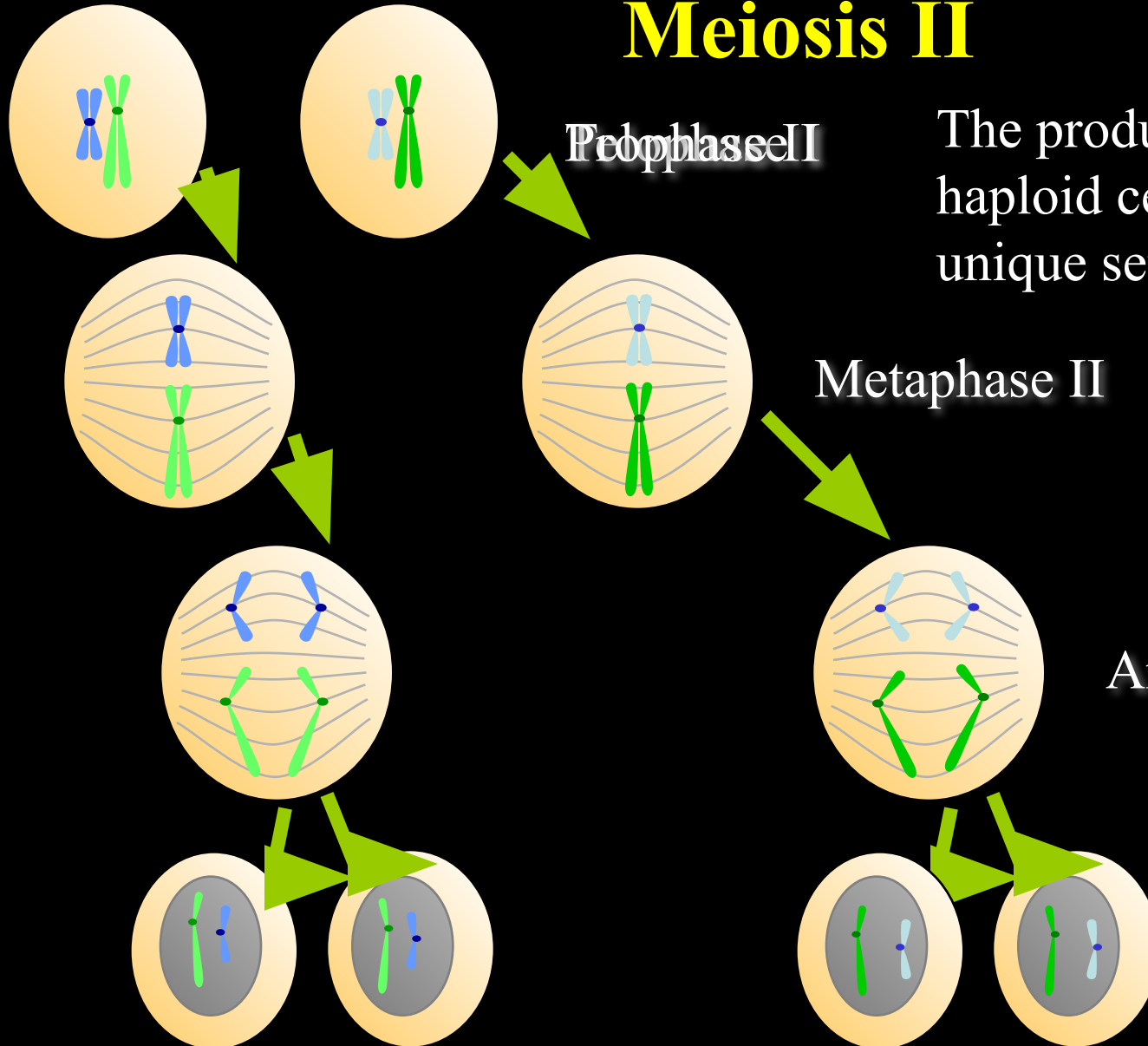
Meiosis II





# Stages Of Meiosis:

## Meiosis II



Prophase II

The products of meiosis are 4 haploid cells each with a unique set of chromosomes.

Metaphase II

The products of mitosis are 2 diploid cells with identical chromosomes.

Anaphase II

Telophase II

# **MEIOSIS-I**

- **At the start of meiosis, cells have the diploid number of chromosomes.**
- **There is interphase before start the first meiotic division.**
- **DNA is replicated in interphase.**

**INTERPHASE**

# PROPHASE-I

- Spindle fibers are formed by centrioles.
- Nuclear membrane and nucleolus disappear.
- DNA are shortened and thickened and to form chromosomes.
- Each chromosome lines up exactly with its homologous chromosome.
- Homologous chromosomes attach to their pairs and tetrads are formed.

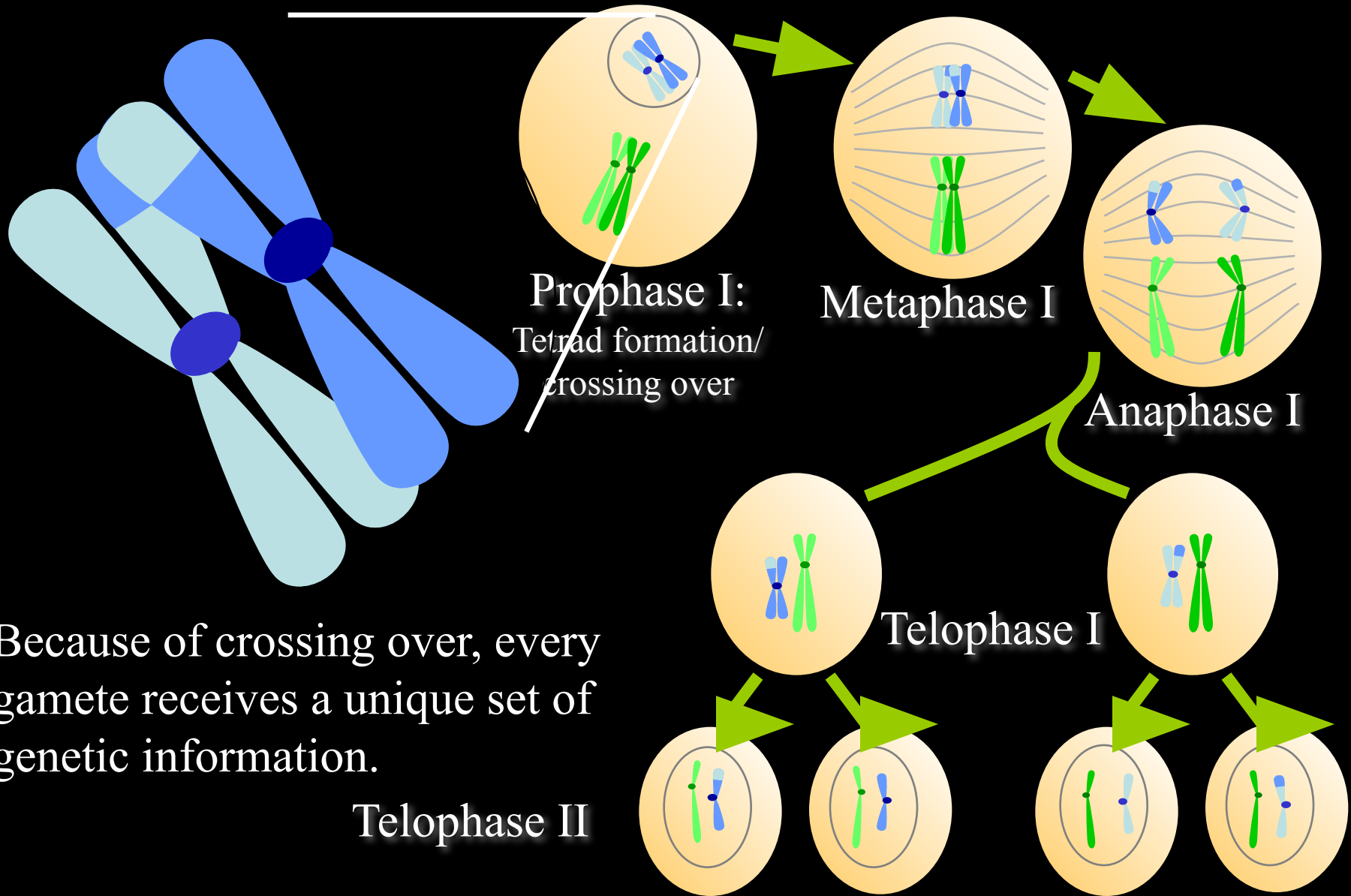
# PROPHASE 1

# CROSSING-OVER

- Pairs of homologous chromosomes forms the **TETRADS**.
- The gen exchange between chromatids of homologous chromosomes pairs is called **crossing-over**.
- Crossing-over provide the variety of species.



# Crossing Over



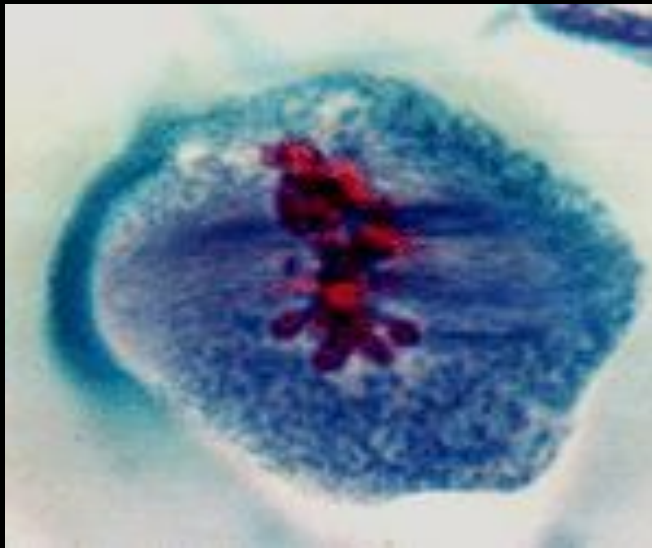
Because of crossing over, every gamete receives a unique set of genetic information.

Telophase II

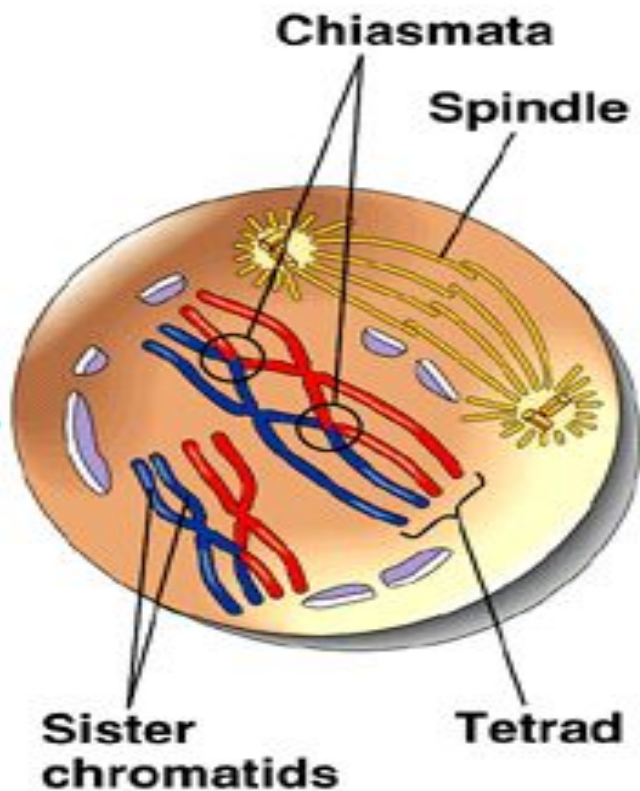
**CROSSING-OVER**

**CROSSING-OVER**

# METAPHASE-I



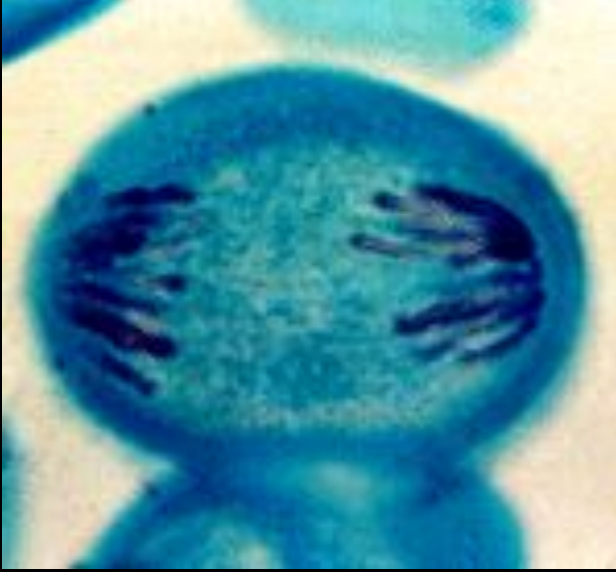
- Homologous chromosomes pairs line up on the equator.
- The chromosomes attach to the spindle fibers at their centromers.



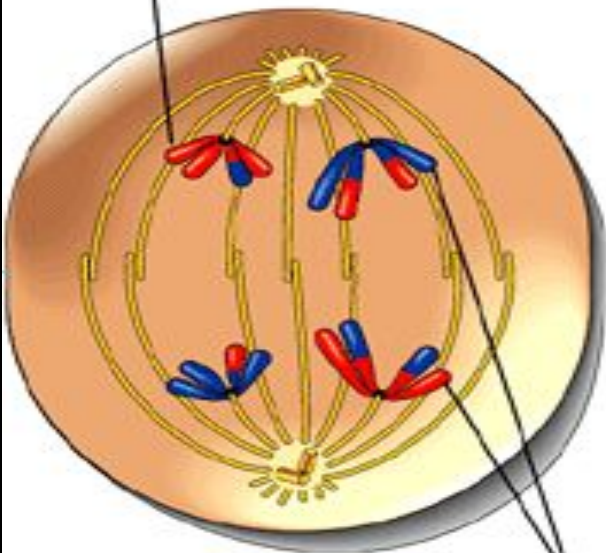
# METAPHASE 1

# ANAPHASE-I

- The homologous chromosomes of each tetrad separate from each other.
- They move to opposite poles of the cell.
- The set of chromosomes around each pole is haploid.



Sister chromatids remain attached



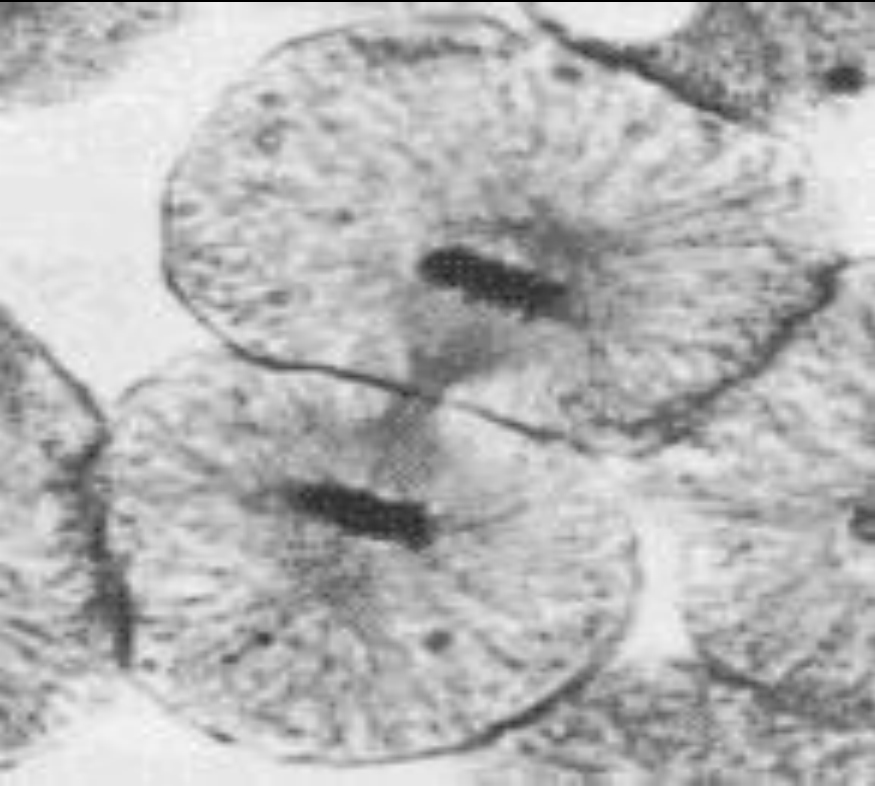
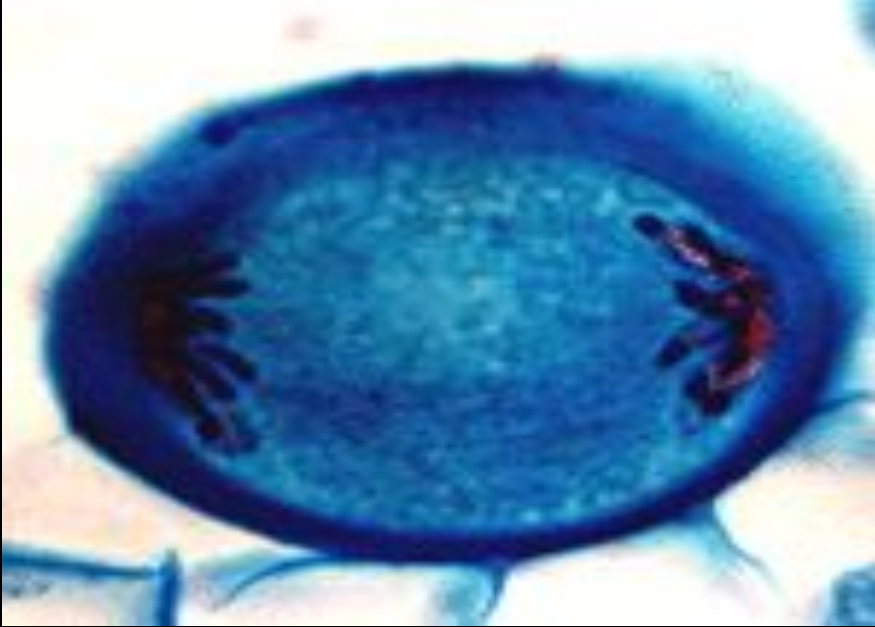
Homologous chromosomes separate



# ANAPHASE 1

# TELOPHASE-I

- Nuclear membranes are formed. The cytoplasm divides forming two daughter cells.



# TELOPHASE 1

**The interphase between meiosis I and meiosis II is called **interkinesis**.**

- **How does interkinesis differ from the mitotic interphase in terms of S phase?**
- **Interkinesis has no S phase**
  - After meiosis I, each **homologous chromosomes separate.**
  - After meiosis II, each **sister chromatids separate.**

## **PROPHASE-II**

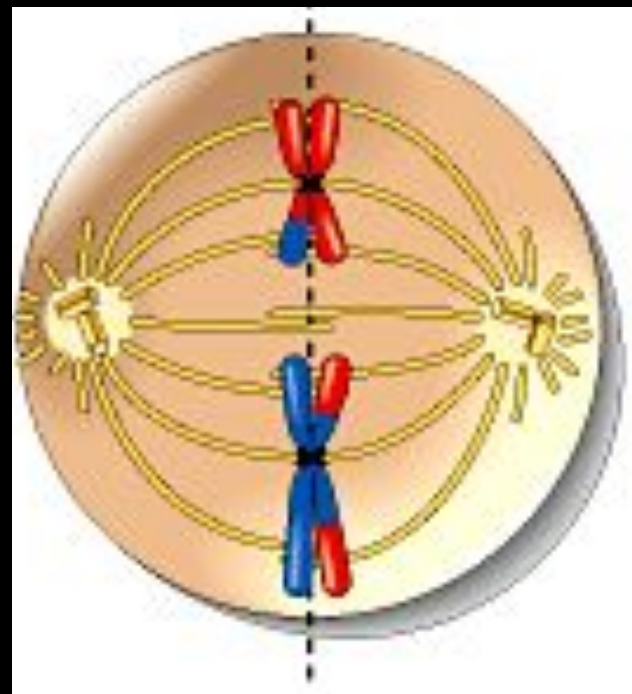
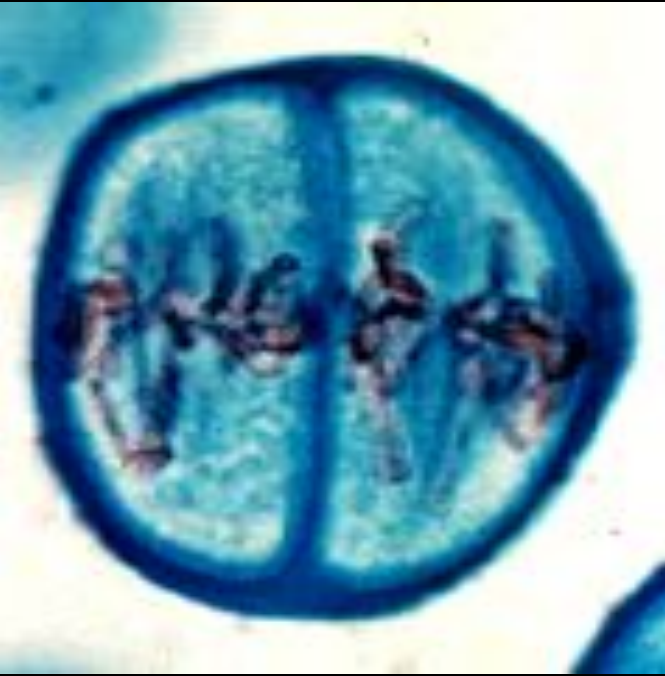
- **Each of the daughter cells forms a spindle and the double stranded.**
- **Chromosomes move toward the middle of the cell.**



# PROPHASE 2

# METAPHASE-II

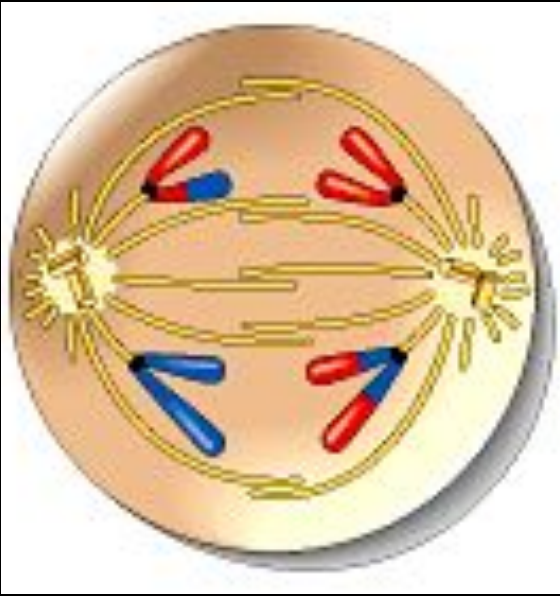
- The chromosomes become attached to the spindle fibers at their centromeres.
- And the chromosomes line up on the equator.



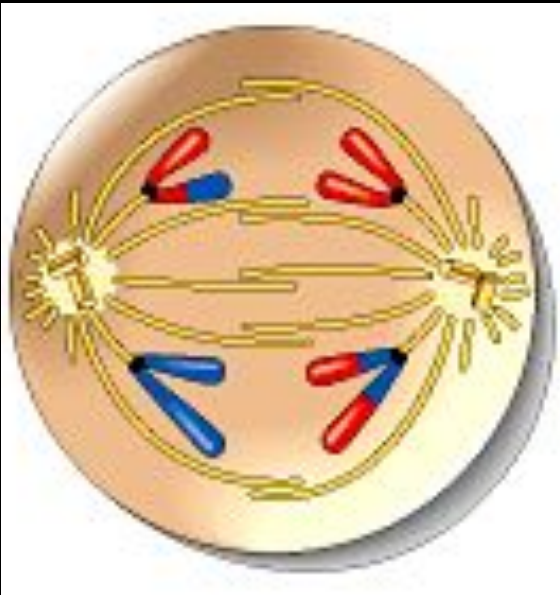
# METAPHASE 2



# ANAPHASE-II



- The Centromers divide and the sister chromatids separate.

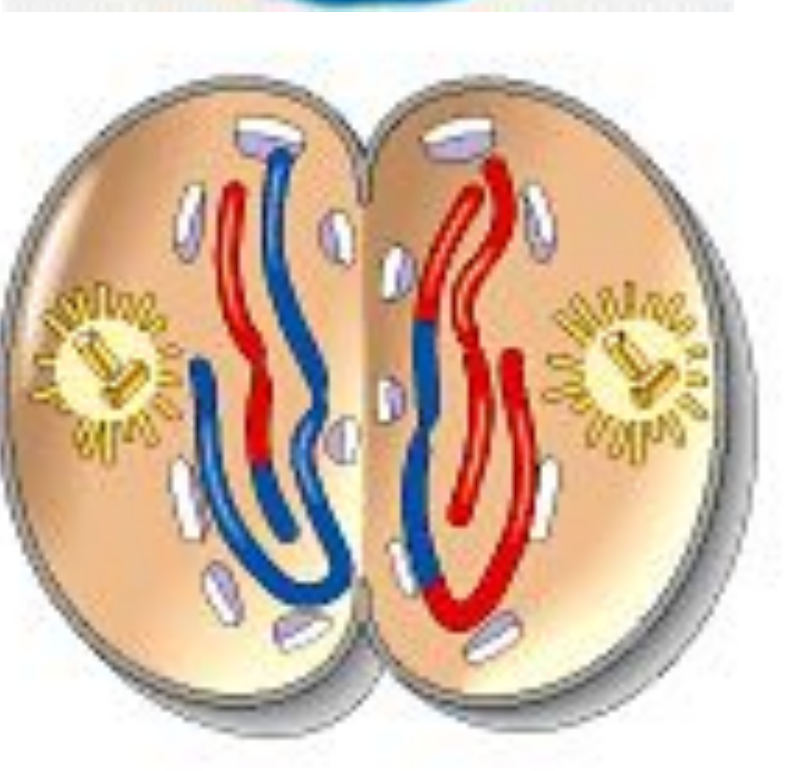


- The chromatids move toward the opposite poles of the cells.

# ANAPHASE 2

# TELOPHASE-II

- Both daughter cells divide forming 4 haploid cells.
- The nuclear membrane reforms.



# TELOPHASE 2

**ACTIVITY**

**ACTIVITY**

**ACTIVITY**

**ACTIVITY**





# SUMMARY