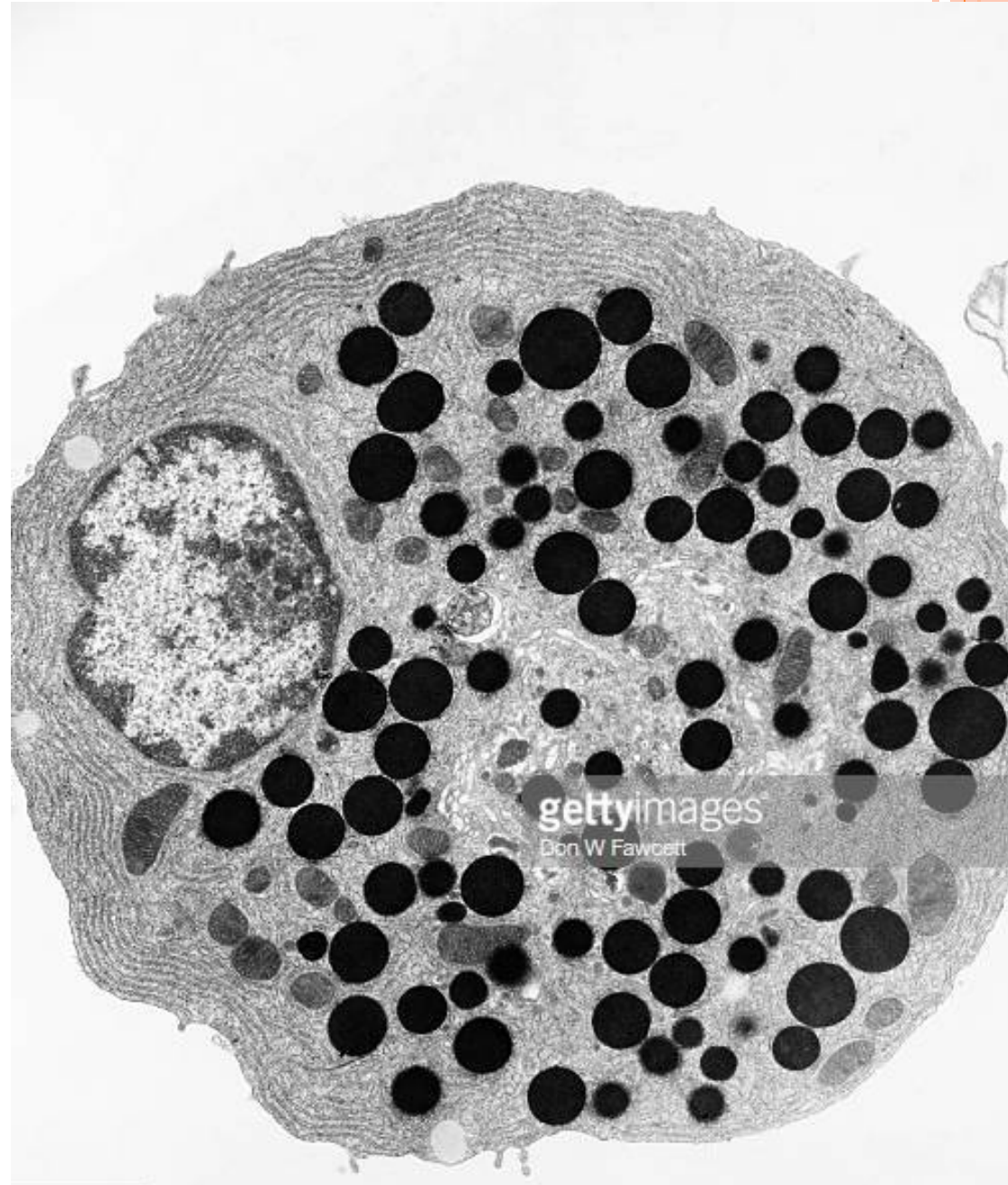
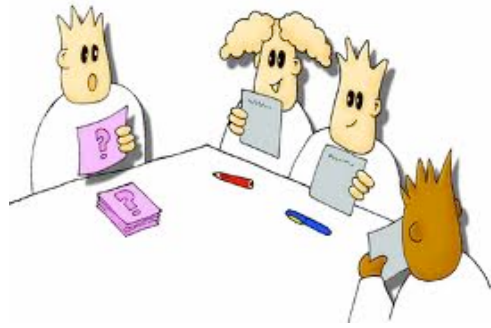


## Practice

Study the micrograph with your desk group.

- Identify the organelles visible
- Deduce the overall function of this cell

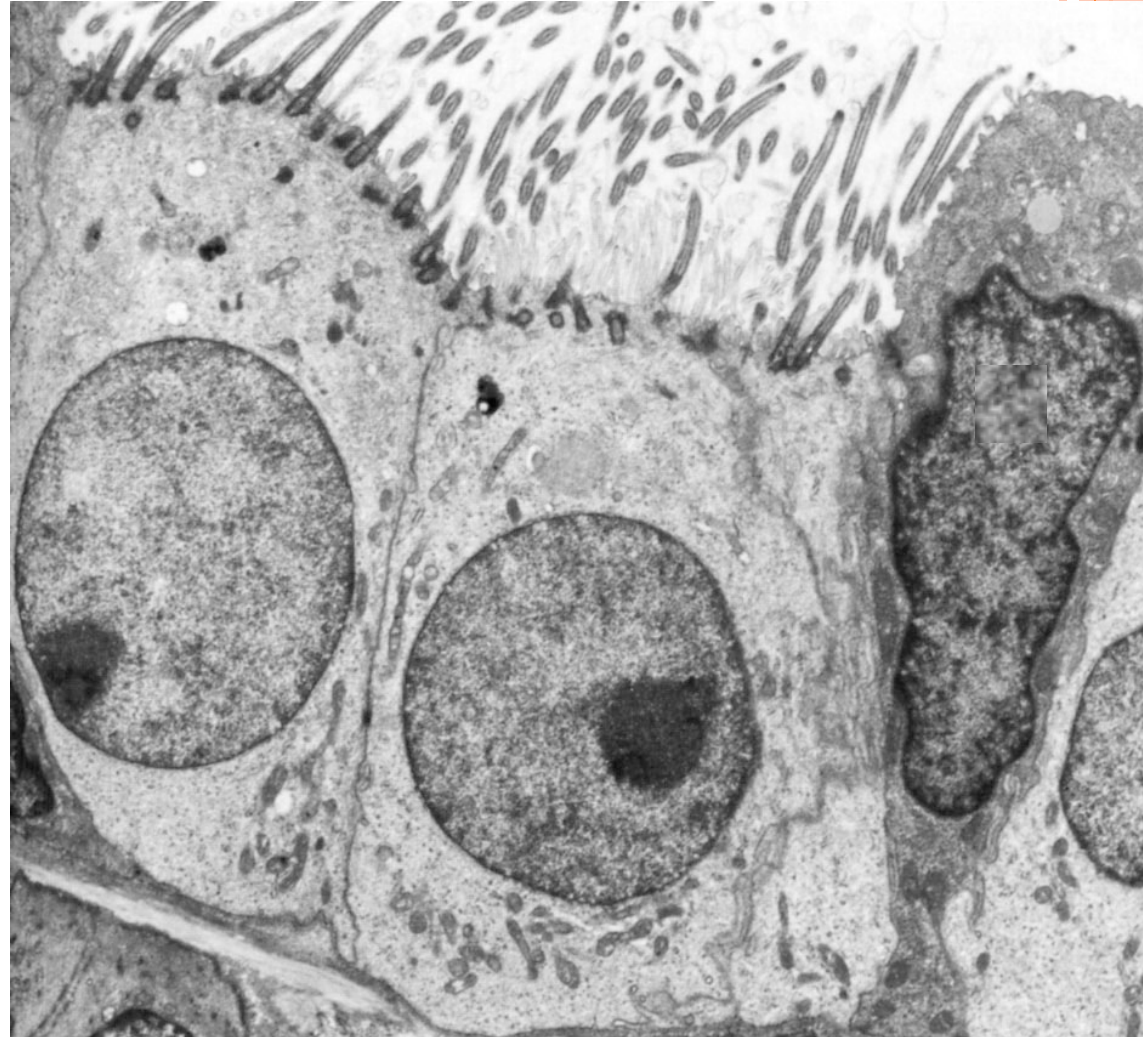




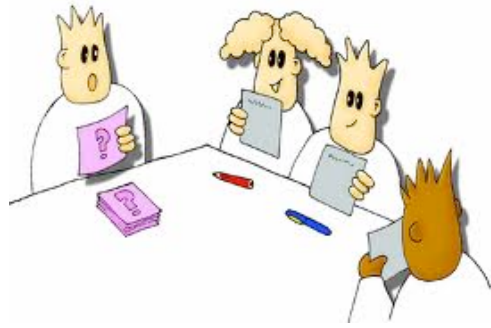
## Practice

Study the micrograph with your desk group.

- Identify the organelles visible
- Deduce the overall function of this cell





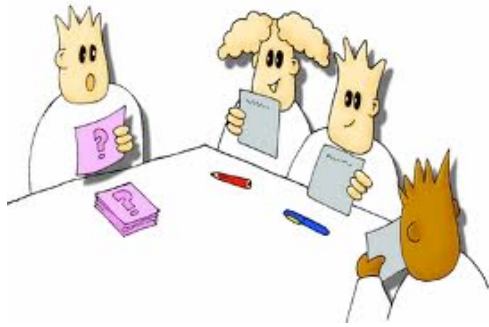


## Practice

Study the micrograph with your desk group.

- Identify the organelles visible
- Deduce the overall function of this cell





Explain is spontaneous generation?

State which of the following supported the idea spontaneous generation?

Redi?

Pasteur?

Spallanzani?

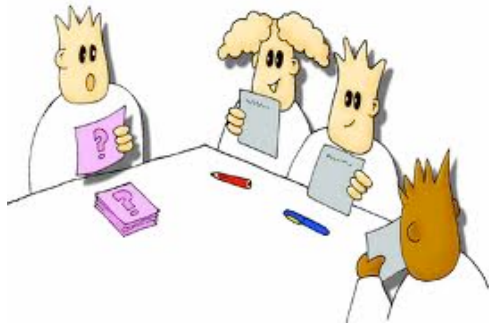
Paracelsus?

Aristotle?

Miller?



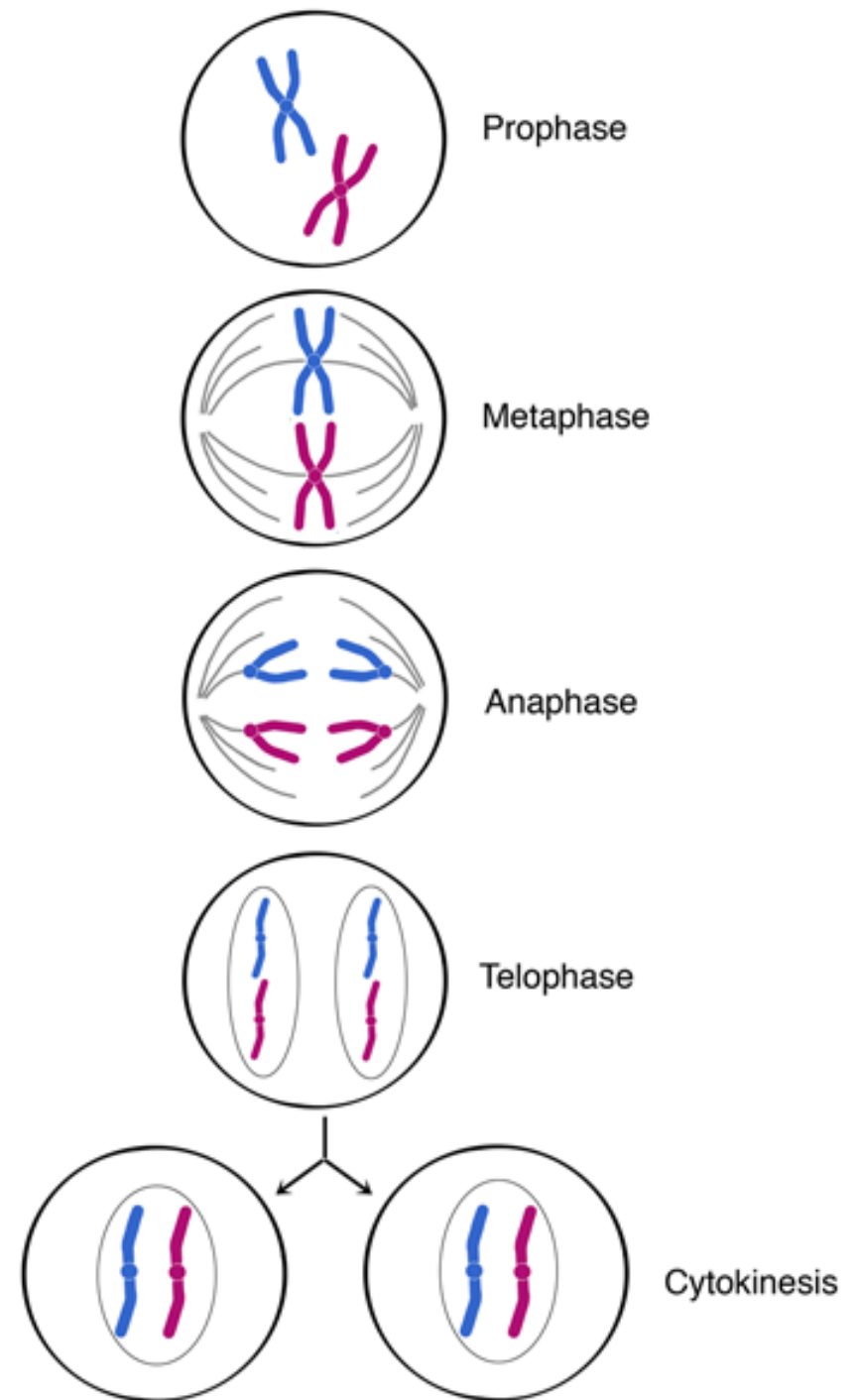


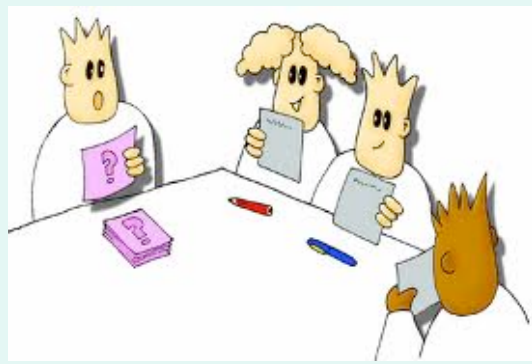


List points of the origin of eukaryotic cell development.



# Mitosis and Cell Division

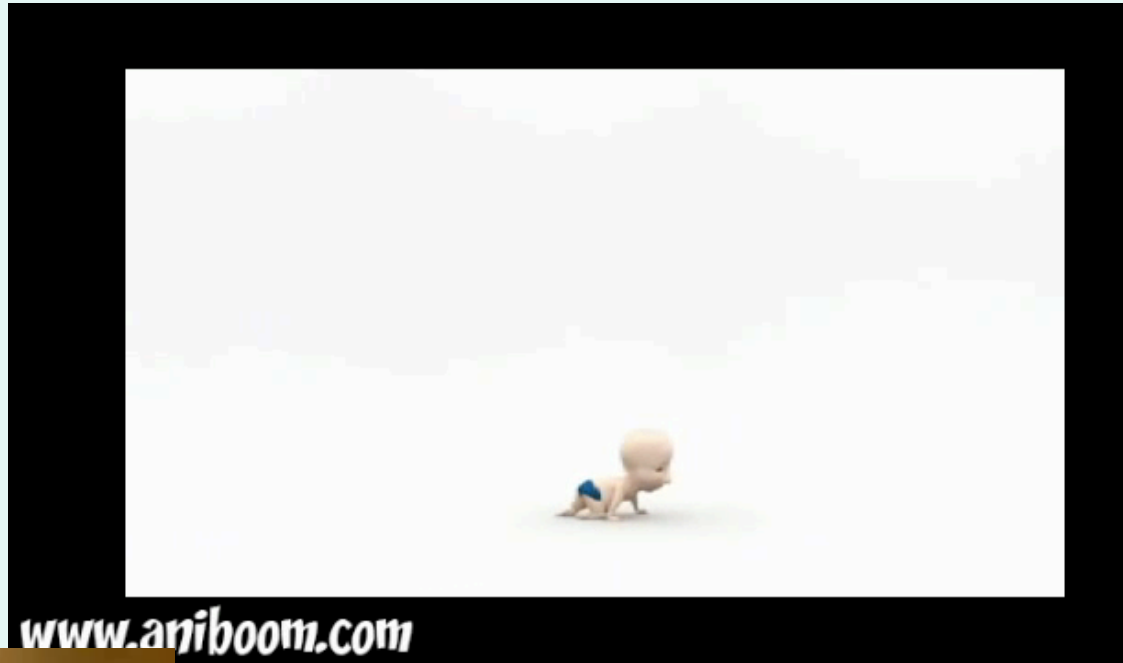




*Mitosis... what do you remember?*

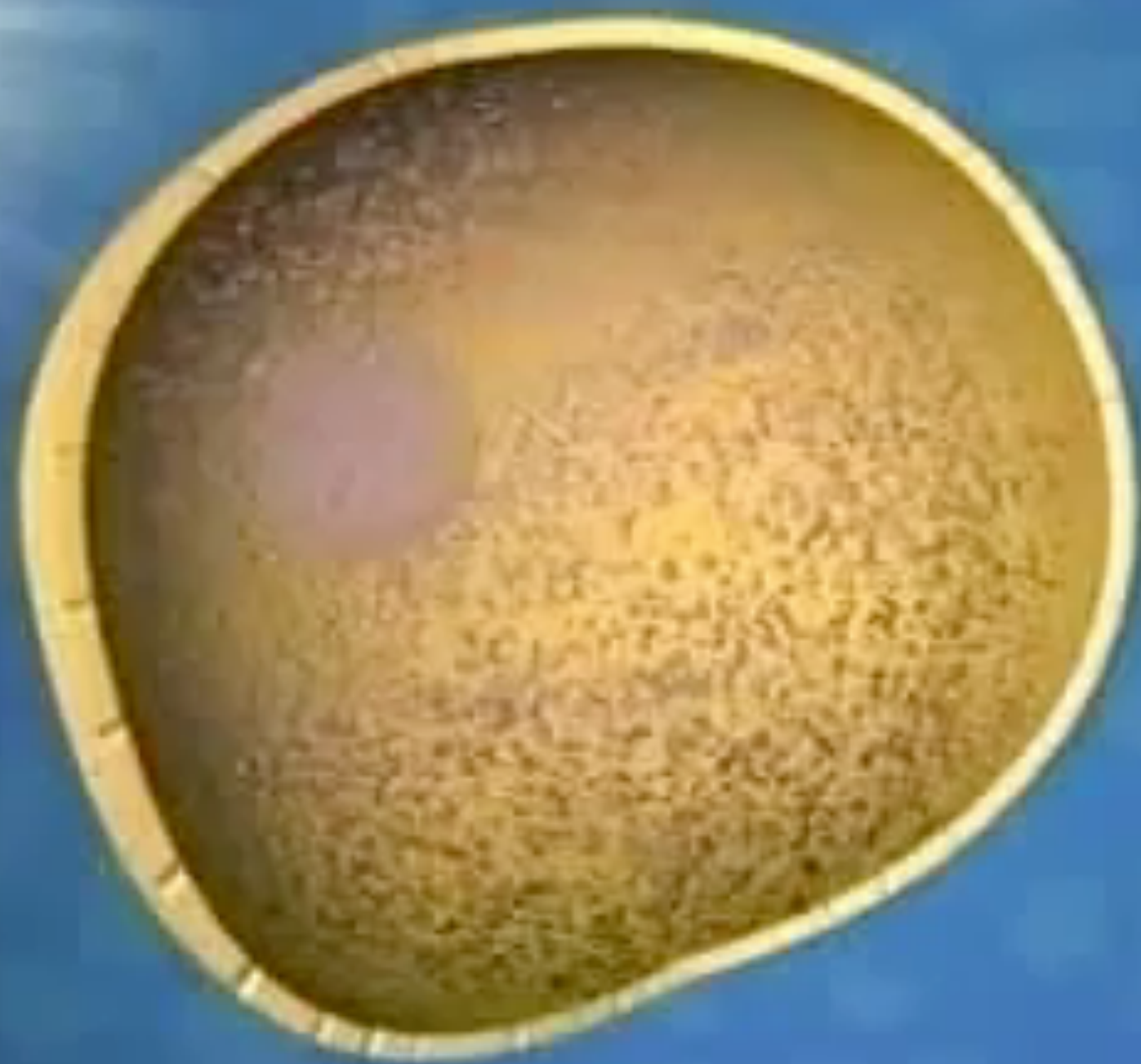


- Why is mitosis necessary?



# Mitosis = Cellular Division





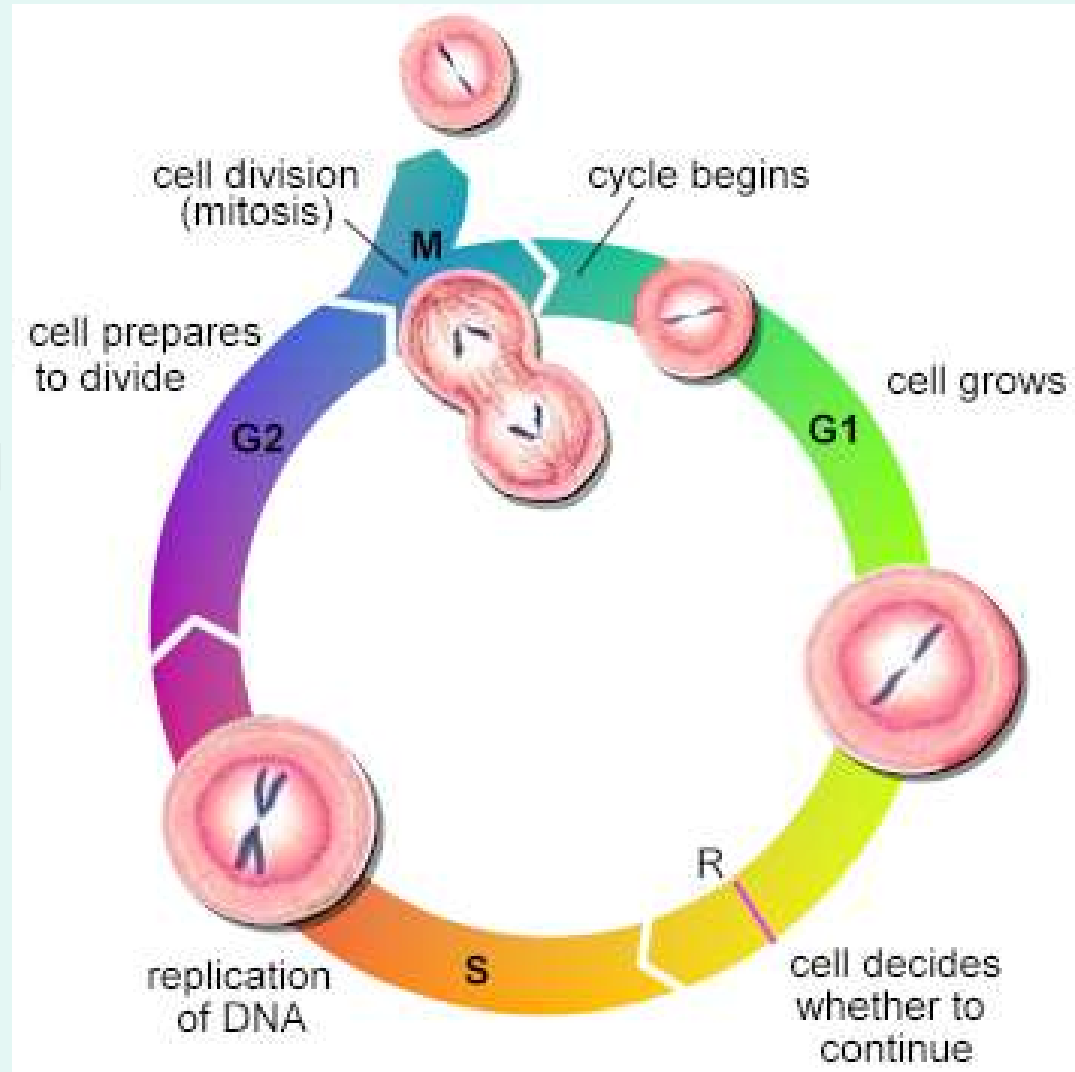


# INTERPHASE

## G1 Stage (also known as interphase)

The cell grows rapidly and has high metabolic activity, mitochondria increase. In plants, chloroplast increase in #

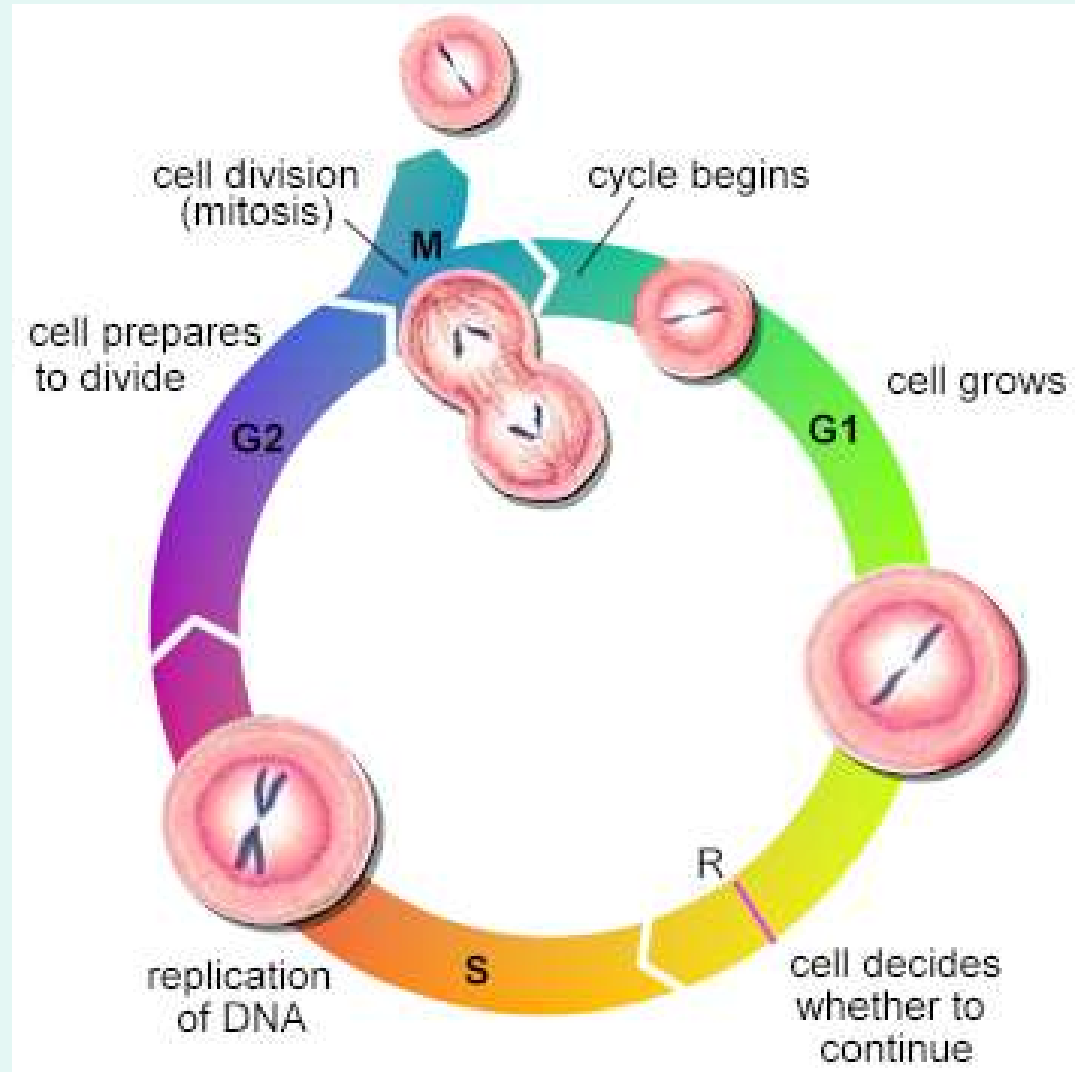
A Cell may never divide-  
Stay in G1 and enters G<sub>0</sub>  
or  
continues on to divide



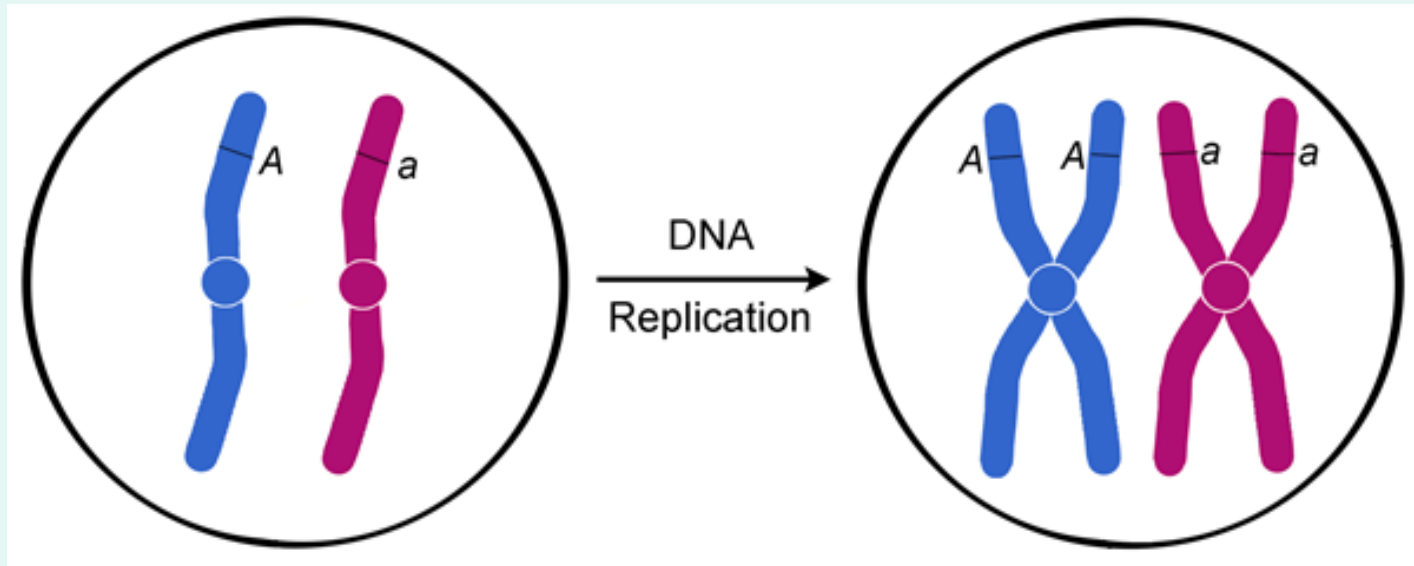
# INTERPHASE

## S1 phase (synthesis)

- DNA is replicated
- Centrioles begin to replicate



# What Does DNA Replication during S phase of interphase look like?



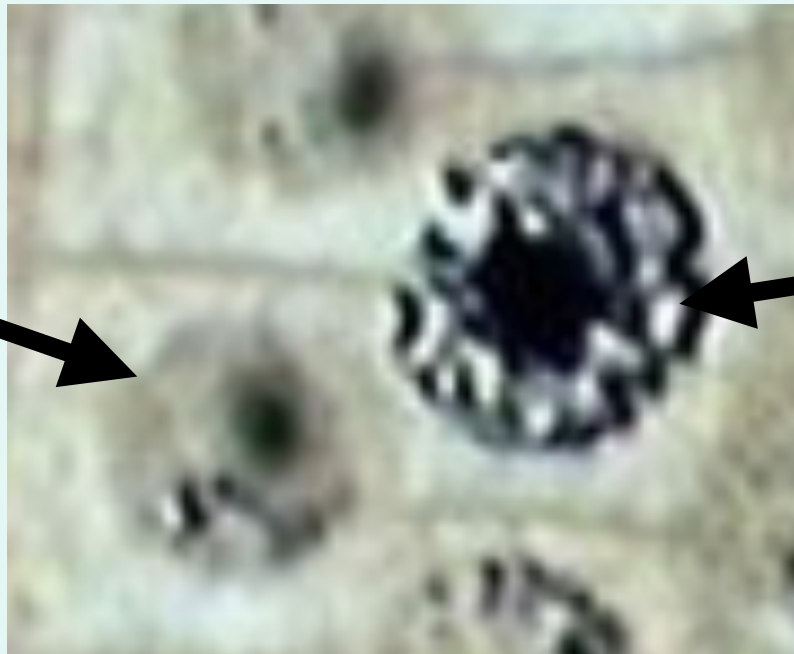
Two homologous chromosomes

Two homologous chromosomes and their identical copies joined. (called chromatids)



- Chromatin - Uncoiled DNA that is not visible under a compound light microscope (in interphase)
- Chromosomes- the coiled version of DNA that becomes visible during prophase of mitosis

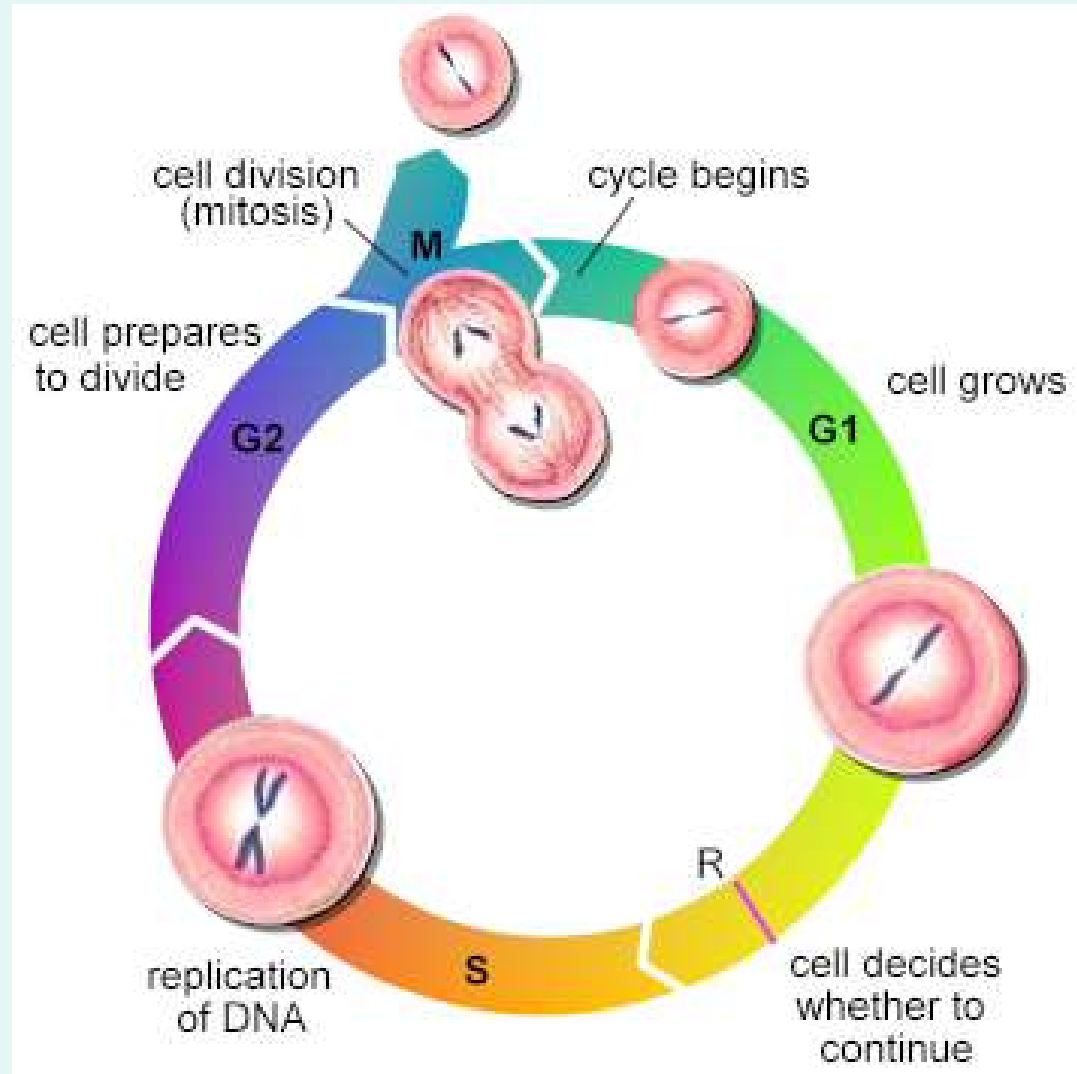
Interphase  
(Chromatin)



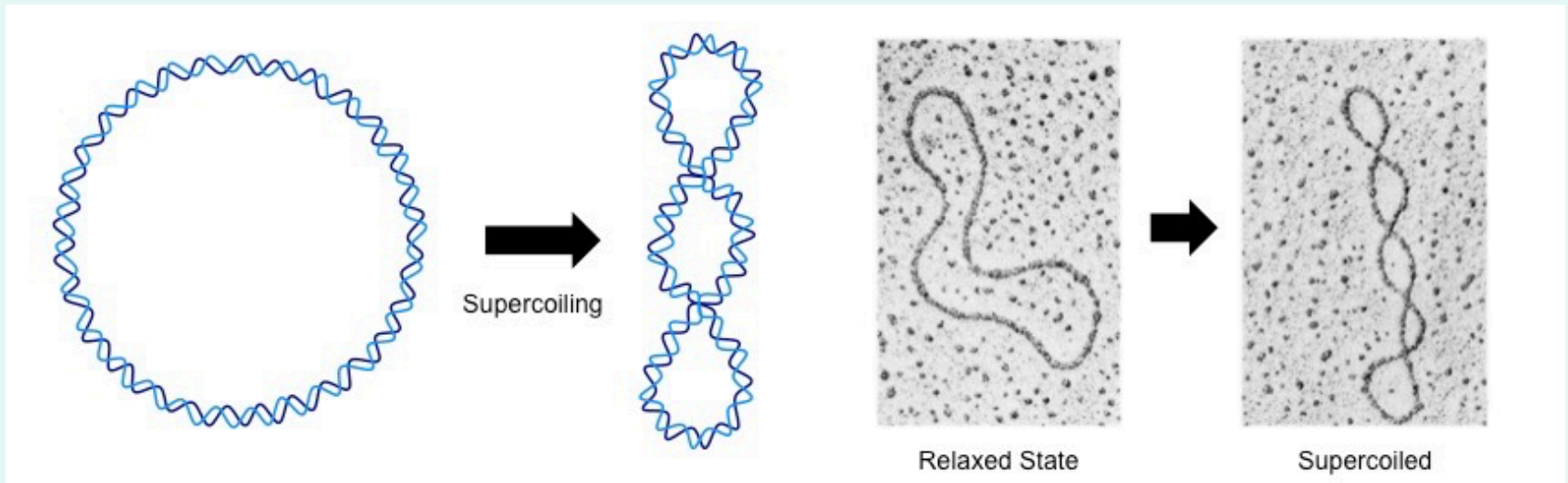
Prophase  
(Chromosomes)

# INTERPHASE

**G2- Cells continues to prepare for division**

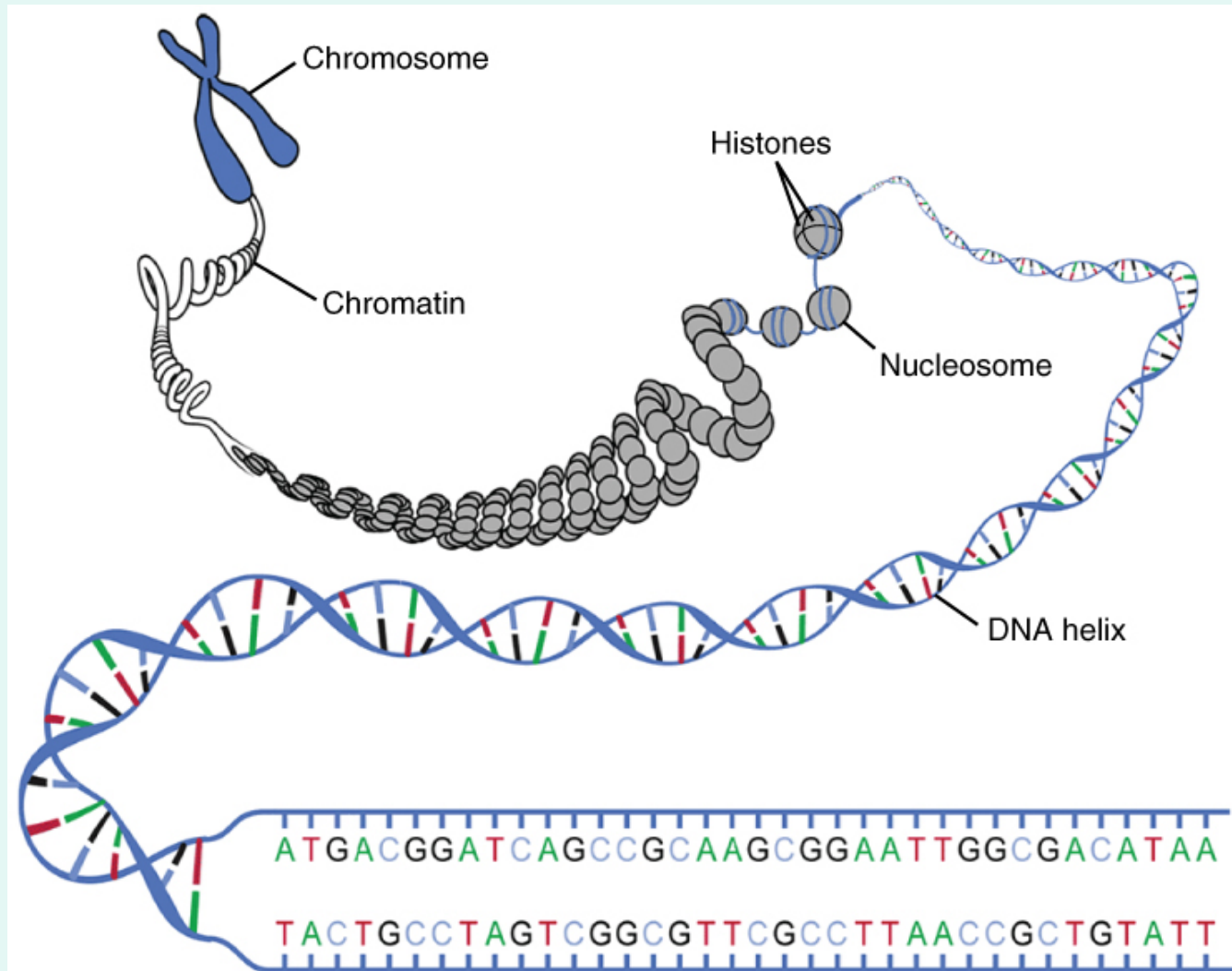


# Supercoiling of DNA into Prokaryotes



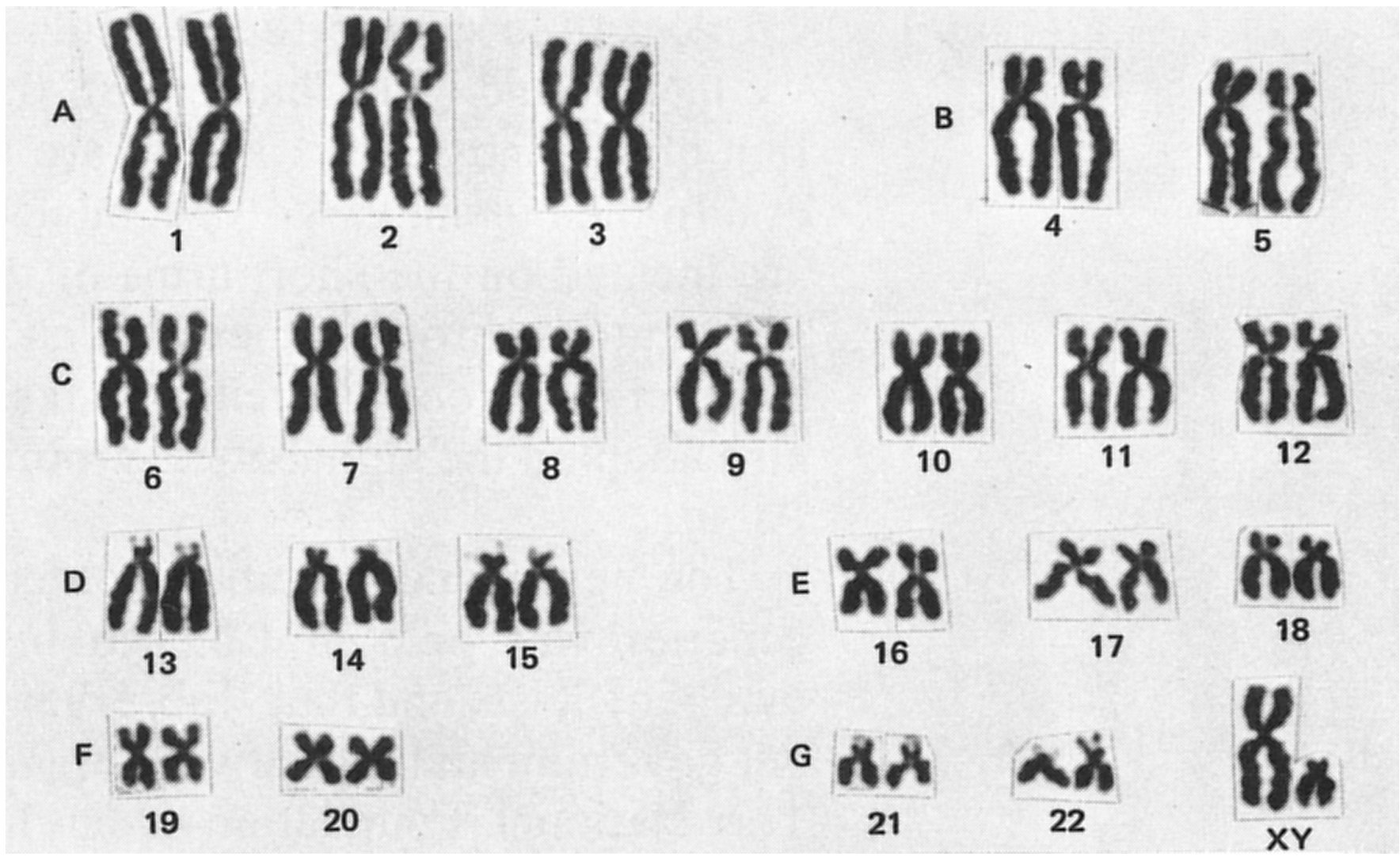


# Supercoiling of DNA leading into Prophase in Eukaryotes





1. What is the advantage to supercoiling?
2. Why might you think that simple supercoiling acceptable for prokaryotic cells, but not eukaryotic cells?



- Which ones represent homologous chromosomes? Which are sister chromatids? Explain.

**a**



**b**

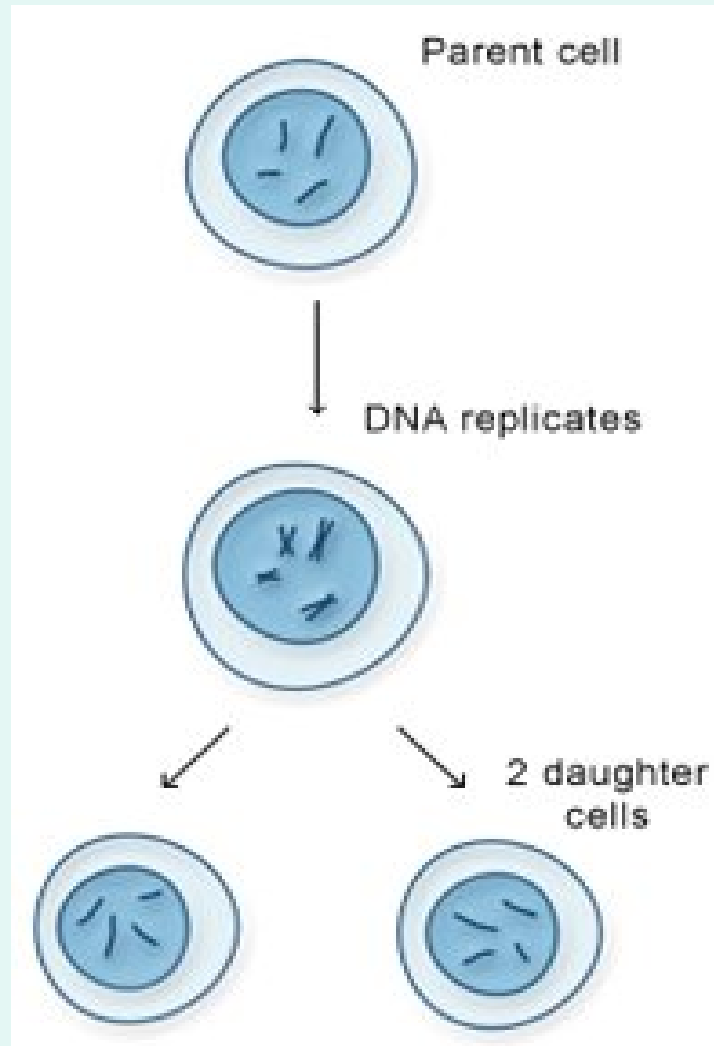


- Do body cells all undergo mitosis at the same time?

cell type	turnover time
small intestine epithelium	2-4 days
stomach	2-9 days
blood Neutrophils	1-5 days
white blood cells Eosinophils	2-5 days
gastrointestinal colon crypt cells	3-4 days
cervix	6 days
lungs alveoli	8 days
tongue taste buds (rat)	10 days
platelets	10 days
bone osteoclasts	2 weeks
intestine Paneth cells	20 days
skin epidermis cells	10-30 days
pancreas beta cells (rat)	20-50 days
blood B cells (mouse)	4-7 weeks
trachea	1-2 months
hematopoietic stem cells	2 months
sperm (male gametes)	2 months
bone osteoblasts	3 months
red blood cells	4 months



# Phases of Mitosis

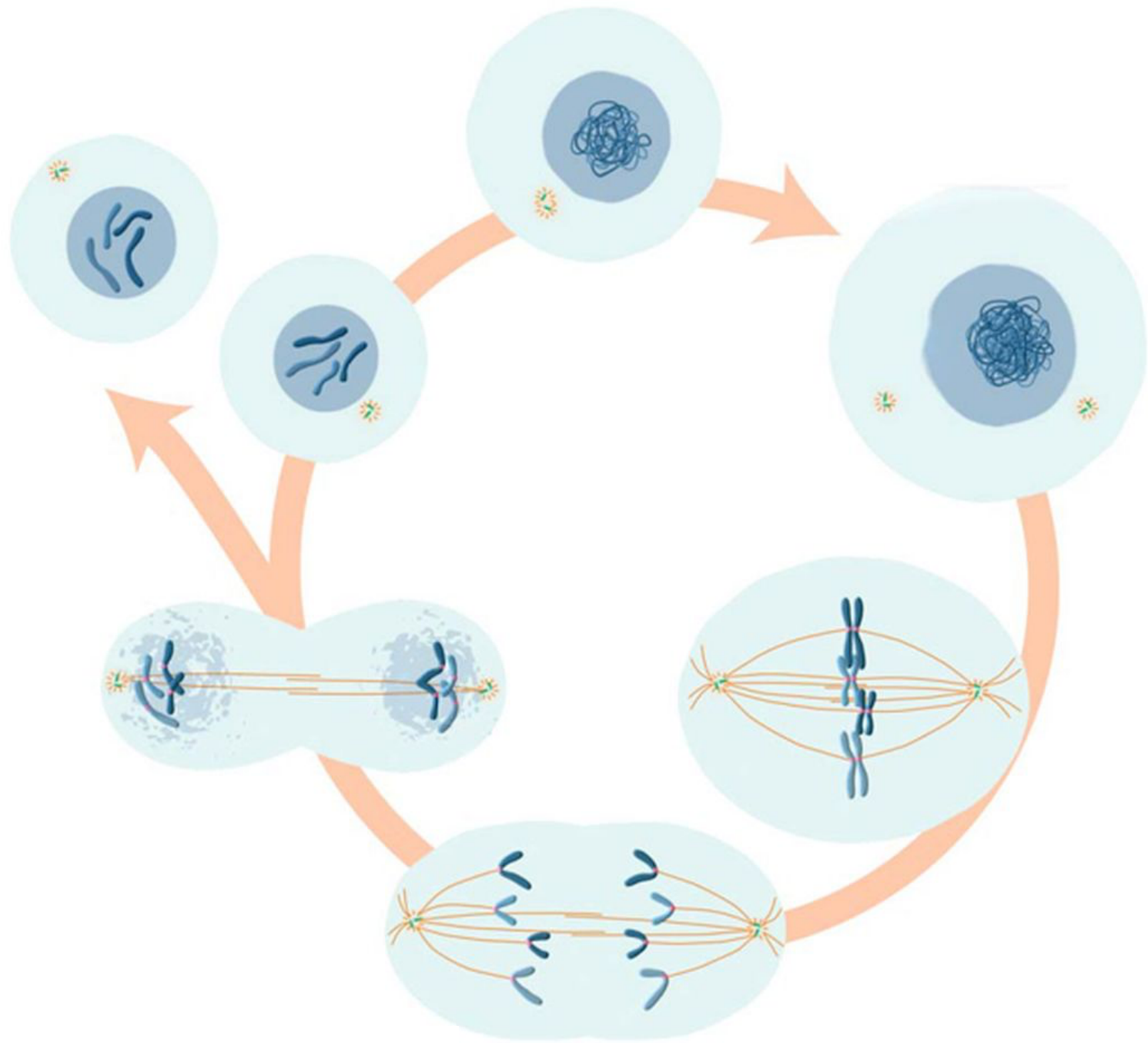




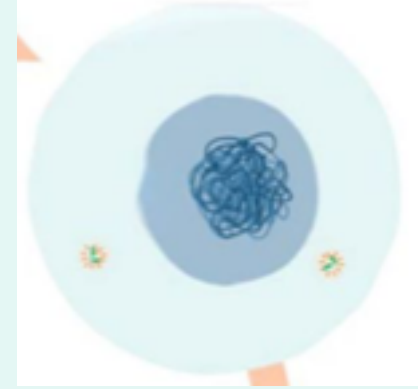
# Mitosis

- results in 2 **identical** daughter cells
- have the same **number** & **type** of chromosomes as the parent
- **somatic** (body) cells undergo mitosis (eg. skin, liver, ...)
- for **growth** or **repair**



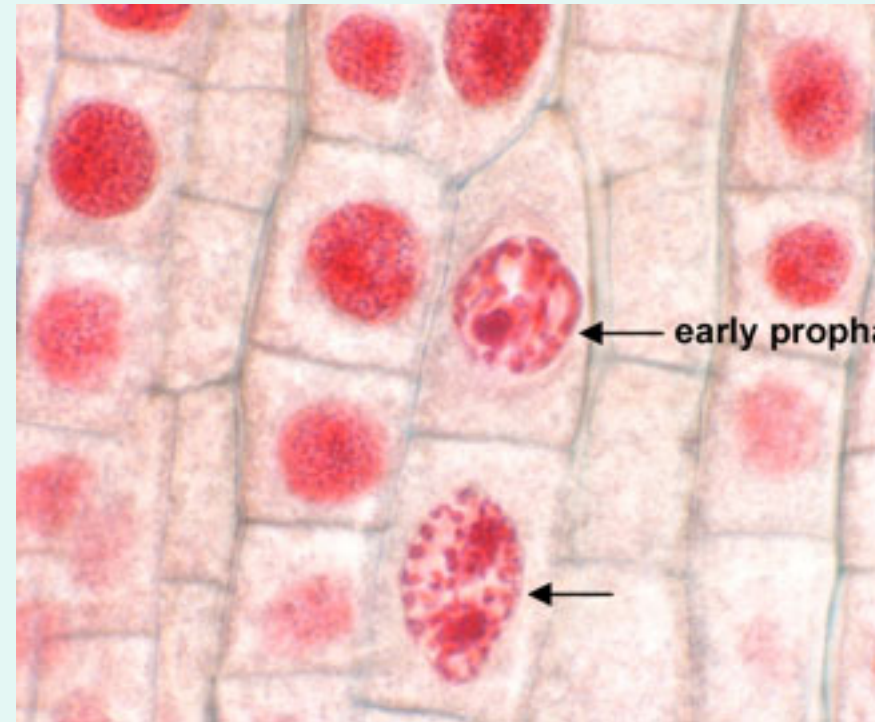


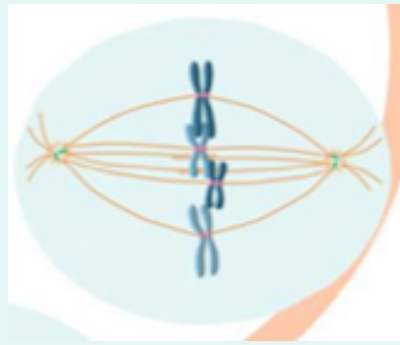
# The Phases of Mitosis



## 1. Prophase

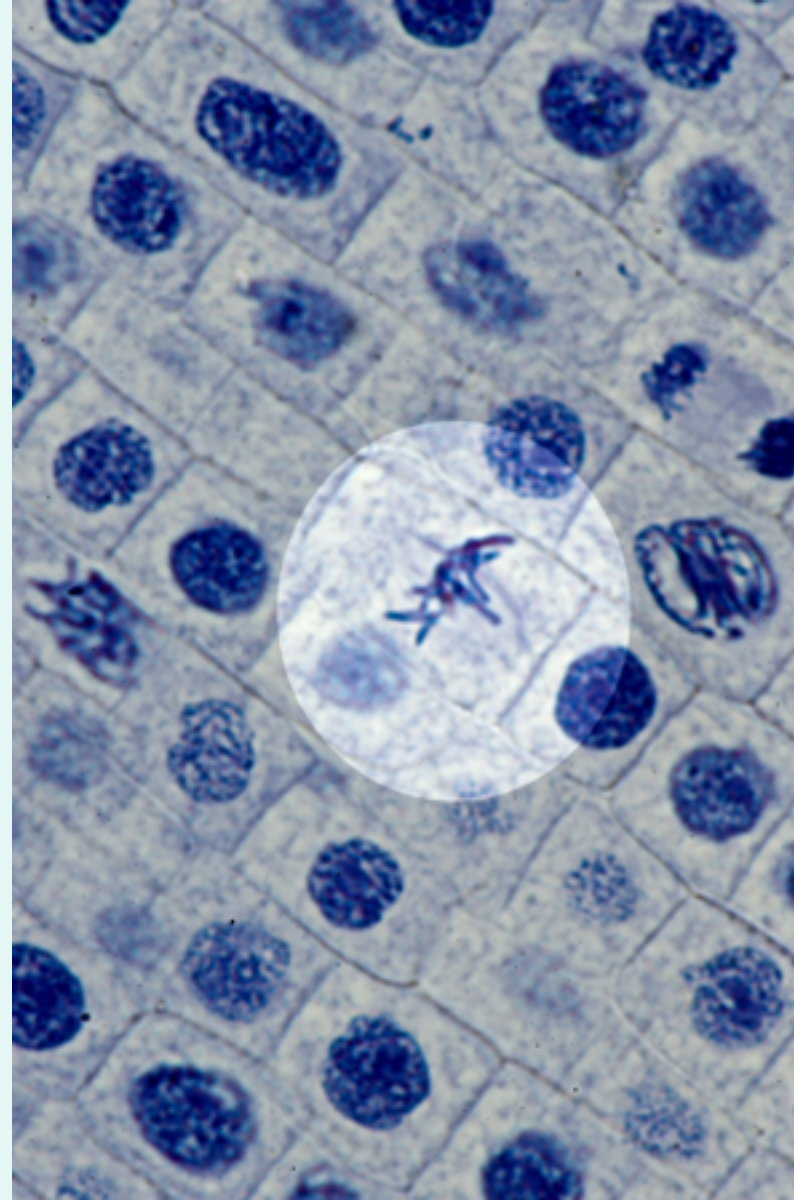
- DNA supercoils becoming short and fat to form visible chromosomes
- nuclear mb disappears
- centrioles ( now called Microtubule organizing centres (MTOC) with microtubules form a spindle-shaped array that links the poles





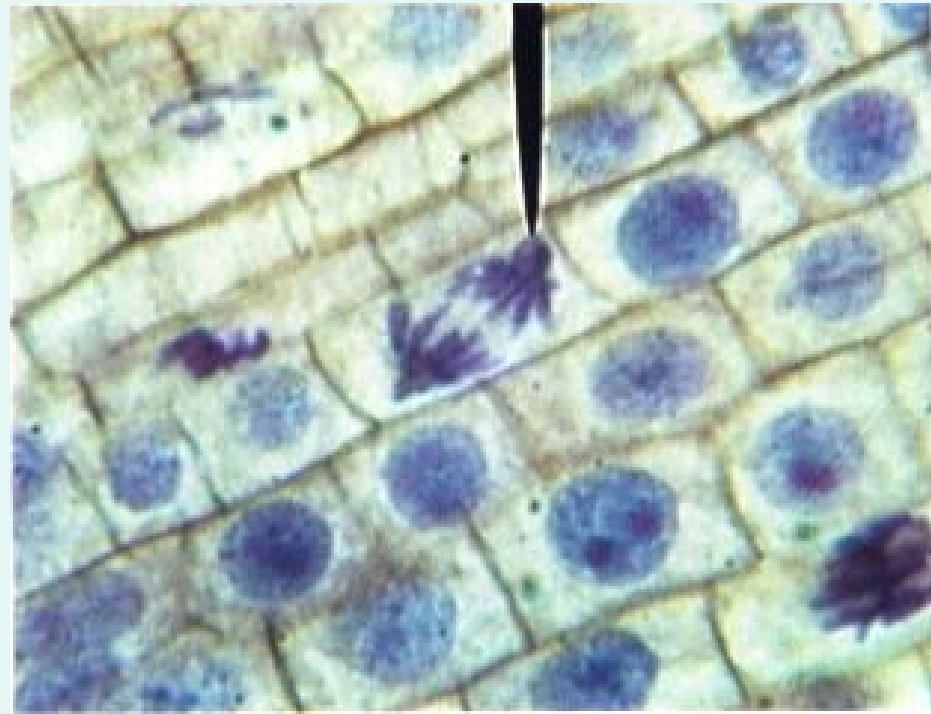
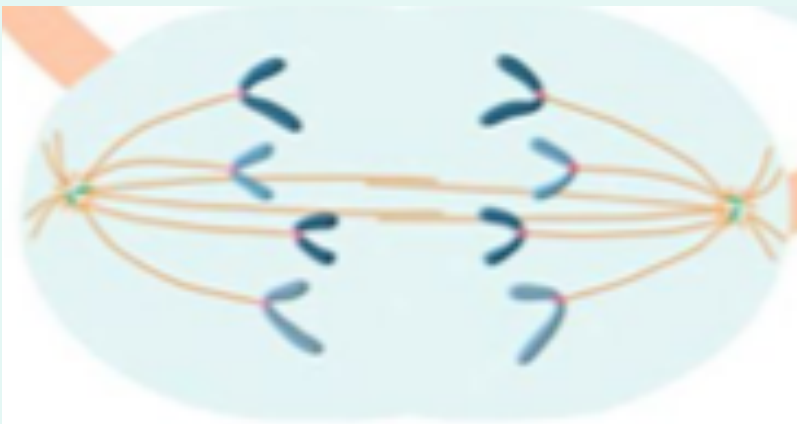
## 2. Metaphase

- microtubules grow and attach to centromere on opposite sides of chromosome
- chromosomes move to equator of cell by tension and shortening of microtubules



### 3. Anaphase

- centromeres split & microtubules pull sister chromatids to opposite poles of the cell.

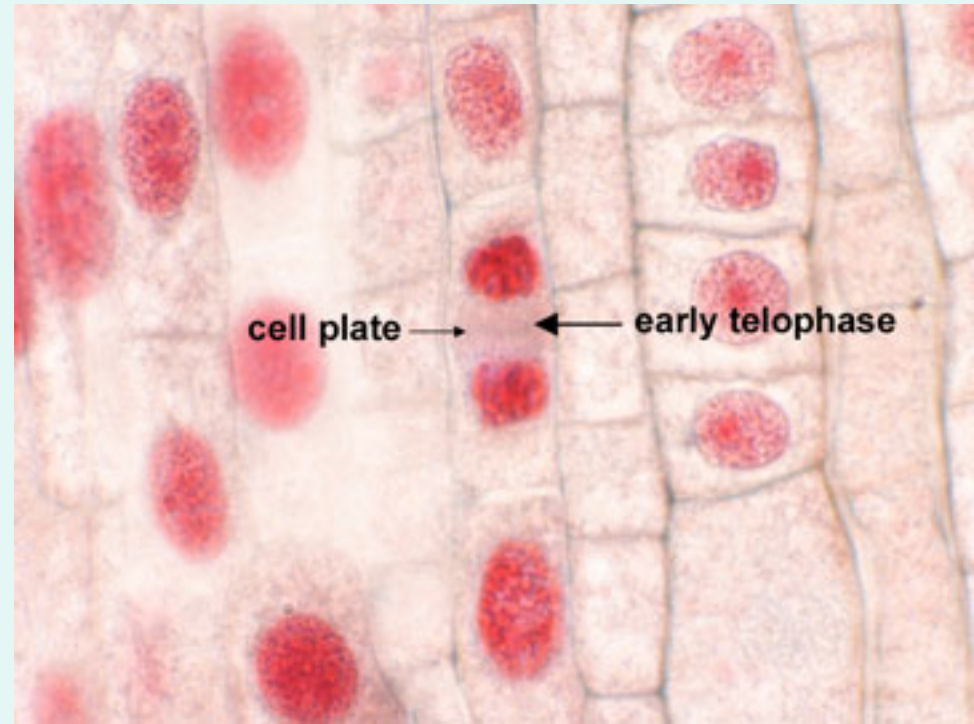






## 4. **Telophase**

- chromatids now called chromosomes begin to unwind
- nuclear membrane reforms
- cytokinesis has begun in this phase

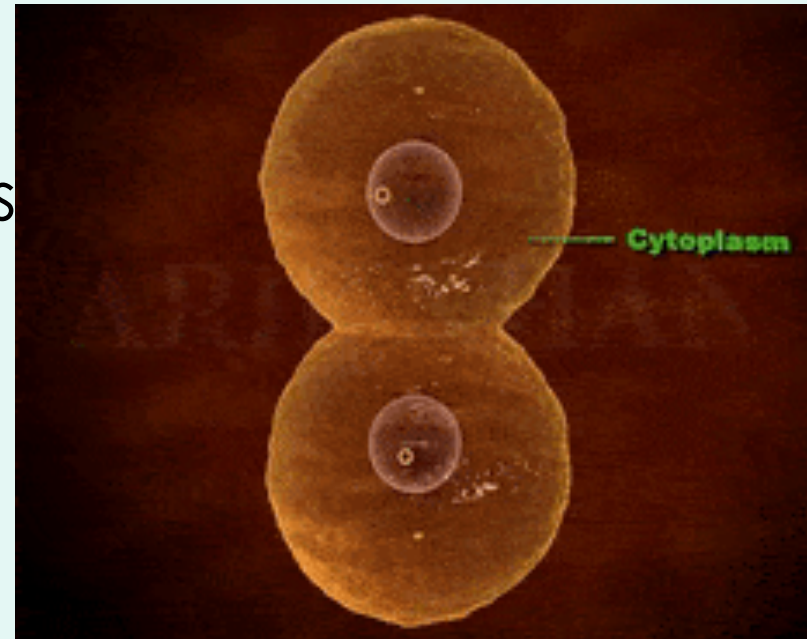


# cytokinesis

- cytoplasm divides and 2 daughter cells are formed

## Animal cells

- plasma membrane pinches inward by proteins actin and myosin
- the cleavage furrow eventually pinches apart the cells

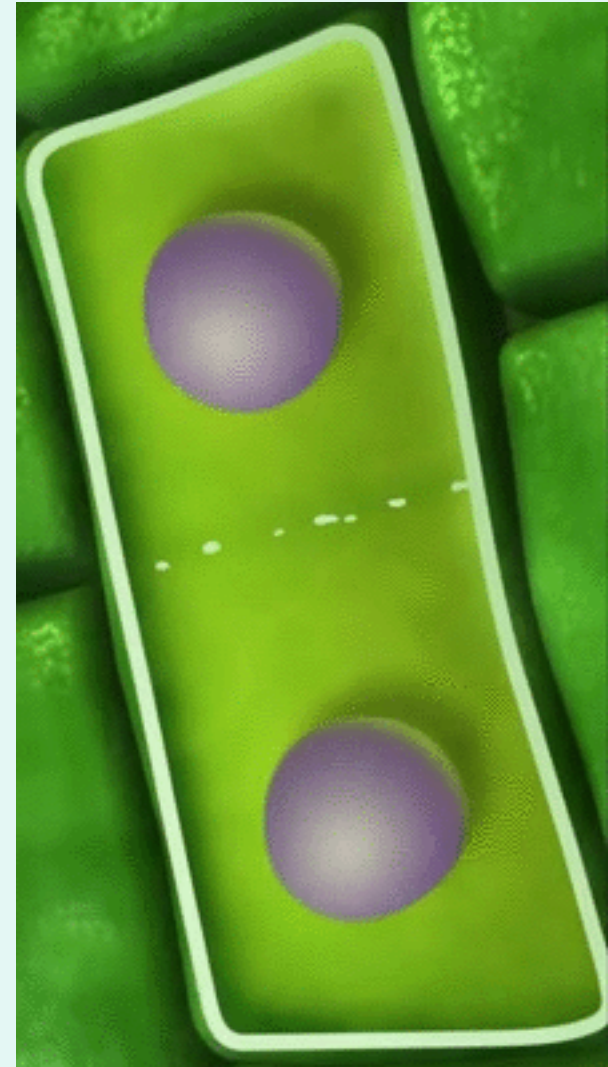


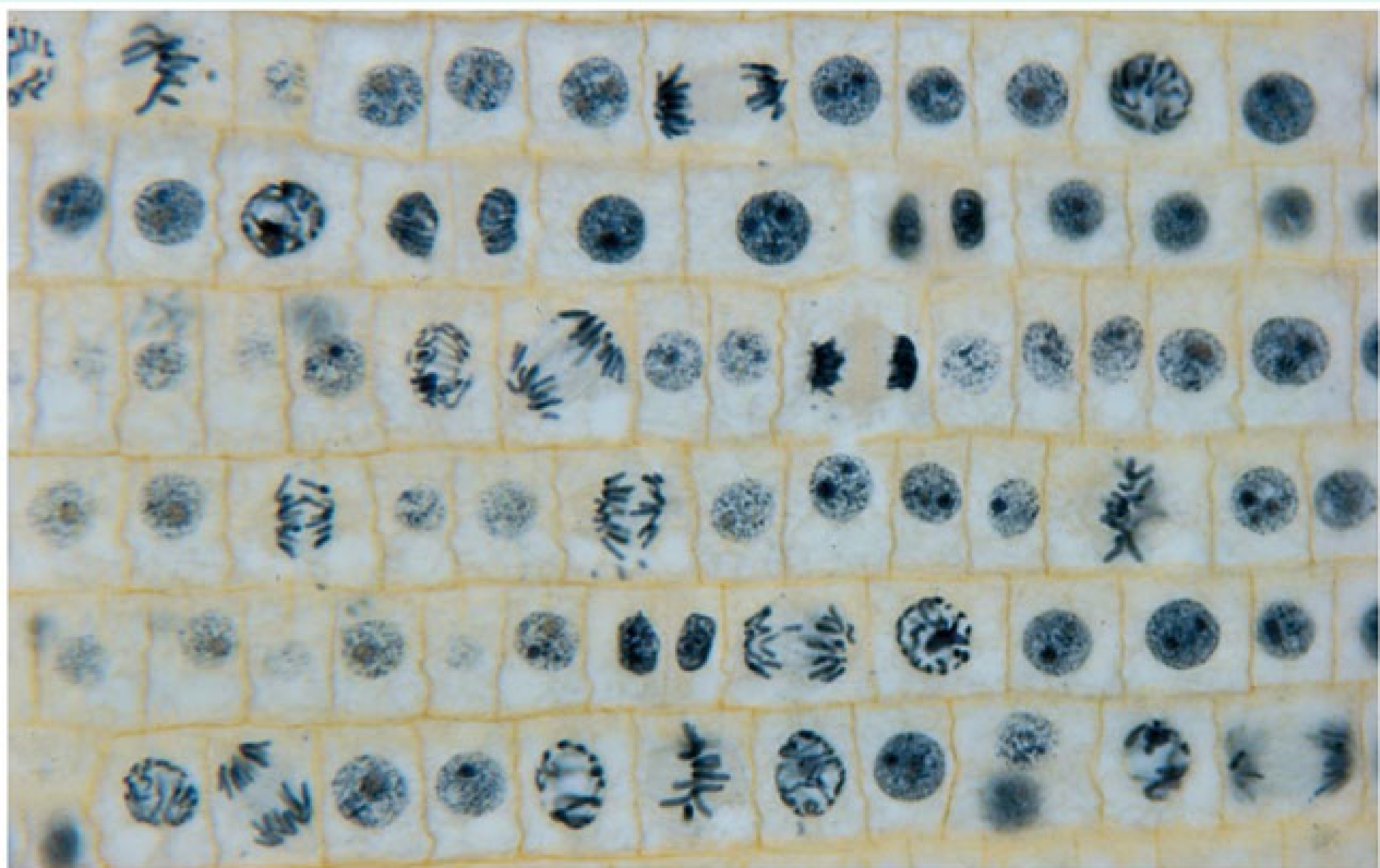
# cytokinesis

- cytoplasm divides and 2 daughter cells are formed

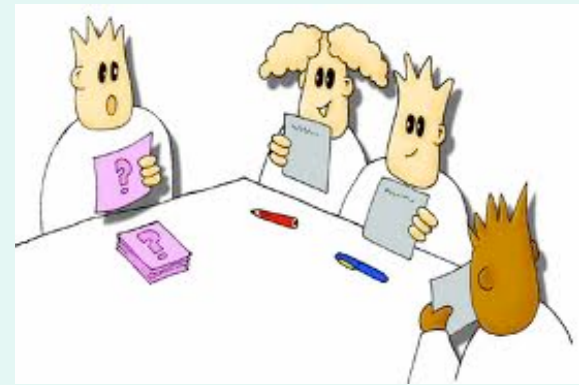
## plant cells

- vesicles fuse at equator to form a tubular membrane structure across
- wall forming substances like pectin deposit along a middle lamella between the membranes
- each daughter cell deposits cellulose which forms cell walls





*Be sure to get 2 different coloured makers!*



Draw:

Prophase in a cell with 2 pairs of chromosomes.

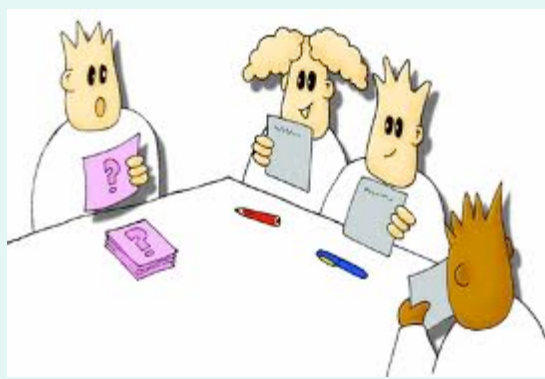
Metaphase for the above cell.

Anaphase for the above cell.

Metaphase in a cell with 3 pairs of chromosomes.

Cytokinesis in the above cell.

Interphase.



Why is mitosis necessary?

At what stage does the nuclear mb dissolve?

How do daughter cells compare to the parent?

If a cell undergoes mitosis how many cells are now present?

Do all cells divide at the same rate? Explain (with an example).

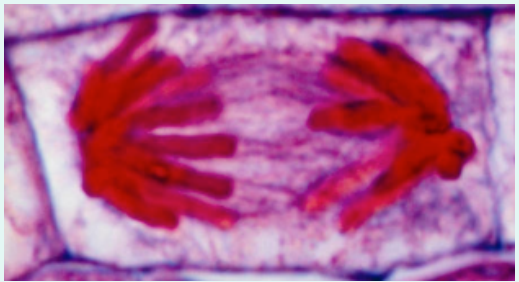
Do you know how cancer and mitosis are related?



What stage is represented?



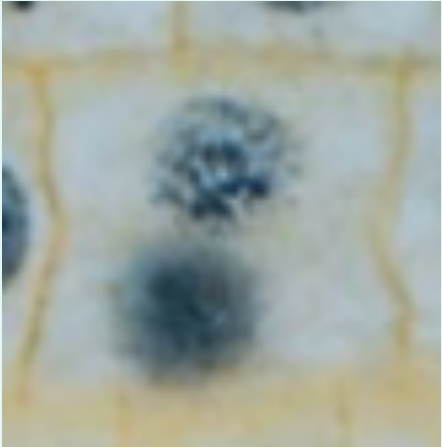
1



2



3



4



# Calculating Mitotic index

$$\text{MITOTIC INDEX} = \frac{\text{\# of cells in Mitosis}}{\text{Total \# of cells}}$$