

Cell division and mitosis

Presented by

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Cell division

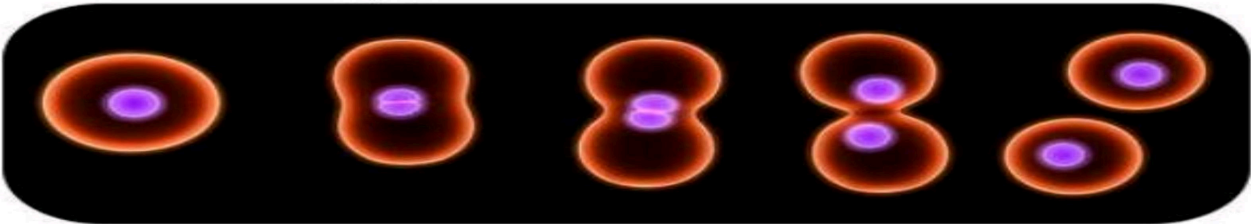
- When a single cell divides to form two identical daughter cells
- Daughter cells are the two new cells which are formed
- The original cell is called as the parent cell
- Hence once parent cell undergoes cell division to form two daughter cells

Single parent cell

Division process begins



2 Daughter cells

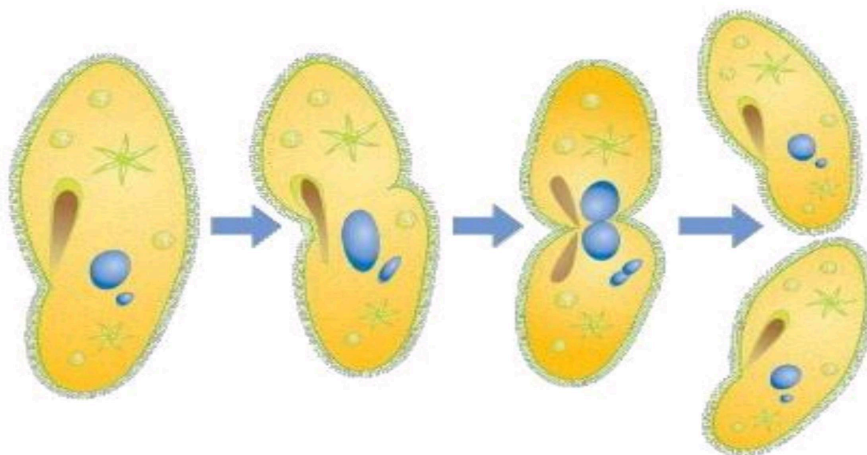


Cell Reproduction

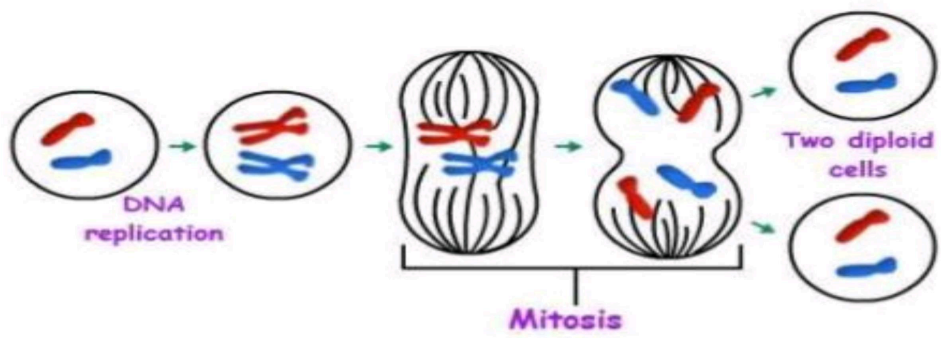
1. Asexual reproduction:
 - a. Binary fission
 - b. Mitosis

2. Sexual reproduction:
 - Meiosis

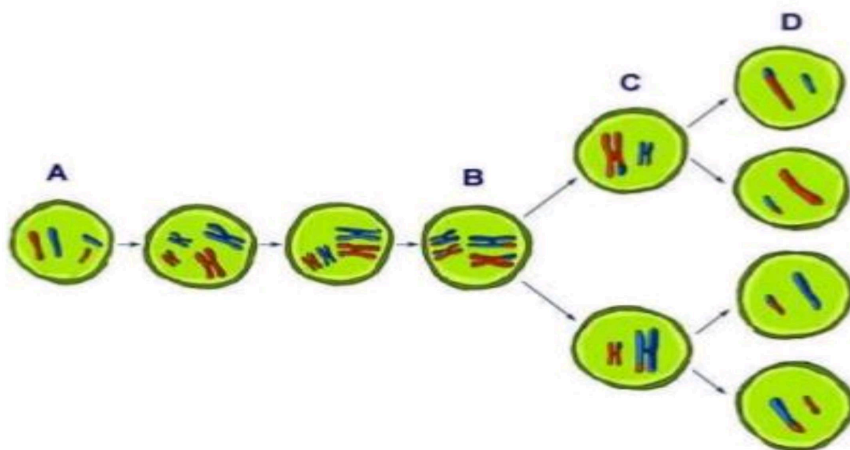
BINARY FISSION



MITOSIS

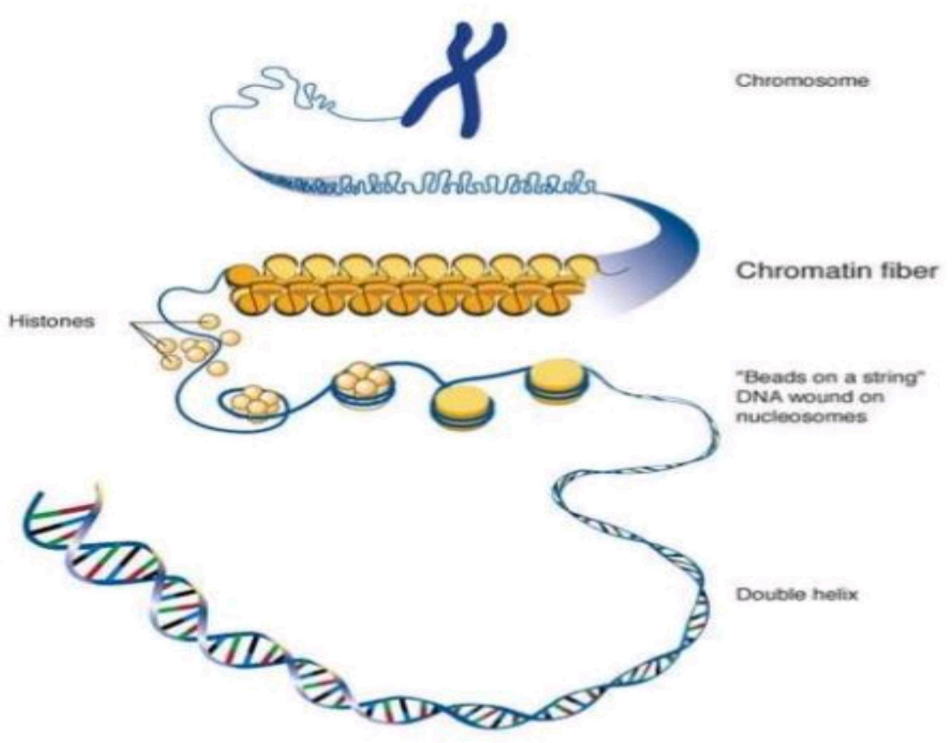


MEIOSIS



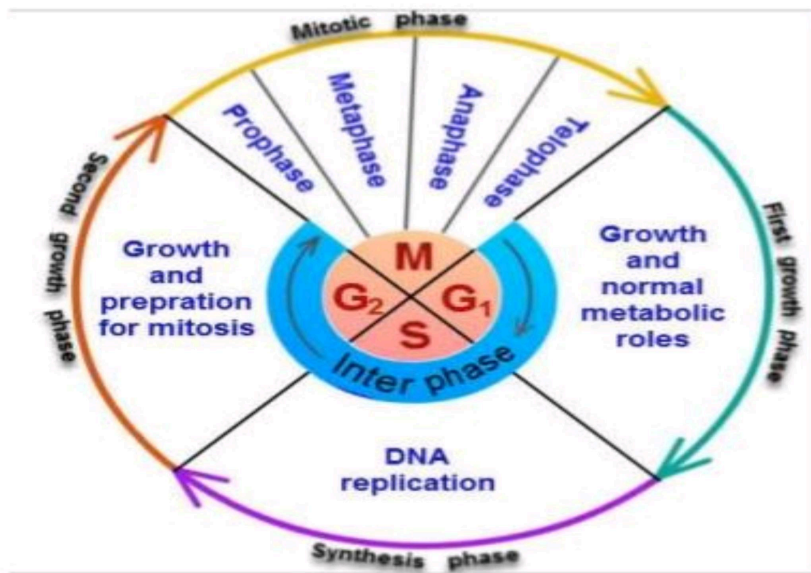
Packaging of DNA

- DNA is present in the nucleus of the cell
- It is tightly packaged or condensed several times so as to fit it inside the nucleus.
- DNA \longrightarrow Chromatin \longrightarrow Chromosome
- Thus DNA is tightly packed into chromatin and chromatin is tightly packed into a chromosome



The cell cycle

- The cell cycle involves 4 phases:
 1. The growth phase in which the cell grows in size (G1 & G2 phase)
 2. The synthesis phase in which the DNA multiplies or replicates (S phase)
 3. And finally the mitosis stage or the cell division stage in which the parent cell divides into 2 daughter cells (M phase)
 4. Order of phases = G1-S-G2-M



Stages of the cell cycle

1. G1 phase

- It is the 1st growth phase of the cell
- The cytoplasm and organelles grow in the cell
- It prepares the DNA for the next phase that is S phase
- The cell performs normal cellular activities during this phase

Stages of the cell cycle

2. 'S' phase

- It is also called as synthesis phase
- A new DNA is synthesized from the original DNA
- Hence the DNA no. doubles in the cell

3. G2 phase

- It is the 2nd growth phase of the cell
- The cell prepares itself and grows the required organelles for cell division

Stages of the cell cycle

4. 'M' phase

- It is also called as the mitosis phase or cell division
- The parent cell divides into 2 daughter cells in this phase
- Each daughter cells have the same no. of chromosomes as present in the parent cell
- E.g. if parent cell has 8 chromosomes then each daughter cell will have 8 chromosomes

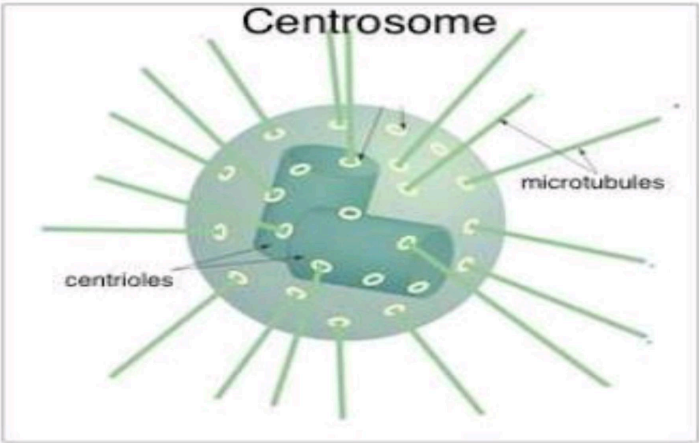
- The G1, S & G2 phases are together grouped under 'Interphase'
- An interphase is the duration between every successive mitotic division

What is mitosis?

- Division of the nucleus into 2 parts
- Also called karyokinesis
- Occurs only in eukaryotes
- Has 4 stages
- Doesn't occur in some cells such as the brain cells

What are centrosomes ?

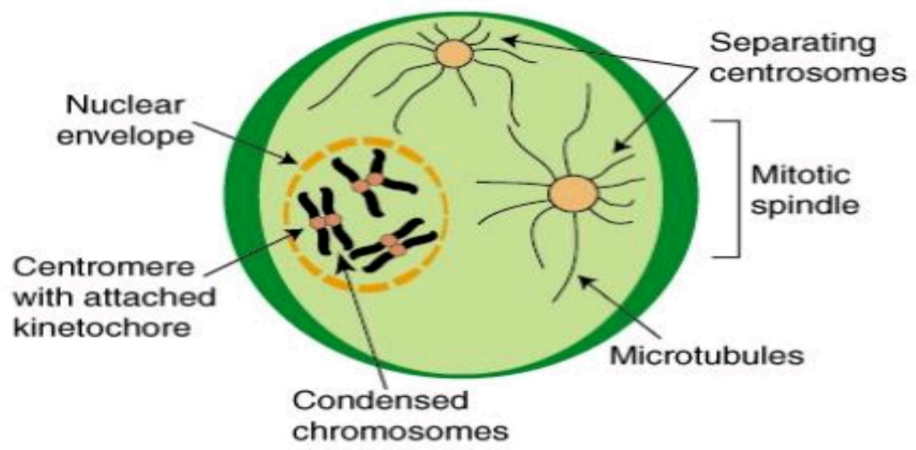
- A centrosome is an organelle produced by the cell in the G2 phase of cell cycle
- It helps in the mitosis
- 2 centrosomes are produced per cell, each at one end of the cell
- Each centrosome has 2 centrioles which produce fibres that pull the chromosomes during mitosis
- Hence each cell has 2 centrosomes and each centrosome has 2 centrioles



Stages of Mitosis

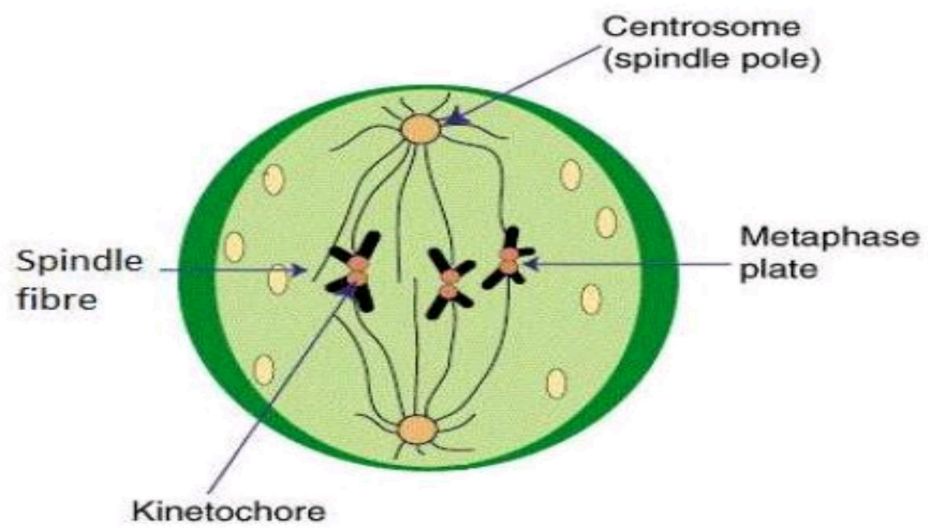
1. Prophase

- It is the 1st phase of mitosis
- The chromatin present in the nucleus condenses to form chromosomes in this phase
- The centrosomes begin to move apart from each other
- Later these centrosomes also start the formation of spindle fibres or microtubules



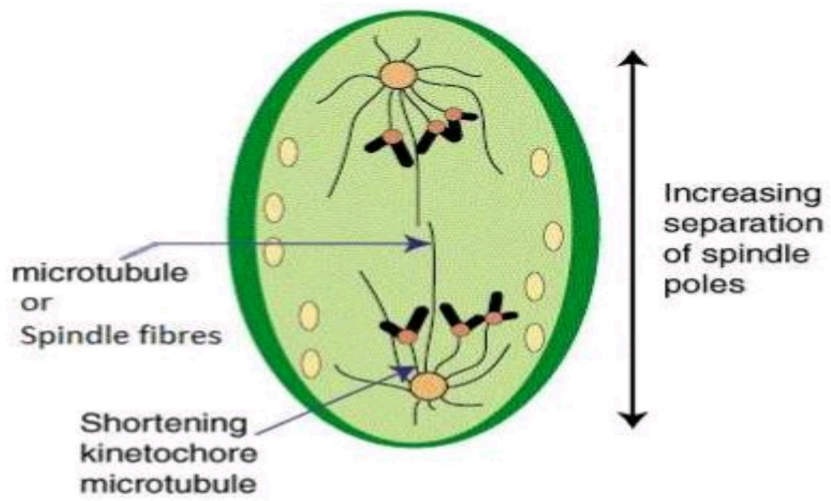
2. Metaphase

- Longest stage of mitosis lasting about 20 min
- Centrosomes align at opposite ends of the cell
- Chromosomes get arranged on an imaginary metaphase plate
- The chromosomes are attached to the spindle fibres with the help of kinetochores present on centromere of chromosomes



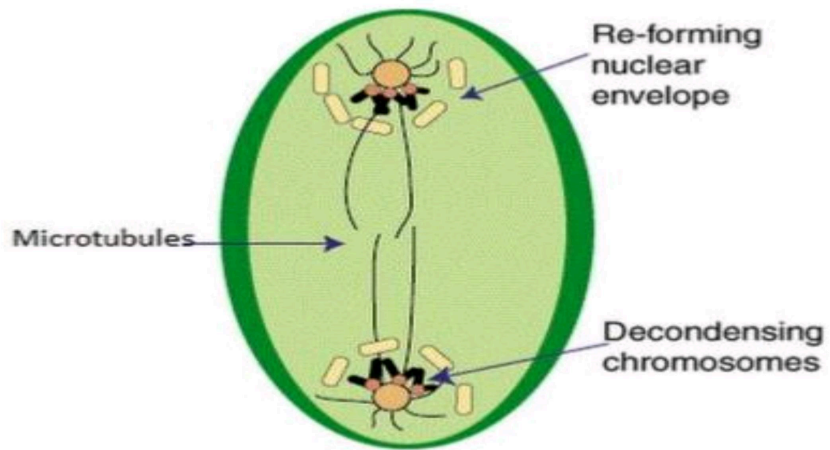
3. Anaphase

- Shortest stage of mitosis which lasts for a few min
- The two sister chromatids of each chromosome are pulled apart by the pulling spindle fibres
- Each chromatid behaves like an individual chromosome
- By the end of Anaphase the 2 ends of the cells have equal no of chromosomes



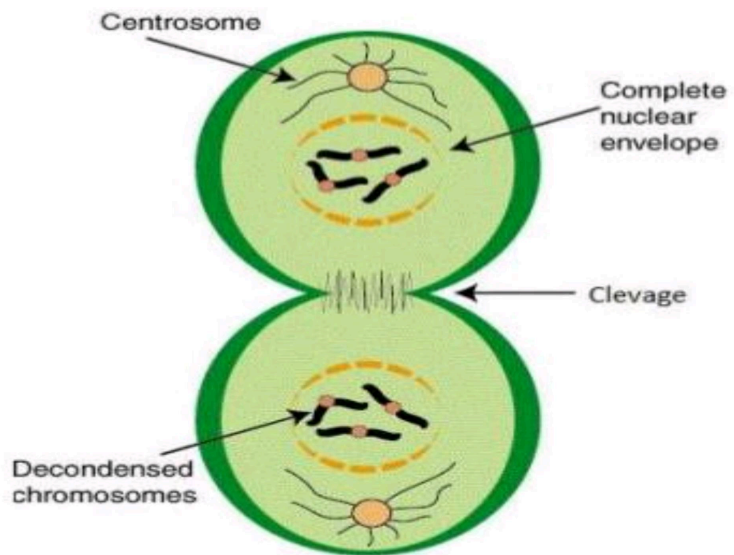
4. Telophase

- Nucleus develops surrounding the chromosomes at each end of the cell
- The chromosomes become less condensed
- A nuclear envelope begins to form around each nucleus
- Mitosis is thus completed



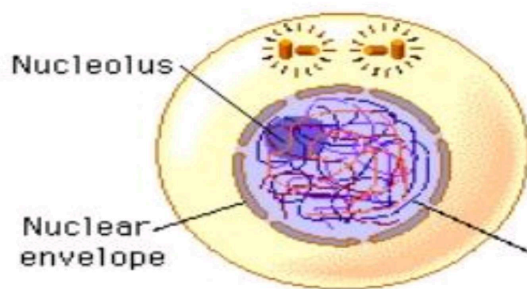
Cytokinesis

- Means division of the cytoplasm
- Cleavage of cell into two halves
- Each half is called a daughter cell
- Each daughter cell has the same number of chromosomes present in the parent cell



Interphase

- Interphase is the stage after cytokinesis right upto the next prophase of the mitotic cycle
- It consists of G1, S & G2 phases of the cell cycle
- It ends with the beginning of prophase of the M phase of the cell cycle
- Hence it can be said that two successive mitotic phases are separated by an interphase



Interphase

The nucleolus and the nuclear envelope are distinct and the chromosomes are in the form of threadlike chromatin.

Chromatin

