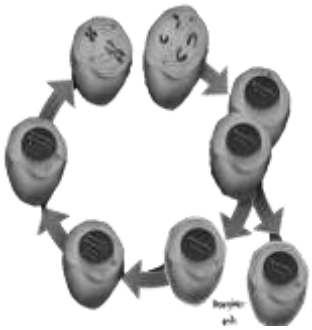
Day – 2

MITOSIS

- Mitosis was discovered by Fleming in 1879 in animal cell.
- Mitosis is a cell division in which parent cell divide to form two daughter cell, in which number of chromosome, amount of DNA, number and types of gene are equal to parent cell.
- It occurs in somatic cell (n, 2n, Polyploid any).
- It is called indirect division.
- Mitosis results in increase in number of cells in the body.



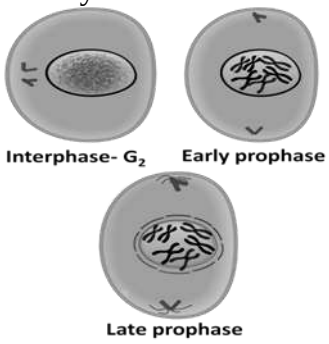
KARYOKINESIS

Divided into four phases –

- Prophase
- Metaphase
- Anaphase
- Telophase

PROPHASE

- It is the longest phase of karyokinesis.
- Chromosomes appear as pairs of chromatids joined by centromere (chromatin condensation start).
- The nuclear membrane disintegrate and disappear into the cytoplasm.
- Nucleolus start disappearing.
- Each centrioles Separates and start to move towards the opposite pole of the cell.
- Around each centriole astral rays are formed in the cytoplasm.



- **Anastral mitosis-** In plants, centrioles are absent and no asters are formed. Mitosis without asters is known as anastral mitosis.
- **Amphiastral Mitosis-** In animals, the asters are present and the mitosis is described as amphiastral, or astral mitosis.

METAPHASE

- Each chromosome is joined by astral/spindle fiber at each kinetochore.
- Chromosome lies at equator and arms remain directed towards poles.
- In metaphase each chromosome splits lengthwise upto the centromere (division of matrix of chromosome).
- Thus replicated chromatids clearly visible at metaphase stage.
- Best phase for seeing chromosome (due to biggest size).

Early metaphase

Late metaphase

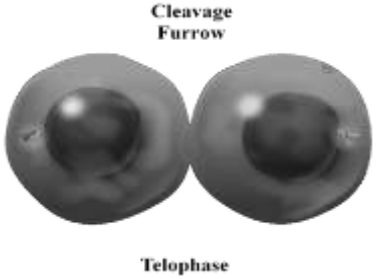
ANAPHASE (Smallest stage)

- In early anaphase fibers which occur in between the chromosomes are called inter-zonal fibers appears at equator of cell.
- Centromere of each chromosome splits lengthwise (division of centromere).
- Number of chromosome becomes double in cell during mitotic anaphase.
- Inter-zonal fibers expands and they push chromosomes towards the opposite poles.(Pushing)
- Astral / spindle fibers contract and they pull chromosome towards opposite poles. (Pulling)
- At this phase cytokinesis process starts.

Anaphase

TELOPHASE (Reverse prophase)

- The daughter chromosomes with their centromere at the poles begin to uncoil and lengthen. They aggregate together to form a mass at the poles.
- New nuclear membrane develops around the chromosomes from the elements of the E.R.
- Spindle/astral fibre are absorbed in the cytoplasm.
- Thus two daughter nuclei are formed and they have the appearance of the interphase nuclei.

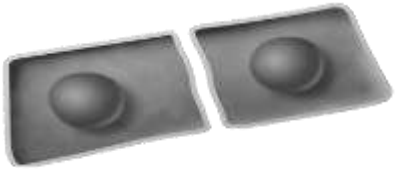


Telophase

CYTOKINESIS

- After nuclear division (Karyokinesis) cytoplasm get divided into two equal parts, this results in formation of two daughter cells from a single parent cell.
- Cytokinesis starts in late anaphase.
- The cytoplasmic division differs in animal and plant cells.
- In animals cytokinesis occurs by constriction & furrow formation. Microtubules and microfilaments are involved, cytokinesis take place in centripetal order.

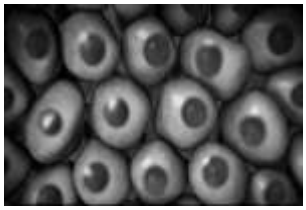
- **Cytokinesis in plants:** Takes place by cell plate formation because constriction is not possible due to presence of the rigid
- cell wall.
- Many Golgi vesicles arrange themselves on equator to form phragmoplast. ER and Fragmets of spindle fibres also collect on equator. Collectively this structure is known as Cell plate.
- Golgi vesicles secrete calcium and magnesium pectate. Further cell plate is modified into middle lamella.


Two daughter cells

SIGNIFICANCE OF MITOSIS

- Identical gene composition
- In mitotic cell division daughter cell contain the same number of chromosomes as the parent cell.
- The daughter cells carry the same hereditary information as is in the parental cells.
- There is no variation in genetic information.
- It gives a genetic stability within a population.
- Growth
- Mitotic cells division is responsible for growth in an organism.
- Cell Replacement

- Mitotic cell division is responsible for the replacement of lost cells , healing of wound.
- Regeneration and Asexual reproduction
- In many lower animals mitotic cell division is responsible for regeneration and asexual reproduction.



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