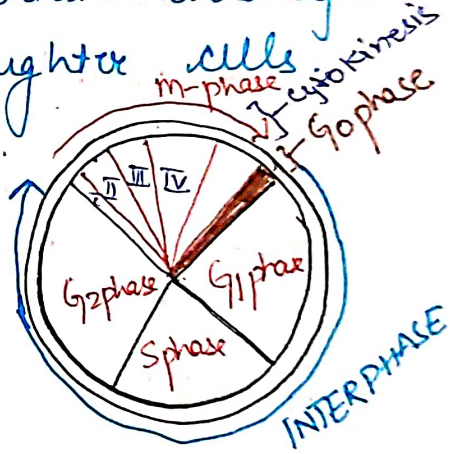
CELL DIVISION / CELL REPLICATION

- Cell Division is the process in which a cell duplicates itself by dividing its genetic material.
- In prokaryotes, cell division takes place by simple Binary fission.
- In eukaryotes, cell division takes place by both sexual reproduction or vegetative involving the replication of DNA.
- Cell division is defined as a process by which a cell distributes its genetic material and cytoplasm and gives rise to new daughter cells



Cell division are of two types :-

1. Mitosis
2. Meiosis

There are three phases in cell divisions::

- I - PROPHASE, II - METAPHASE, III - ANAPHASE, IV - TELOPHASE
  - Interphase
    - G_1 phase
    - S phase
    - G_2 phase
  - M-phase
  - Go phase

Interphase :- Primary phase before the cell division (Mitosis / Meiosis).

- Cell decide whether it will undergo division or not.

- Stage at which cell gain of optimum growth nutrient and living mass before it decide to enter the cell division.

Interphase is divided into –

1. G_1 phase :- RNA synthesis and protein synthesis occur at this stage.

2. S-phase :- (Synthesis phase)
   – There is a replication of DNA in this phase

3. G_2-phase :- In this phase the quantity of RNA and protein get doubled due to synthesis of RNA and protein which undergo enlargement and growth before entering the mitotic stage.

M-PHASE :-

Computed in two steps.

- Karyokinesis (division of nucleus)
- Cytokinesis (division of cytoplasm)

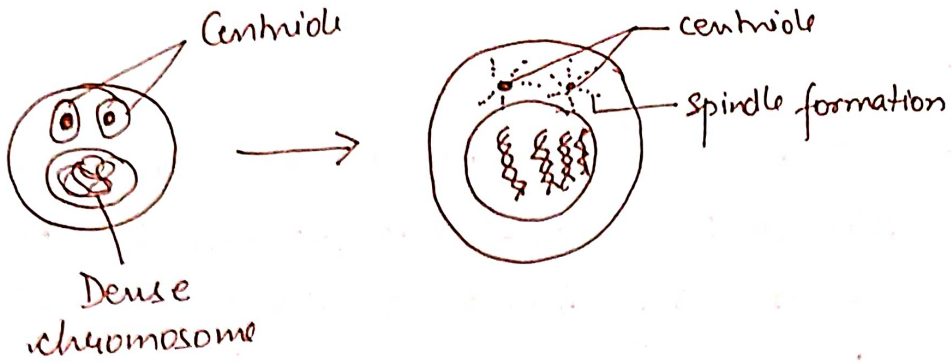
MITOSIS :-

- Also known as "Equational division".
- In this division one cell divides to produce two genetically identical daughter cells.
- Majority of cells of body undergo mitosis.
- This process is integral to an organism's body growth and development and it takes place throughout the organism's lifetime.

mitosis
- Karyokinesis
  - Prophase
  - Metaphase
  - Anaphase
  - Telophase
- Cytokinesis

PROPHASE :-

- In early phophase, the cell initiate cell division by breaking down some cell components and building other components and then division starts.
- Coiling of the chromosomes takes place.
- Elongation of the chromosomes occur with shortening and thickening.



- The spindle starts to form a structure made of microtubules. It organizes the chromosomes and moves them around during mitosis. The mitotic spindle grows between the chromosomes of the cell as they move towards different poles.
- One chromosome finish condensing they form a compact structure.
- The nuclear envelope breaks down and the chromosomes are released.

METAPHASE :-

- Metaphase starts when the mitotic spindle organizes all chromosomes and lines them up in the middle of the cell to divide.
- All chromosomes align at the metaphase plate.
- At this stage, the chromosomes should be attached to microtubules from opposite spindle poles. Before proceeding the cell will ~~both~~ check this.

ANAPHASE :-

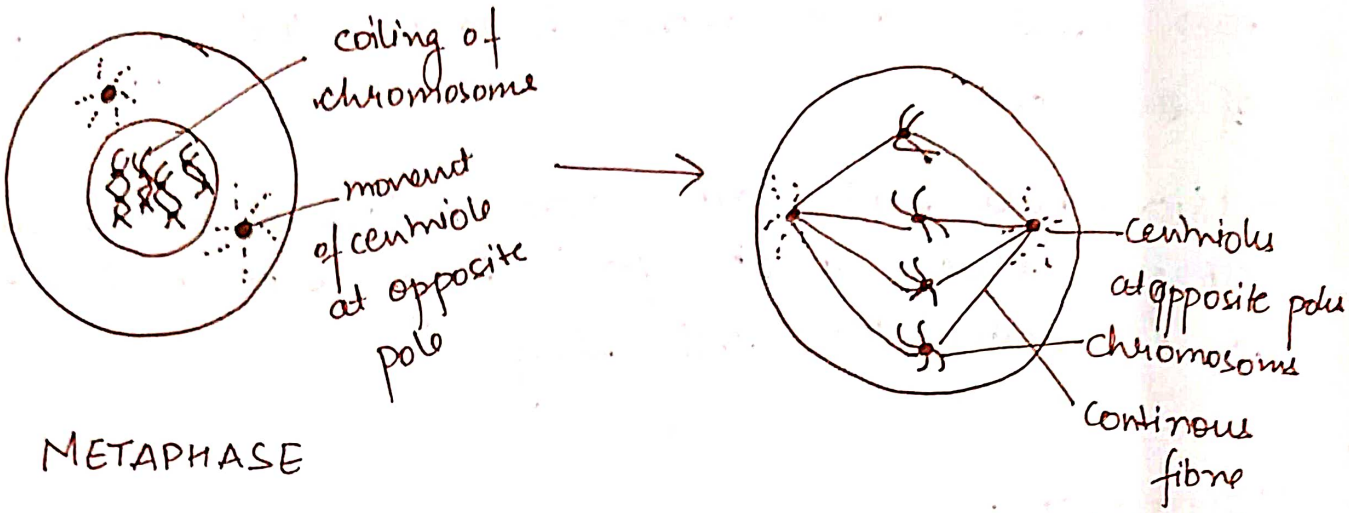
- At this stage, the sister chromatids seperate from each other and move towards the opposite poles of the cell.
- Microtubule that are not attached to chromosomes elongate and push apart. They seperate the poles and makes the cell longer.

TELOPHASE :-

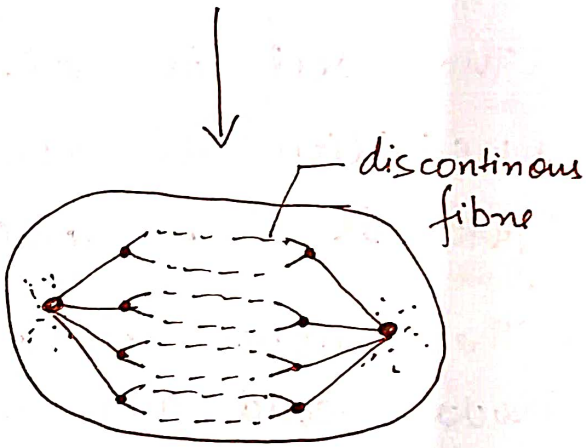
- The cell is almost divided and starts to re-establish its normal cellular structures as cytokinesis takes place.
- The mitotic spindle breaks down into building blocks and two nuclei are formed, one for each chromosoms set.
- The nuclear membrane and the nucleoli then reappear and chromosome begains to de-condense to return to their normal form.

CYTOKINESIS :-

- Division of cell membrane / cell wall and formation of two daughter cells takes place.

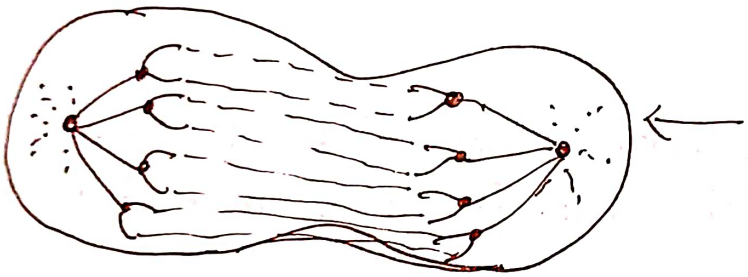


METAPHASE



movent of chromosoms towards opposite pole

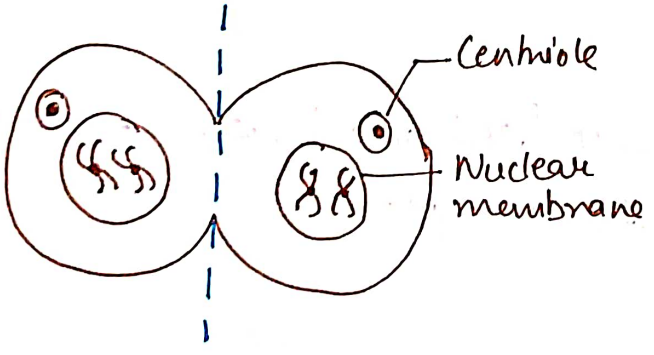
TELOPHASE



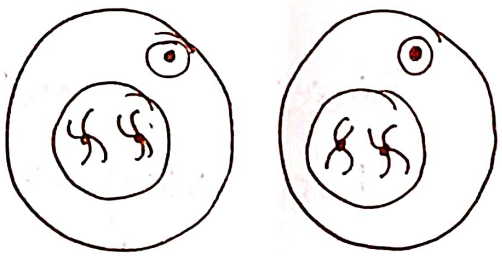
Moment of chromosoms at opposite pole

ANAPHASE

formation of nuclear membrane starts



CYTOKINESIS



Two daughter cell