MITOSIS:

Mitosis is a cellular process wherein a parent cell undergoes division, resulting in the formation of two identical daughter cells. These daughter cells are not only identical to each other but also mirror the parent cell in terms of their genetic content. This type of cell division ensures the equal distribution of already duplicated chromosomes into the two daughter cells, maintaining an identical chromosome count. Mitosis is often referred to as equational division due to the preservation of the same number of chromosomes in both daughter cells as in the parent cell. The observation of mitosis was first reported by Strasburger in plant cells and Walter Flemming in animal cells, who also coined the term "mitosis" in 1882.

Mitosis is commonly known as somatic cell division because it takes place in the somatic cells (body cells) of animals. It also occurs in gonads for the multiplication of undifferentiated germ cells. In plants, mitosis is observed in dividing meristematic tissues and also in leaves, flowers, and fruits during growth.

Mechanism of Mitosis:

Mitosis is a complex process involving significant changes in both the nucleus and the cytoplasm. The process can be divided into two major events:

- **Karyokinesis:** Karyokinesis, derived from "karyon" meaning "nucleus" and "kinesis" meaning "movement," is the division of the nucleus. It is a continuous process, and although mitosis is conventionally categorized into four stages for ease of understanding, clear distinctions between these stages are not definitive, given the progressive nature of karyokinesis.
- **Cytokinesis:** Cytokinesis, originating from "kytos" meaning "cell" or "hollow" and "kinesis" meaning "movement," marks the culmination of cell division by orchestrating the division of the cytoplasm. Unlike karyokinesis, which is focused on the nucleus, cytokinesis ensures the separation of the cell into two daughter cells, each possessing its own nucleus and cytoplasm. This phase includes the distribution of cell organelles in the cytoplasm to the daughter cells.
- In certain organisms, karyokinesis may not be succeeded by cytokinesis, resulting in numerous nuclei embedded in the cytoplasm, forming a syncytium. The process of cytokinesis differs between animal and plant cells:

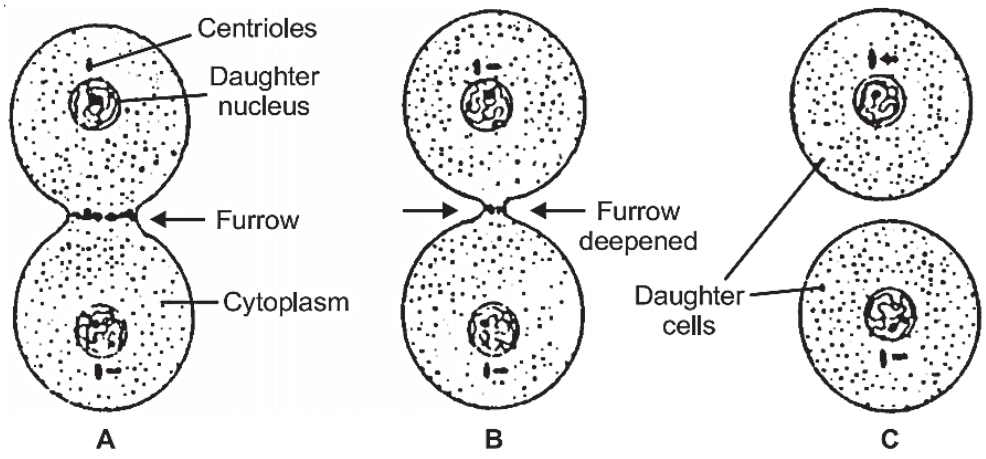

Fig. : Cytokinesis by furrowing in an animal cell

- In animal cells, cytokinesis involves the gradual formation and deepening of a furrow in the plasma membrane. The furrow progresses centripetally until it meets at the center, dividing the cell cytoplasm into two and ultimately leading to the separation of the animal cell into two daughter cells.

- In plant cells, cytokinesis is achieved through the formation of a cell plate. A phragmoplast, formed by the Golgi complex, grows centrifugally to create the cell plate. Due to the inextensible cell wall in plant cells, the cell plate begins at the center and moves outward, dividing the cell into two halves.

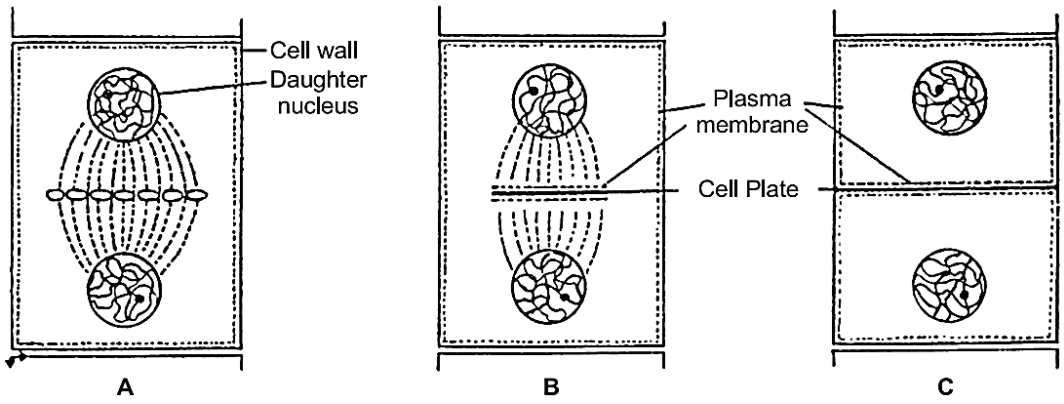

Fig. : Cytokinesis by cell plate in a plant cell