The Fundamental Unit of Life
Cell Division

Cell Division:

Cell multiplication is needed for the growth, development and repair of the body. Cell multiplies by dividing itself again and again this process called **cell division**.

Cell divisions are two types

(a) Mitosis , (b) Meiosis

(a)Mitosis:

Stages of Mitosis:

Interphase, prophase, metaphase, anaphase and telophase are roughly the five stages or phases of mitosis.

(a) Interphase:

(i) The period between one cell division and the next is called **interphase** in which the cell is said to be in the resting stage.

(ii) Interphase, however, includes three phases, i.e. G1-phase, S-phase and G2-phase. G1-phase is a resting phase or pre-DNA synthesis phase.

(iii) During S-phase, DNA synthesis takes place. G2-phase is again a resting phase and it may be described as a post-DNA synthesis phase.

(iv) The main mitosis division takes place during M-phase which involves prophase, metaphase, anaphase and telophase.

(b) Prophase:

(i) Prophase is actually the first and the longest phase in the mitosis cell division.

(ii) Chromosomes become visible in the nucleus as short, thick and helically-coiled threads.

(iii) Each chromosome splits into two chromatids joined at the centromere.

(iv)Nuclear membrane dissolves away.

(v) Nucleolus also dissolves away and finally disappears.

(c) Metaphase:

(i) It is the second stage in the mitotic cell division.

(ii) Nuclear membrane and nucleolus disintegrate and they are lost completely.

(iii) Spindle tubules start appearing, and these tubules get attached to chromosomes at the centromeres.

(iv) Chromosomes move actively, become shorter and thicker and arrange themselves in the canter or on the equator of the spindle.

(v) Separation of the two chromatids from each chromosomes also begins at the end of metaphase.

(d) Anaphase :

(i) It is the third stage of mitosis.

(ii) Chromatids separate from each other at centromeres.

(iii) Separated sister chromatids, each with a centromere, are called daughter chromosomes. They move to the ends of opposite poles of the spindle.

(iv) Daughter chromosomeres appear in V, U or J-shaped during their movement towards the poles.

(v) During the late anaphase stage, the cell starts constricting in the middle region.

(e) Telophase :

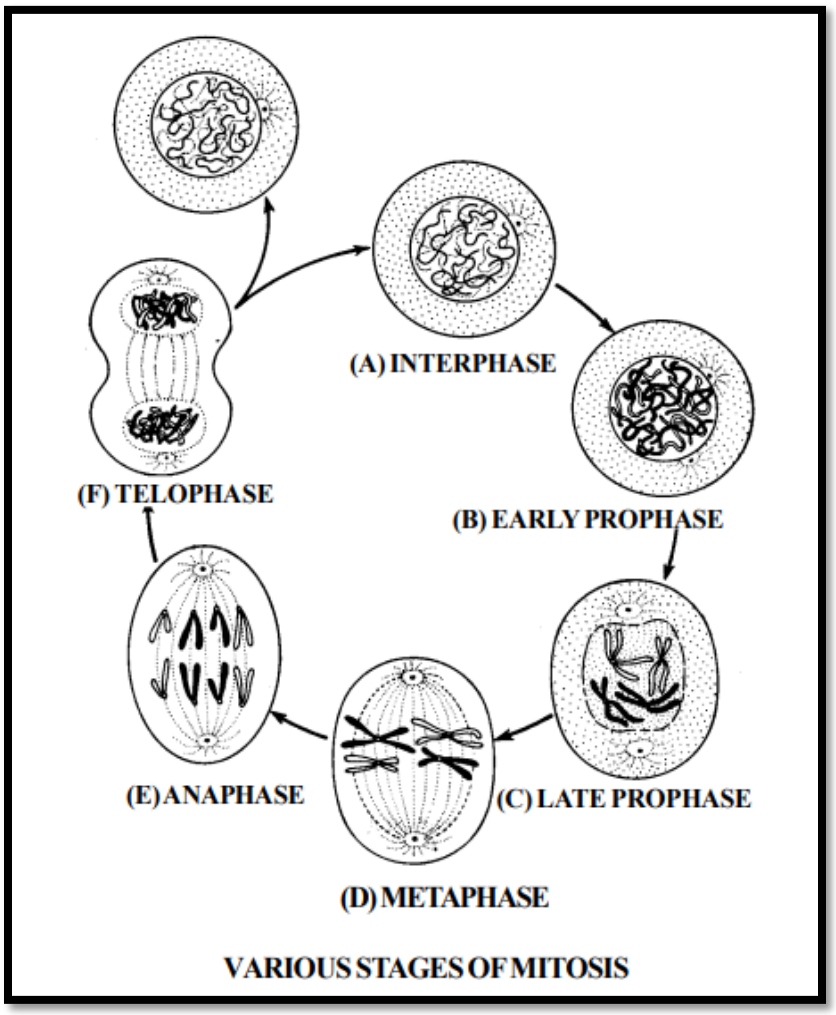
(i) Telophase is the last stage of mitotic cell division.

(ii) Chromatids or daughter chromosomes are now at the end of the spindle.

(iii) Nuclear membranes and nucleoli reform around each group of chromosomes and thus two new nuclei are reorganized at each pole.

(iv) Chromosomes begin to lose their compact structure.

(v) Spindle Xapparatus disappears gradually.



VARIOUS STAGES OF MITOSIS

Karyokinesis :

Division of nucleus is called **karyokinesis** and, the process of the division of cytoplasm is called cytokinesis.

(i) In animal cells, a circular constriction appears at the equator, the constriction deepens and eventually divides the cell into two.

(ii) In plant, there is no constriction. A cell plate or new cell wall forms across the cell resulting in the separation of two daughter cells.

Significance of Mitosis :

(i) Mitosis occurs during the growth and development of multicellular plants and animals.

(ii) Mitosis ensures that the two daughter cells inherit the same number of chromosomes.

(iii) It helps the cell in maintaining proper size.

(iv) In unicellular organisms mitosis helps in asexual reproduction during which two or more individuals arise from the mother cell.

(v) If mitosis becomes uncontrolled it may cause tumour or cancerous growth.