Lab -3-
Cell Division (Reproduction).

The first stage of growth in a living organism is the formation of new cells by a process known as cell division, which occurs most commonly in the meristematic or growth tissues of plants. Cell division involves two phases:-

1- The division of the nucleus into nuclei is a process known as **Mitosis.**
2- The division of the cytoplasm is a result of the formation of a new cell wall, separating and dividing the original cell into new cells in a process known as **Cytokinesis.**

1- Mitosis is a process of nuclear division in which chromosomes divide lengthwise, separate, and form 2 identical nuclei. Mitosis is usually accompanied by cell division, which involves the formation of a new cell wall between the 2 identical nuclei. In plants, good sites to observe mitosis are in root tips, shoot apices, and newly developing leaves. This is done by making thin sections of the tissues, mounting them on slides, staining them with acetocarmine or Feulgen stains, then observing the sections with the high power or oil immersion lens of an optical (light) microscope.

The Cell Cycle

The period when the nucleus is between divisions is called **interphase**. During interphase is a period of replication of cytoplasmic organelles, followed by a period when chromosomes are duplicated, then a period when spindle fibers (bundles of microtubules) are made. Phases of mitosis are **prophase, metaphase, anaphase, and telophase.** Interphase and the 4 phases of mitosis constitute the cell cycle.

Phases of Mitosis

Prophase. At the first stage of mitosis, the chromosomes become visible as long threads. For clarification, only 3 chromosomes are shown. On each strand is a small body called a **centromere**. Then the chromosomes start to shorten and thicken and divide into 2 helical coiled strands called **chromatids**. DNA is replicated half to each chromatid.

Metaphase. In stained cells on microscope slides, the nuclear membrane and nucleolus can no longer be seen during metaphase in vascular plants. Metaphase is marked by the appearance of the spindle. It is at this time that the chromosomes migrate to the spindle and the centromeres align in a flat equatorial plane. The pairs of chromatids. are held together at the centromeres.

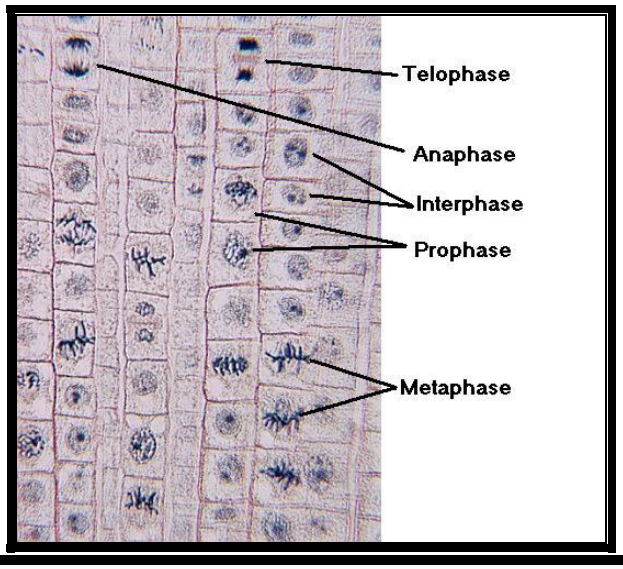
Anaphase. Anaphase is initiated with division and separation of the centromere, providing each chromatid with centromere). This phase ends with the chromatids, which are now called chromosomes, moving to opposite poles of the spindle.

Telophase. This phase begins with the chromosomes completing their movement to the poles. It ends with the chromosomes once more becoming diffuse, as in interphase. A new nuclear membrane forms around each group of chromosomes and nucleoli reappear. During interphase, a new cell wall forms between the nuclei.

2- Cytokinesis:- While the two nuclei are re-organizing, a cell plate appears near the equator of the original cell. The cell plate extends across the cell toward the walls of the original cell and becomes a rigid layer by adding a cellulosic material by each new cell against the cell plate. Now it becomes a middle lamella, this separating the original cell into two daughter cells.

Practical parts:

Examine the L. S. of **Allium cepa** root tip. And try to recognize each phase in mitosis, and draw them with labels.



Mitosis in Allium cepa root tip.