

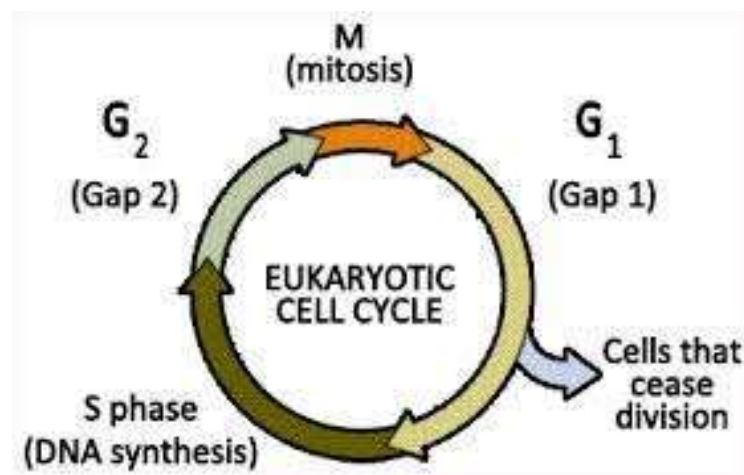
## Cell division

### Cell Cycle:

Cell division is a very important process in all living organisms. During the division of a cell, DNA replication and cell growth also take place. All these processes, i.e., cell division, DNA replication, and cell growth, hence, have to take place in a coordinated way to ensure correct division and formation of progeny cells containing intact genomes. The sequence of events by which a cell duplicates its genome, synthesises the other constituents of the cell and eventually divides into two daughter cells is termed **cell cycle**. Although cell growth (in terms of cytoplasmic increase)

is a continuous process, DNA synthesis occurs only during one specific

stage in the cell cycle. The replicated chromosomes (DNA) are then distributed to daughter nuclei by a complex series of events during cell division. These events are themselves under genetic control.



## Cell division

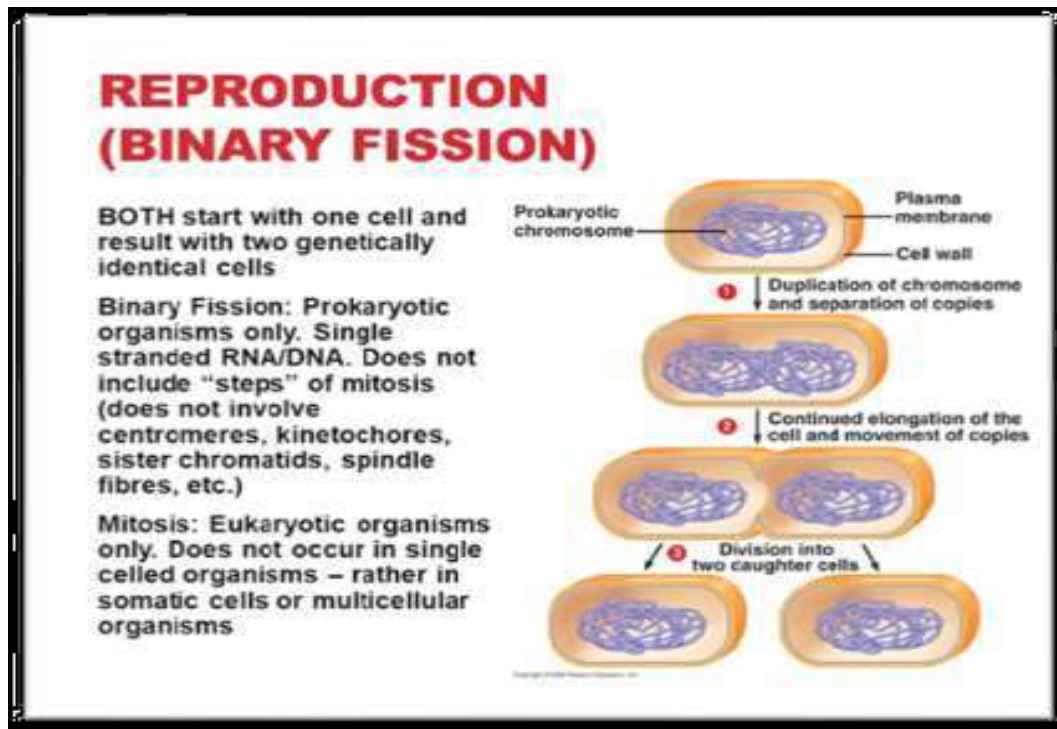
There are ٣ types of cell division:

- ١- Binary fussion
- ٢- Mitotic cell division
- ٣- **Meiosis** cell division

There are Two Types of Cell Division in Eukaryotic Cells Mitosis = cellular division in which the daughter cells receive the exact chromosomes and genetic makeup of the parent cell; occurs during growth and repair. Meiosis = nuclear division that occurs as part of sexual reproduction in which daughter cells receive the haploids (equal) number of chromosomes.

### ١- Binary fussion

Binary fission, asexual reproduction by a separation of the body into two new bodies. In the process of binary fission, an organism duplicates its genetic material, or deoxyribonucleic acid (DNA), and then divides into two parts, with each new organism receiving one copy of DNA. Is the primary method of reproduction of prokaryotic organisms.



## ٦- Mitosis

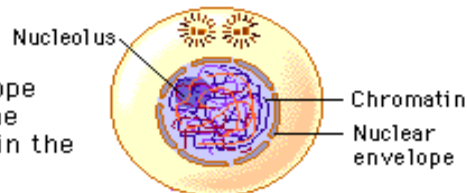
Eukaryotic cells divide by undergoing mitosis, which is, somewhat similar to binary fission inasmuch as the splitting of one cell into two identical daughter cells is concerned. The difference lies in the complexity of the process and the number of stages a eukaryotic cell goes through to split into two complete, individual daughter cells. Owing to a more complex structure and the presence of a number of specialized organelles, eukaryotic cells go through a number of stages that involve preparation of the parent cell for division, division of the nucleus and all of its genetic matter and chromosomes and division of all organelles, cytoplasm and the cell membrane into two distinct stack, followed by the eventual division of the cell into two compartments, each compartment containing exactly the same set of genetic matter and cellular components.

Mitosis starts with *prophase* in which the chromosome is condensed. The cell proceeds to *metaphase* where the chromosomes are aligned on the

metaphase plate. Then the chromosomes are separated in *anaphase* and the cell's cytoplasm is pinched apart during *telophase*. *Cytokinesis* is the final process that breaks the cell membrane and divides the cell into two.

### Interphase

The nucleolus and the nuclear envelope are distinct and the chromosomes are in the form of threadlike chromatin.



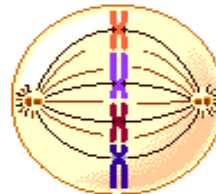
### Prophase

The chromosomes appear condensed, and the nuclear envelope is not apparent.



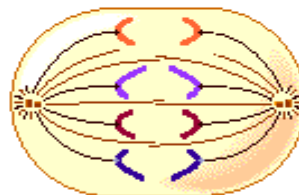
### Metaphase

Thick, coiled chromosomes, each with two chromatids, are lined up on the metaphase plate.



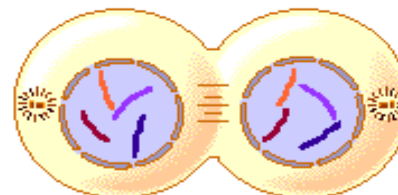
### Anaphase

The chromatids of each chromosome have separated and are moving toward the poles.



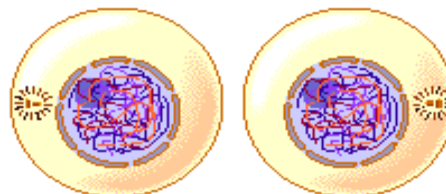
### Telophase

The chromosomes are at the poles, and are becoming more diffuse. The nuclear envelope is reforming. The cytoplasm may be dividing.



### Cytokinesis

Division into two daughter cells is completed.



### ٣ - Meiosis

Meiosis is the type of cell division that occurs in eukaryotic organism specifically for the purpose of sexual reproduction. During meiosis, each diploid cell, containing two sets of chromosomes, divides into two haploid cells, containing just one set, wherein each daughter cell has just half the number of chromosomes the parent cell had. The diploid parent cell is actually the germ line cell which differentiates into the haploid gametes or specific male or female sex cells. The haploid cells thus formed in males are called sperms while those in females are called ova or egg cells.

The stages of meiosis are similar to mitosis, but the chromosomes act differently. Meiosis has two phases, which include two separate cell divisions without the DNA replicating between them. *Meiosis I* and *meiosis II* have the same ٤ stages as mitosis: prophase, metaphase, anaphase, and telophase. Cytokinesis concludes both rounds of meiosis.

