

# CELL CYCLE AND CELL DIVISION

Cl11 ch 10

# Contact me

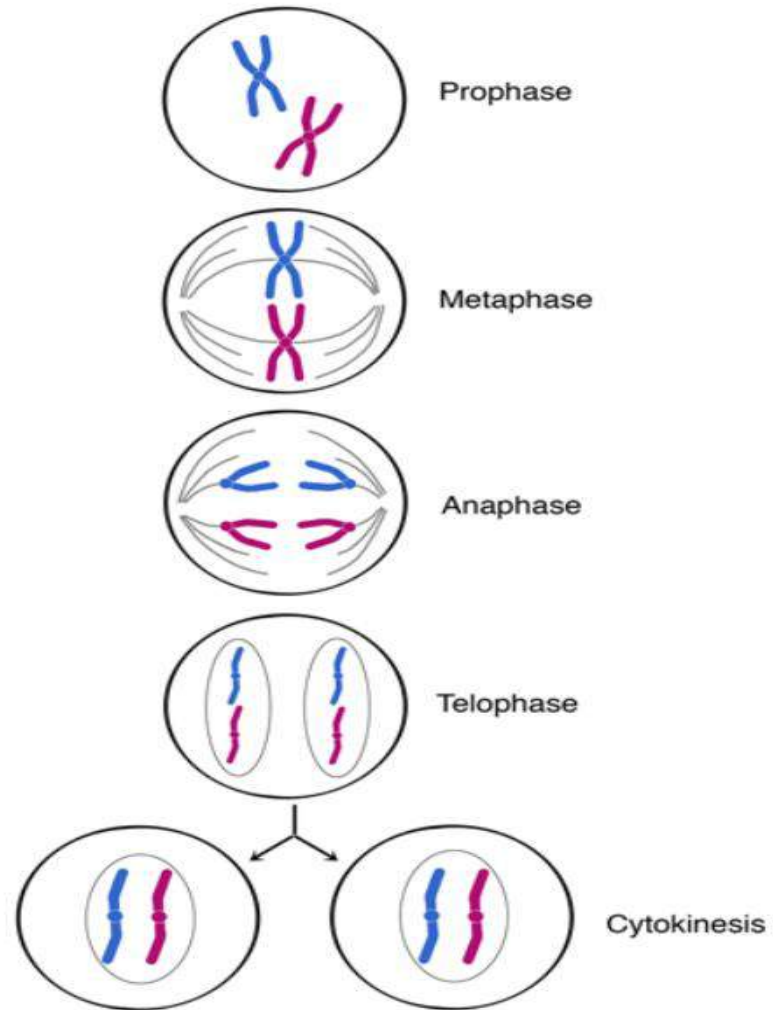
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- all organisms, even the largest, start their life from a single cell.
- Growth and reproduction are characteristics of cells, indeed of all living organisms.
- All cells reproduce by dividing into two, with each parental cell giving rise to two daughter cells each time they divide.
- These newly formed daughter cells can themselves grow and divide, giving rise to a new cell population that is formed by the growth and division of a single parental cell and its progeny.
- In other words, such cycles of growth and division allow a single cell to form a structure consisting of millions of cells.

# CELL CYCLE

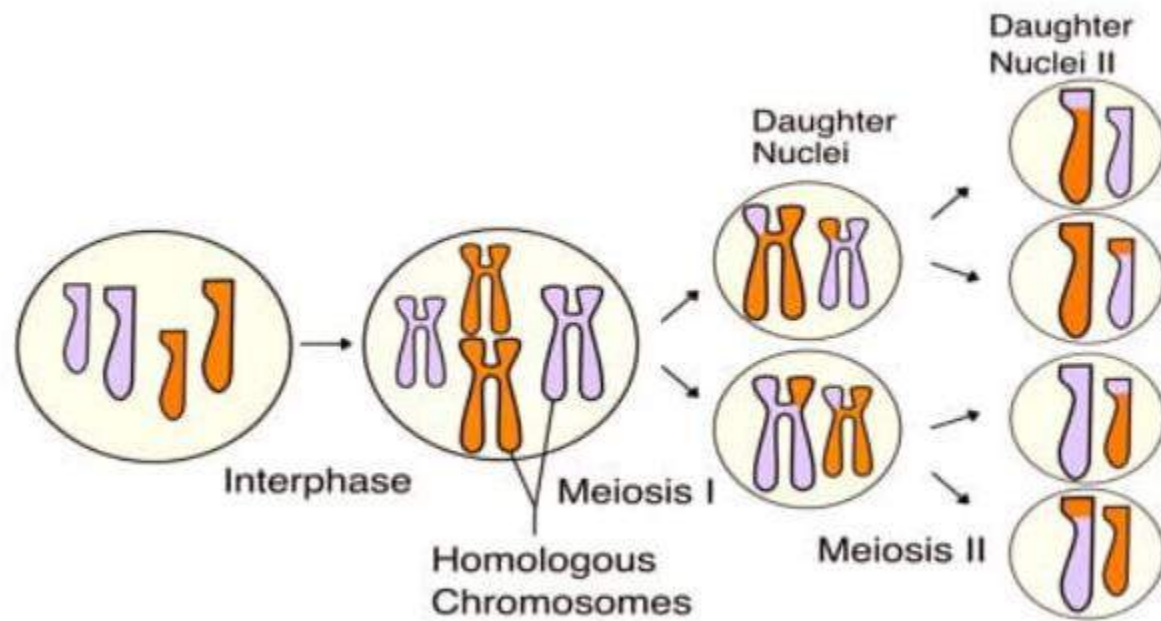
- Cell division is a very important process in all living organisms. During the division of a cell, DNA replication and cell growth also take place.
- All these processes, i.e., cell division, DNA replication, and cell growth, hence, have to take place in a coordinated way to ensure correct division and formation of progeny cells containing intact genomes.
- The sequence of events by which a cell duplicates its genome, synthesizes 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.

# Mitosis



# Mitosis

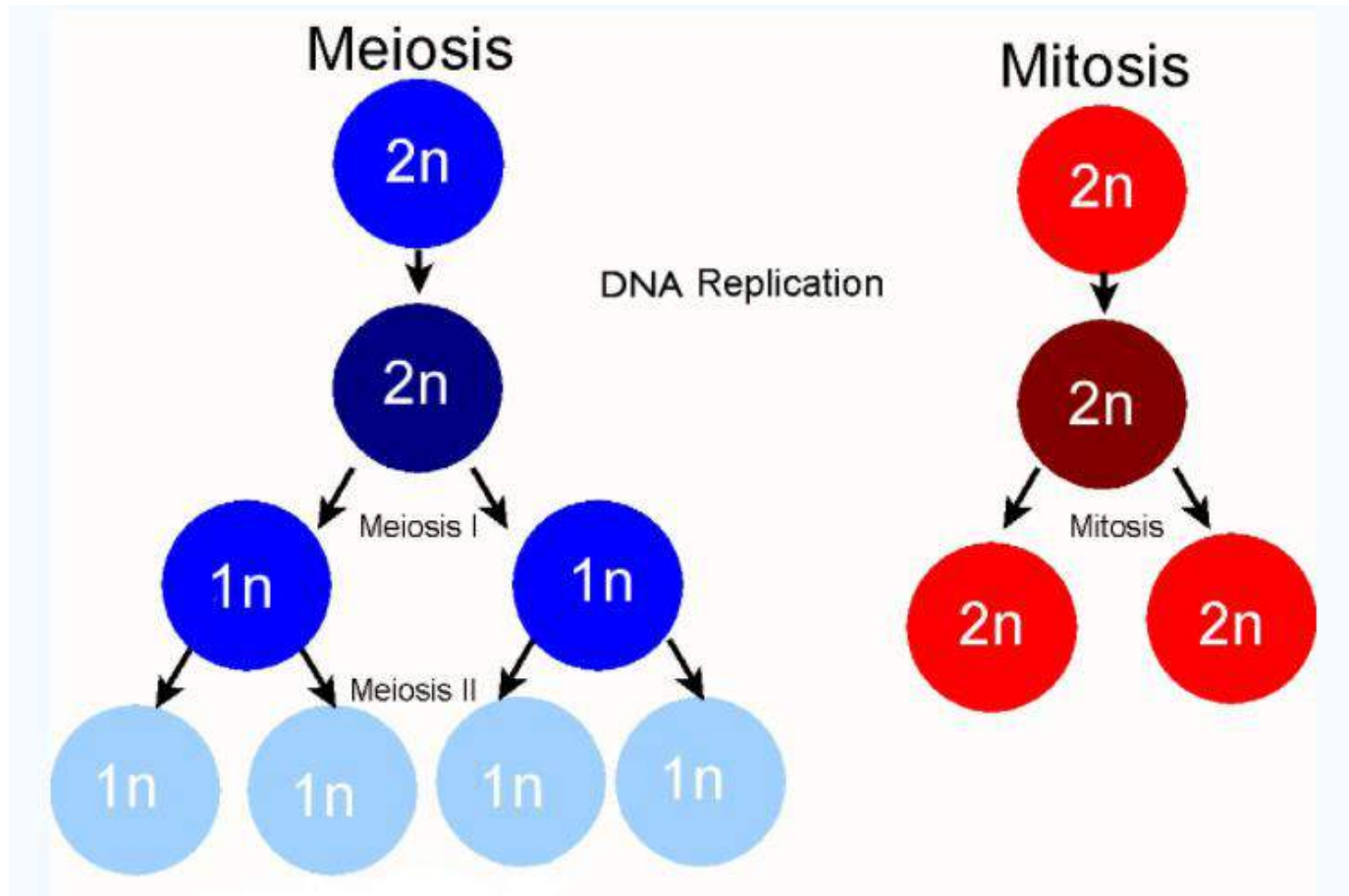
- (i) It helps in the production of diploid daughter cells with equal and identical genetic complement.
- (ii) Mitosis helps in growth of multicellular organisms.
- (iii) It also helps in maintaining a proper cell size by dividing an overgrown somatic cell.
- (iv) It is helpful in cell repair mechanism, eg., continuous replacement of the cells like of the upper layer of the epidermis, cells of the lining of the gut, and blood cells.
- (v) The growth of multicellular organism is due to mitosis as, it is known that a cell cannot grow in size beyond a certain limit without disturbing the ratio between the nucleus and the cytoplasm.
- After reaching the particular size, the cell divides in order to restore the nucleocytoplasmic ratio. Therefore, the growth of cell takes place by the increase in the number of cells, rather than the increase in the size of the cell.
- (vi) It is also helpful in producing new cells for healing wounds and for regeneration.
- (vii) Mitosis plays an important role in continuous growth of plants throughout their life by meristematic tissues like the apical and the lateral cambium.



# Meiosis

- (i) It maintains the same chromosome number in the sexually reproducing organisms. From a diploid cell, haploid gametes are produced which in turn fuse to form a diploid cell. Haploid gametes are formed due to reduction of chromosomes to its half.
- (ii) It restricts the multiplication of chromosome number and maintains the stability of the species.
- (iii) Maternal and paternal genes get exchanged during crossing over. It results in variations among the offspring.
- (iv) All the four chromatids of a homologous pair of chromosomes segregate and go over separately to four different daughter cells. This leads to variation in the daughter cells genetically.
- (v) Paternal and maternal chromosomes assort independently . Thus, cause reshuffling of chromosomes and traits controlled by them.





|  | <b>Mitosis</b>  | <b>Meiosis</b>  |
|--|---|---|
| <b>Definition</b>                        | A process of asexual reproduction in which the cell divides into two, producing a replica with an equal number of chromosomes in each resulting diploid cell. | A type of cellular reproduction in which the number of chromosomes are reduced by half producing two haploid cells. |
| <b>Occurs in</b>                         | All organisms   | Reproductive cells of humans, animals, plants and fungi.  |
| <b>Type of reproduction</b>              | Asexual   | Sexual  |
| <b>Genetically</b>                       | Produces identical organisms or cells   | Different cells or organisms.   |
| <b>Crossing over</b>                     | No, crossing over cannot occur.   | Yes, mixing of chromosomes can occur.   |
| <b>Pairing of Homologous chromosomes</b> | No  | Yes   |
| <b>Number of divisions</b>               | 1   | 2   |
| <b>Number of daughter cells produced</b> | 2 diploid cells   | 4 Haploid cells   |

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Thankyou