

# CELL-REPRODUCTION

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## Cell Division

## Cell-Cycle

1. Formation of new cells from pre-existing cells is known as

Cell Reproduction.

2. It occurs through cell division.

3. After replication of its <sup>cell</sup> components a cell <sup>may</sup> give rise to two to four (2-4) cells. This process is known as Cell division.

The process of <sup>or</sup> formation of two to four (2-4) cells, after replication of components of a cell is known as Cell-Division

4. The newly formed cells are known as Daughter cells and the cell which divides is known as Mother cell.

5. The series of changes that occur in cells from its beginning as daughter cell, to act as mother cell, giving rise its own daughter cell is known as Cell-Cycle.

6. The sequence of events by which a cell duplicates its genome, synthesis of other constituents of the cell and eventually divides into two daughter cells is known as Cell-Cycle

7. The time (period) required to complete one cell-cycle (i.e. period between two successive cell divisions) (From the beginning of one cell division to the beginning of next cell division) is known as Generation Time

Cell div<sup>n</sup> (contd.)

History of Cell div<sup>n</sup> / Repd<sup>n</sup> / Cycle.

1. 1824 - Prerost and Dumas → Studied cleavage in fertilized egg of frog.

2. 1841 → Robert Remak → Working on cleavage of egg  
→ Found cells to develop from cells.

1855 — do → Discovered Mitosis  
3. 1855 → Rudolf Virchow → Observed that →  
The new cells always develop/come from pre-existing cells — Omnis cellula-e-cella [1858]

He proposed → Cell Lineage theory or Law of cell lineage  
And.  
Doctrine of genetic continuity

4. ~~4~~ Howard & Paley 1873 → Strasburger → Nuclei present inside the cells also develop from pre-existing nuclei

5. 1875 → Edward Strasburger → German → Described (1stly) → Mitosis in plant cells.

6. 1879 → Walther Fleming → German → Described (1stly) → Mitosis in animal cells.

7. 1882 August Weismann → He gave the term Mitosis  
1887 → Edouard Van Beneden → Theoretically predicted that no eggs must be laid during gamete formation.  
8. 1900 → Edouard Van Beneden and Winiwater separately studied

details of Meiosis, but said it as Double division. This is required for formation of gametes.

9. 1905 → Farmer and Moore coined the term meiosis.

10. 1953 → Howard and Paley → Studied details of cell-cycle.



## Factors Responsible For Cell Div<sup>n</sup>

or Causes or Cell Div<sup>n</sup>

(3) (3)

There are a number factors which are responsible for induction of cell-division. Some of important<sup>ones</sup> are as follows:

1. Mitogens: These are substances (Biochemicals) which induce cell division e.g. Cytokinin a plant hormone (known).  
EGF (Epidermal Growth Factors) in animal cells.  
PDGF (Platelet Derived Growth Factor) & Lymphokines.
2. Minimum Growth: Some amount of cell and its components is required for cell-div<sup>n</sup>.
3. Nucleo-cytoplasmic or Karyoplasma Ratio: After cell div<sup>n</sup>, the size of cytoplasm of daughter cells increase as time span, but the size of nucleus remain same as initial (very less change). N/C as decreases (Decrease in nucleocytoplasmic ratio); C/N increases (Increase in cytonuclear ratio) stem to trigger the cells to divide.
4. Surface<sup>area</sup> volume Ratio: As daughter cells grow there is decrease in surface<sup>area</sup> volume ratio. It hinders the efficiency of surface exchange required for maintenance of optimum metabolism. After a critical stage (S.A/V) the cell is stimulated to divide.

All Cycle consists of two phases

- A → Interphase
- B → M-phase.

- A → Interphase:

L. - inter = In between  
Gk - phasis = state.

1. Previously it was known as Rest phase also.
2. But now it is established that various changes take place at molecular and sub molecular level i.e. production of carbohydrates, lipids, proteins and nucleic acids needed for its growth and different functions.
3. It is a period of intense synthesis and growth.
4. It involves a series of changes that ~~involving~~ in a newly formed cell and its nucleus to get ready for division.
5. It is an interval between two successive divisions.
6. It takes 75% - 90% of generation time
7. It has three sub-stages / phases
  - G<sub>1</sub> → Gap-I phase
  - S → Synthesis phase
  - G<sub>2</sub> → Gap-II phase