

* Cell Cycle and Cell Division *

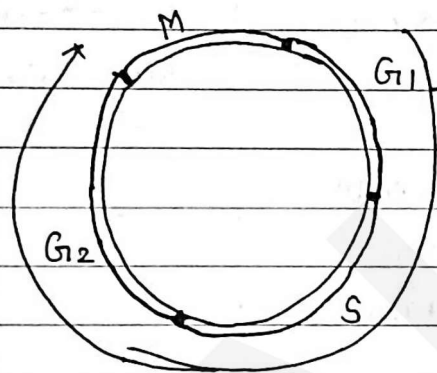
* Cell cycle.

- Grow in size
- DNA synthesis
- Grows more
- divided into 2 daughter cells
- It is controlled genetically
- To maintain Nucleoplasm ratio
cytoplasm

* Cell cycle duration

- varies in each organism and cell type
- Ex - Human cell - 24 hours
- Yeast - 90 minutes
- Bacteria - 20 minutes

* Phases of Cell cycle.



G₁ → Interphase (more than 95% of cell cycle)

* G₁ Phase (Gap 1)

- Growth
- Metabolically active (Protein synthesis)
- Prepare for DNA Replication
- Synthesis of RNA & protein

S - (Synthetic) phase.

→ longest

- DNA replication takes place
- Amount of DNA doubles but no. of chromosome remains same.
- Centrioles, histones duplicate.

G₂ Phase.

- More growth
- RNA & protein^{are} synthesis
- Cell prepares for division

* Mitosis.

- cell division occurs in somatic cell
- Equational division.
- Generally in diploid cell
- ↳ Haploid cells - In plants, honey bee.

1) Prophase. → Early prophase.

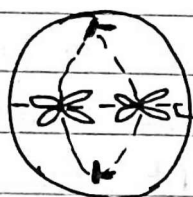
- Chromatin fibres - condensation start
- Nucleolus start to disintegrate.
- Nuclear envelope - Starts disintegrate

→ late prophase.

- Condensation continues
- Nuclear envelope, nucleolus, ER, GA disappear
- Spindle Fibres originate.
- Centrioles move towards pole.

2) Metaphase.

- Chromosome condensation complete
- Best phase to study morphology of chromosome



→ metaphase
Plate

- Spindle Fibres attach to kinetochores
OF chromosome

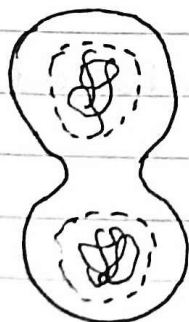
3) Anaphase.

- Shortest phase, centromere splits
- Sister chromatid separate
- move to opposite poles



4) Telophase

- Chromosomes reach opposite poles
- uncoil - chromatin fibres
- Nuclear envelope, ER, GA reappear
- Spindle Fibres disappear

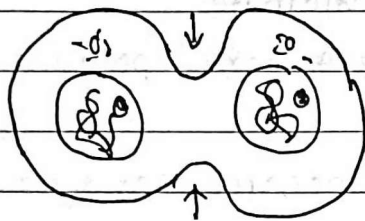


* Cytokinesis (cytoplasmic division)

- In plants centrioles are absent hence it is called anastral mitosis
- In animals centrioles form spindle apparatus called astral mitosis

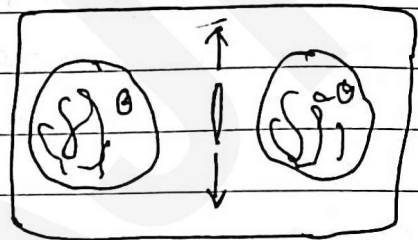
In Animal Cell

- In animal cell it occurs by a process called Cleavage / Furrow formation.



In Plant cell

- In plant cell it occurs by the formation of cell plate.



* Significance of Mitosis.

- Growth ; Restores Nuclear / cytoplasmic ratio.
- helps in cell repair and Replacement.
- Produces identical daughter cells

★ plants grow throughout their life due to meristematic cells.

* Meiosis.

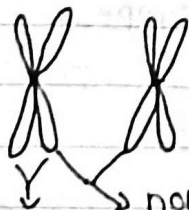
Occurs in germ cells & produce gametes in Animals

Sporic meiosis in Plants

Haploid cells - 4 cells

Homologous Chromosome

Chromosome with similar structure & Pair during meiosis.



sister
chromatids

non sister
chromatids



Meiosis - I (Reductional division)

1) Prophase I

i) Leptotene

→ Chromatin fibres → start condensation

→ Nuclear envelope starts disintegrating



ii) Zygotene

- Homologous chromosomes start pairing - synapsis with the help of synaptonemal complex



iii) Pachytene (longest phase)

Bivalent or tetrad

- Crossing over (Recombining)

- Takes place in the presence 'Recombinase'

- Recombination nodule at crossing over site



iv) Diplotene

- Dissolution of synaptonemal complex except at the site of cross overs

- X-shaped structures - chiasmata

* In oocytes of some vertebrates diplotene last for months or years

v) Diakinesis

- Terminalisation of chiasmata

- Chromosomes are fully condensed

- Meiotic spindle fibre

- Nucleolus, nuclear envelope disappear

2) Metaphase I

- Chromosomes align on equator; spindle fibres attach to chrom.



3) Anaphase I

- Homologous chrom. separate; sister chromatids remain attached



4) Telophase I

- Chrom. reach opp poles

Nuclear memb. nucleolus reappears



* Meiosis II (Equational division, no further DNA Replication)

1) Prophase II



Nuclear envelope,
nucleolus disappear



2) Metaphase II

- chromosome align on
equator spindle fibres
attach to chromosome

3) Anaphase II



sister chromatids
separate; move to
opposite poles

4) Telophase II



4-haploid cells

Significance of Meiosis:

- conserves the chromosome number of each species
- Brings variation