Department of biology

(General Zoology)

Lab3

Stage -1-

Types of cells

By

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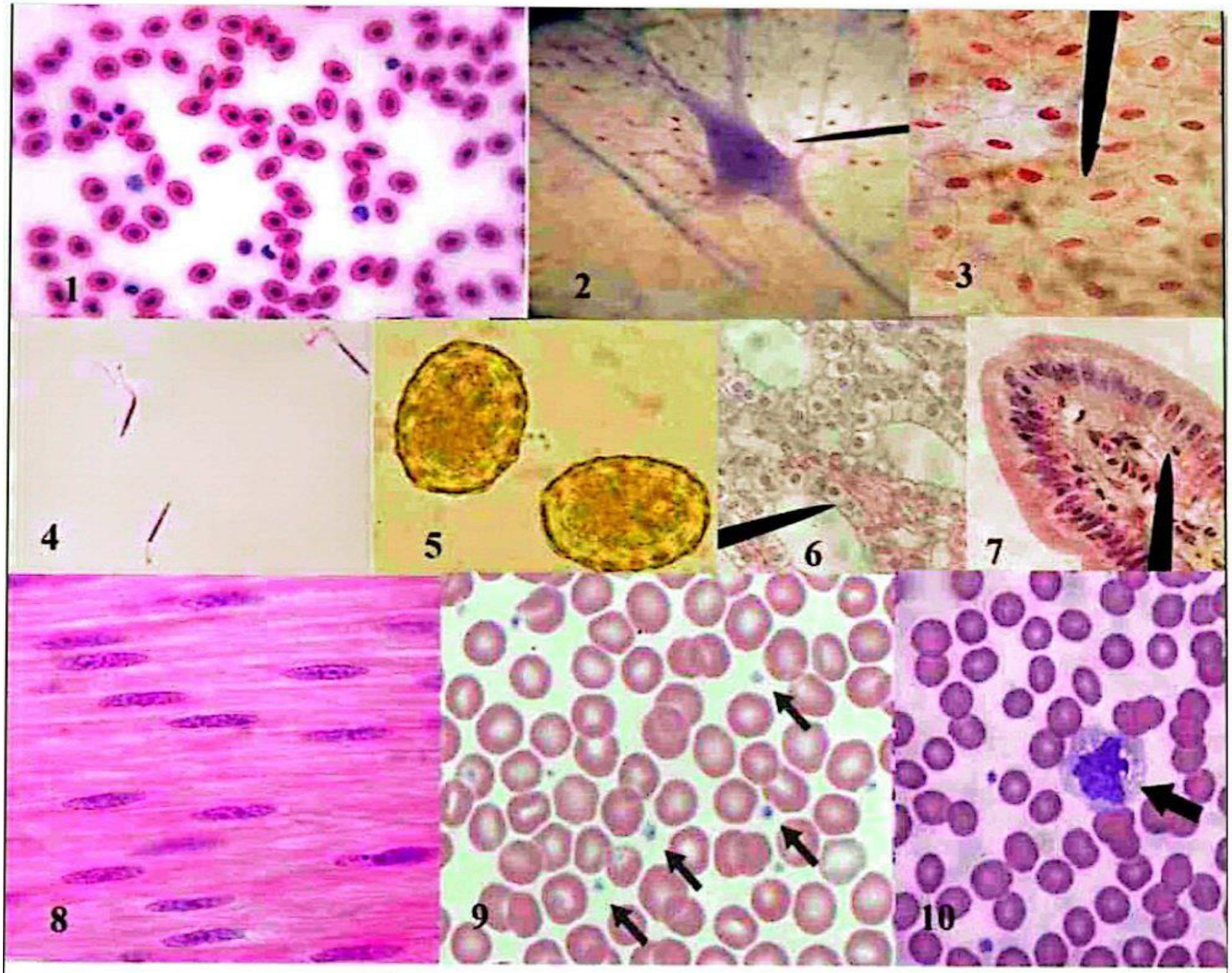
Types of cells:

There are different types of cells found in nature The shape of a cell is often related to its function and specialized role within an organism. Some of the common cell shapes include:

1. **Spherical cells:** These cells are round or spherical in shape, such as red blood cells.
2. **Stellate cells:** These cells have a star-like shape, with multiple branches or projections, such as cells in nerve tissue.
3. **Squamous cells:** These cells are flat and thin, with irregular shapes, such as cells in the skin's outermost layer.
4. **Filamentous:** a cell that has a thread-like or elongated shape, resembling a filament such as: sperms of Frog.
5. **Ovoid:** refers to an animal cell with an ovoid or egg-shaped morphology, such as: ***Ascaris*** worm ova
6. **Cuboidal cells:** These cells are cube-shaped, with equal length, width, and height, such as cells in the lining of the kidney tubules.
7. **Columnar cells:** These cells are long and rectangular in shape, with their height being greater than their width, such as cells in the lining of the intestine.
8. **Fusiform cells**: These cells are spindle-shaped, with tapered ends, such as cells in smooth muscle tissue.
9. **Discoid cells:** These cells are disc-shaped; such as cells in the blood platelets.
10. **Amoeboid cells:** These cells have **irregular**, changing shapes, such as cells of the immune system, like macrophages.



Different types of cells

Cell cycle & Cell division

Introduction:

Cell division is the process by which a parent cell divides into two or more daughter cells. Cell division usually occurs as part of a larger cell cycle

In cell division, the cell that is dividing is called the "parent" cell. The parent cell divides into two "daughter" cells and the process then repeats in what is called the cell cycle.

Why do cells divide???!

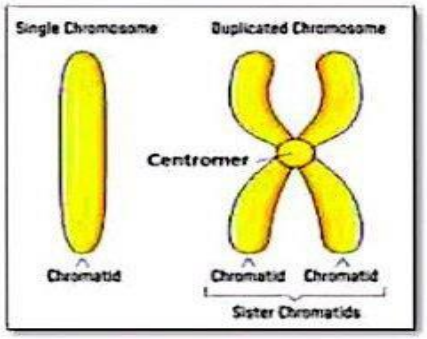
- ✓ To reproduce.
- ✓ To grow bigger.
- ✓ To repair injuries.
- ✓ To become more efficient.

What is Chromosomes:

- ✓ "colored body" seen only when the cell divides
- ✓ Composed of DNA and protein called histones (helps to condense the DNA) to form **Nucleosome**
- ✓ Nucleosomes coil into supercoils – then into chromosomes
- ✓ Must condense in order to separate correctly during mitosis
- ✓ Each chromosome replicates and is paired as sister chromatids joined at a centromere.

Genetic terminology:

- ☞ Diploid organisms receive one of each type of chromosome from female parent and one of each type of chromosome from male
- ☞ Human cell = 46 chromosomes (2n)
- ☞ "n" number = 23 = "haploid"
- ☞ 2n = 46 = "diploid"
- ☞ 4n = 92 (during interphase)
- ☞ Body cells (somatic cells) = 2n = 46 (Mitosis)
- ☞ Sex cells (eggs & sperm) = n = 23 (Meiosis)



The cell cycle:

- The cell cycle refers to the series of events that take place in a cell leading to its division and duplication. Cell cycle consists of **2 phases**:

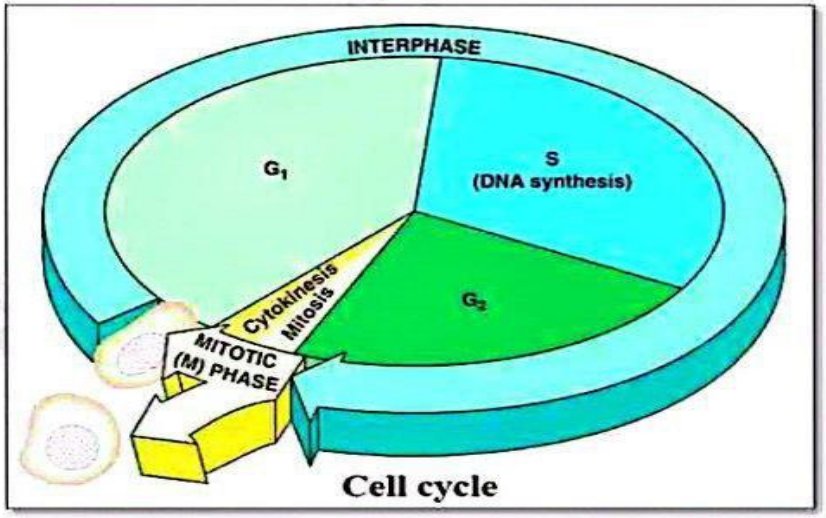
  A. Interphase

  B. Mitotic phase (M Phase)

A. The interphase:

Most of the cell cycle is spent in interphase, that has**3 stages**

1. **G1 stage (Gap1)**: cell growth (increase the size of the cell), cell doubles its organelles, accumulates materials for DNA synthesis.
2. **S stage (synthesis)**: DNA synthesis occurs, and DNA replication results in duplicated chromosomes.
3. **G2 stage (Gap2)**: cell synthesizes proteins and enzymes needed for cell division.



Cell cycle

Interphase It is actually a Non-dividing state. In this state.... cell grows in size, organelles replicated, replication of DNA, synthesis of proteins associated with DNA, synthesis of proteins associated with mitosis.

B. Mitotic phase (M Phase):

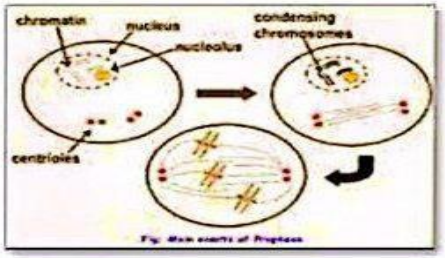
- cells in cukaryotic organisms is called as mitosis
- In this process, a single cell divides into two identical daughter cells.
- Daughter cells have same set of chromosomes as does the parent cell.
- Has of 2 phases:
  - **A. Mitosis**
  - **B. Cytokinesis**

A. Mitosis It has 4 sub-phases:

1. **Prophase**
2. **Metaphase**
3. **Anaphase**
4. **Telophase**

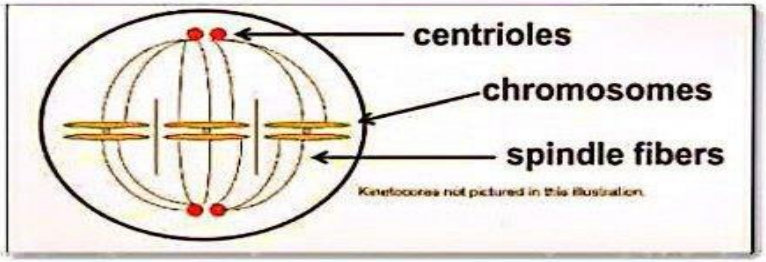
1. Prophase: In this phase 3 Major Events take place:

- Chromosomes condense
- Spindle fibers form (***spindle fibers are specialized microtubules radiating out from centrioles***)
- Chromosomes are captured by spindle.

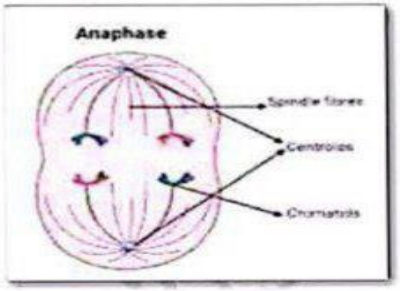


2. Metaphase:

- In this phase chromosomes align along equator of the cell, with one kinetochore facing each pole.

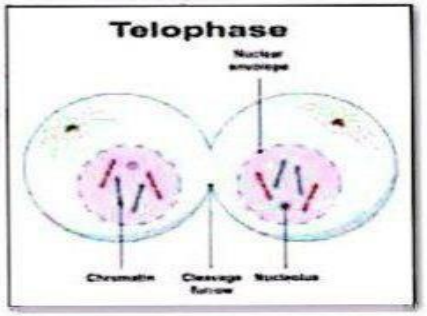


3. **Anaphase:** In anaphase stage



- the sister chromatids separate from each other.
- Spindle fibers attached to kinetochores shorten and pull the chromatids towards the opposite poles.
- The cell appears almost oval in shape as it starts becoming longer.

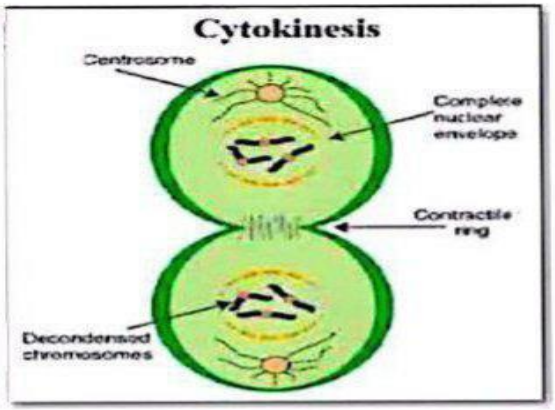
4. **Telophase:** In the telophase stage



- the spindle fibers between the poles disintegrate.
- The nuclear envelopes start reforming around both the groups of chromosomes at the poles
- Chromosomes revert to their extended state by absorbing water from the cytoplasm
- There appears a constriction in the cytoplasm between the two groups of dividing chromosomes.

B. Cytokinesis:

- The cytokinesis means the division of the cytoplasm of the cells after complete the mitosis to form 2 daughter cells, with the same DNA contents of the parent cells (diploid).

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