Faculty of Science

Department of Medical Technology

((General plant sciences))

1st stage

Lab (1)

Plant cell structure

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Lab1 : plant cell structure

There are two types of organelles:

1-- Living (protoplast)

1-**The cell membrane** is about 10 nm thick and cannot be resolved by the light microscope. The limits of the cell can be visualized with the light microscope when there is a heavy concentration of **glycoproteins** or proteoglycans at the cell surface.

2-**The nucleus** is limited by a **nuclear envelope** that consists of a two membrane bilayers and **nuclear pores** that allow passage of material into and out of the cell. **Chromatin**, complexes of DNA and protein, is the major component of the nucleus and consists of two histological structures. **Heterochromatin** is condensed chromatin scattered throughout the nucleus or accumulated along the inner surface of the nuclear envelope. Heterochromatin is considered transcriptionally inactive. In contrast, euchromatin in abundant in cells engaged in transcription. Euchromatin is dispersed and not easily stained.

3-The nucleus often contains one or more **nucleoli** that are spherical or oval bodies composed chiefly of **ribonucleoproteins** (**RNA**). Nucleoli are usually stained with basic dyes because of their high RNA content and are prominent in cells that are actively participating in protein synthesis.

4-**The endoplasmic reticulum (ER)** is a system of interconnected membranous sacs, channels, or cisternae in the cytoplasm. It has two subtypes**: rough endoplasmic reticulum** (RER) and **smooth endoplasmic reticulum** (SER). The RER is a ribbon-like structure surrounding the nucleus near the base of the cell. Its surface appears rough due to the ribosomes attached to its membrane and it is the first organelle into which membrane-bound or extracellular proteins are inserted. SER lacks ribosomes and participates in lipid synthesis and detoxification.

5-**Mitochondria** are organelles that vary greatly in number, size, and shape between different cells in which the biochemical processes of respiration and energy production occur (that is why they called the **power houses**). They are **unusual** in that they contain

their own mitochondrial DNA (**mtDNA**) and **ribosomes**; mitochondrial proteins come from genes in both the nuclear and mitochondrial DNA. These organelles also undergo self-replication. Structurally, two features characterize mitochondria: double bilayer membranes, and cristae, folds that project from the inner membrane into matrix (Figure 3.2).

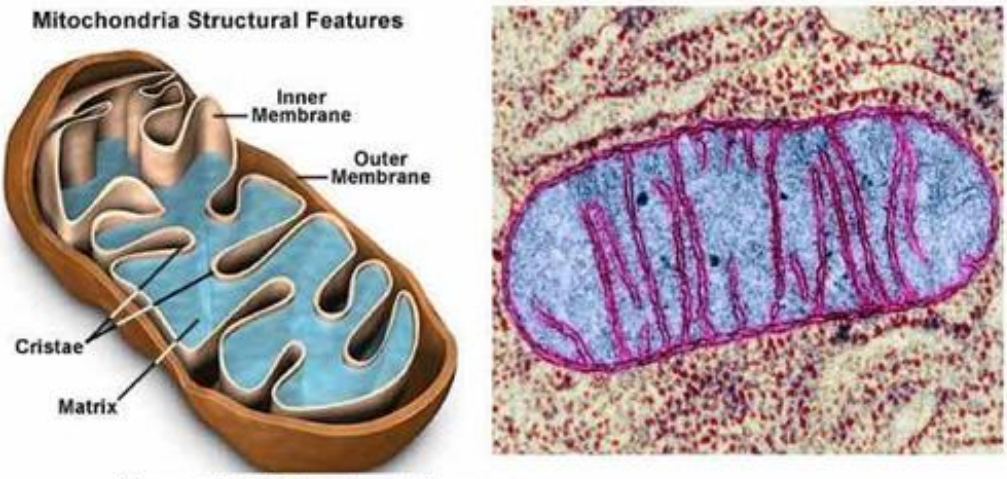

Figure 2-1: Mitochondria structure

6-**Lysosomes** also vary in size and shape, but can be recognized as membrane-bound organelles containing granular material. There are more than 40 lysosomal enzymes that are active at acidic pH.

7- Plastids are large cytoplasmic organelles. Plastids are major organelles found in the cells of **plants and algae**. Plastids are the site of **manufacture** and storage of important chemical compounds used by the cell. Plastids often contain **pigments used in photosynthesis**, and the types of pigments present can change or determine the cell's colour. In plants, plastids may differentiate into several forms, depending upon which function they need to play in the cell (Figure 3.3). The plastids are broadly classified into two main types namely **chromoplasts** and **leucoplasts**.

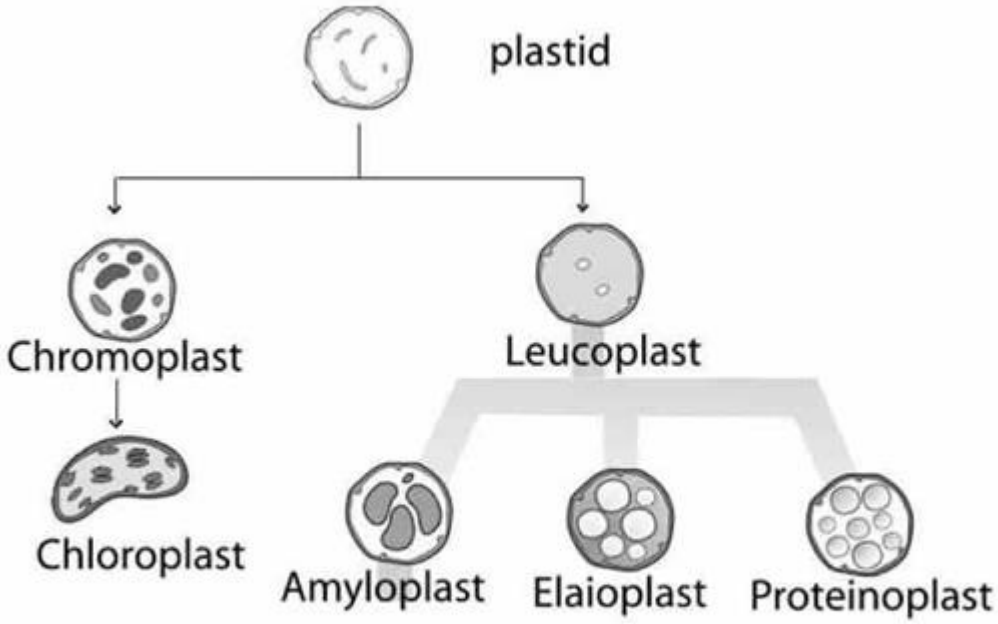

Figure 3-3: The plastids developments