

General Botany

Lecture (3)

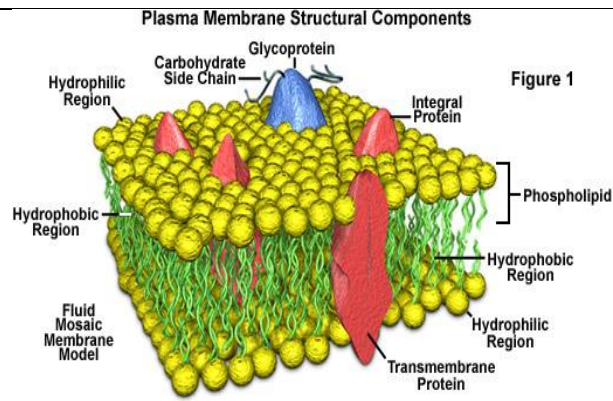
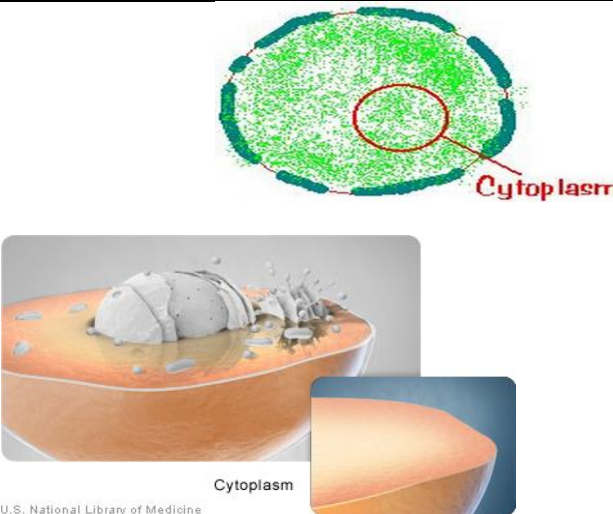
Plant cell

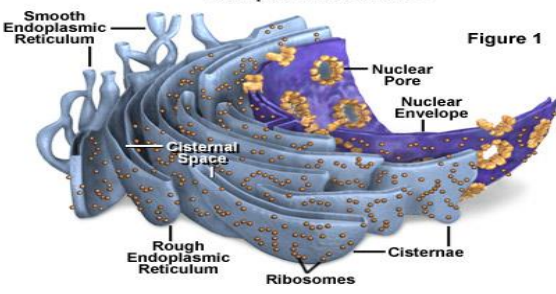
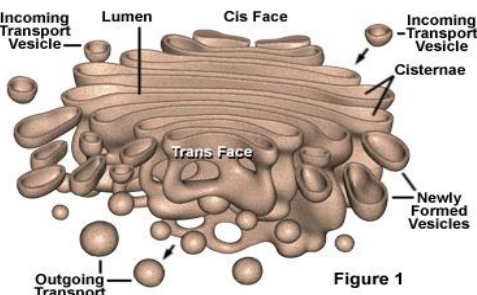
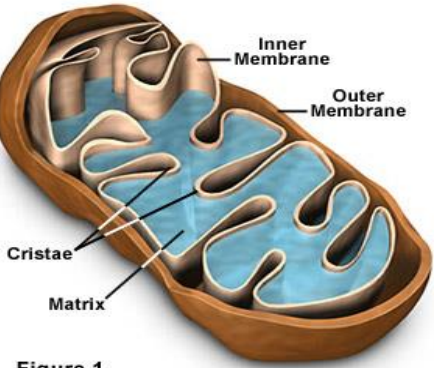
- The protoplast-**Living component**
- Plasma membrane
- Nucleus
- Ribosome
- Plastids
- Mitochondria
- Peroxisome
- Endoplasmic Reticulum
- Golgi apparatus

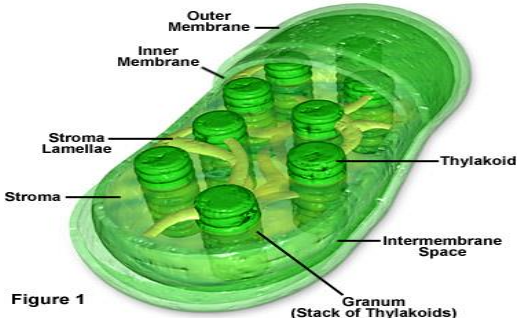
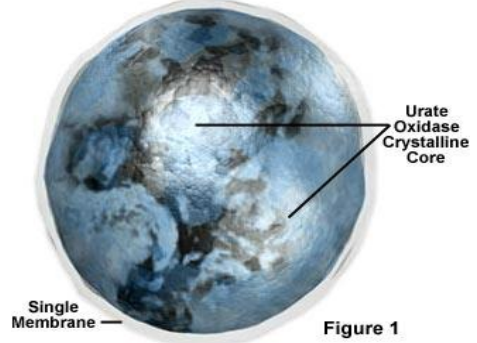
All Groups (1-3)

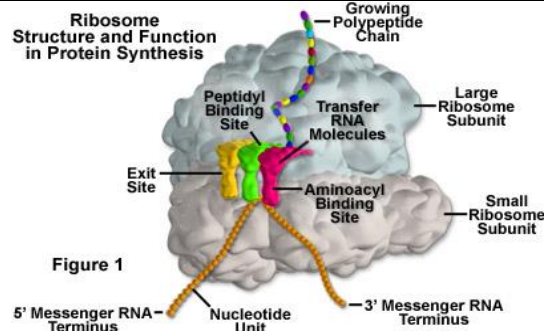
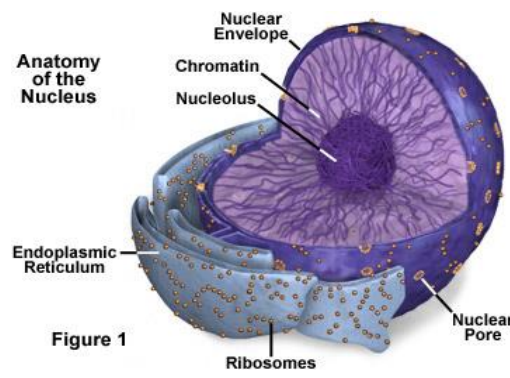
Protoplast

The plant cell typically consists of a more or less rigid **cell wall and a protoplast**. The term protoplast is derived from the word protoplasm, which is used to refer to the contents of cells. A protoplast is the unit of protoplasm inside the cell wall.
A protoplast consists of cytoplasm and a nucleus.

The components	The Function	Figures
1- The plasma membrane It is a phospholipid bilayer. It is both elastic and rigid and helps give the cell its shape. It is selectively permeable	Control transport of substances and homeostasis. It is permeable to gases and water, but many substances can only pass through it with the help of proteins, such as channels, protein pumps and receptor proteins	 <p>Figure 1</p> <p>Plasma Membrane Structural Components</p> <p>Hydrophilic Region</p> <p>Carbohydrate Side Chain</p> <p>Glycoprotein</p> <p>Integral Protein</p> <p>Phospholipid</p> <p>Hydrophobic Region</p> <p>Hydrophilic Region</p> <p>Transmembrane Protein</p> <p>Fluid Mosaic Membrane Model</p>
2- The Cytoplasm The cytoplasm comprises part of the protoplast. Physically it is a viscous substance which is more or less transparent in visible light. Chemically the structure of the cytoplasm is very complex even though the major component (85 – 90 %) is water. The cytoplasm is delimited from the cell wall by a unit membrane termed the plasma lemma and from the vacuole by another unit membrane the tonoplast.	Contains all the components of a living cell and non-living	 <p>Cytoplasm</p> <p>Cytoplasm</p> <p>U.S. National Library of Medicine</p>

The components	The Function	Figures
<p>3- Endoplasmic Reticulum</p> <p>One of the membranous structures occurring in the cytoplasm is the endoplasmic reticulum (ER). This is a complex system which consists of two-unit membranes enclosing a narrow space between them.</p>	<p>1- In special form the (ER) occurs in the cytoplasm strands, plasmodesmata traversing the walls of neighboring cells.</p> <p>2-Carrying the ribosome</p> <p>3-has role in cell division</p>	<p>Endoplasmic Reticulum</p>  <p>Figure 1</p>
<p>4- Golgi apparatus</p> <p>The Golgi apparatus consists of a system of stacks of flat circular cisternae, each bound by a smooth unit membrane.</p> <p>The Golgi bodies are concerned with secretion processes and have a polar structure. In active bodies in addition to the production of many vesicles distal cisternae may break up into vesicles</p>	<p>The Golgi bodies are mainly involved in the secretion of sugar, polysaccharides and polysaccharides protein complexes.</p>	<p>The Golgi Apparatus</p>  <p>Figure 1</p>
<p>5- Mitochondria</p> <p>Mitochondria are organelles which can be seen with the light microscope when living cells are stained with Janus Green B. The mitochondria contain ribosome's which are smaller than those of the cytoplasm and DNA fibrils, but their genetic capability is limited.</p>	<p>The mitochondria are concerned with processes of energy conversion and contain many enzymes</p>	<p>Mitochondria Structural Features</p>  <p>Figure 1</p>

The components	The Function	Figures
<p>6- Protoplastids Plastids are organelles characteristic of plant cells and have no homologues in the animal cell. The principal types of Plastids are chloroplasts, chromoplasts, and Leucoplasts.</p> <p>a. Chloroplasts are green as a result of the pigment chlorophyll which predominates in them.</p> <p>b. Chromoplasts are usually yellow, orange or red because of the carotene pigments.</p> <p>c. Leucoplasts are non-pigmented Plastids usually located in tissues not exposed to light and they store plant products such as starch, protein and fats.</p>	<ol style="list-style-type: none"> 1) Site of photosynthesis 2) Providing space for the temporary storage of starch 3) Involved in the synthesis of amino acids and fatty acids 	<p style="text-align: center;">Plant Cell Chloroplast Structure</p>  <p>Figure 1</p>
<p>7- Peroxisomes Micro bodies are small bodies 1.5 nm in diameter which occurs in the cytoplasm of a Varsity of tissues. They are bound by a single membrane and their matrix appears granular or fibril. They contain enzymes that Vary in accordance to the type of cell or tissue in which they are present.</p>	<p>These micro bodies are sites for oxidation of glycolic acids, a product of carbon dioxide fixation.</p>	<p style="text-align: center;">Peroxisome</p>  <p>Figure 1</p>

The components	The Function	Figures
<p>8- Ribosomes Are small particles (17-20) μm in diameter that occur free in the cytoplasm, on the outside of the membranes of the endoplasmic reticulum, in the nucleus, also, chloroplasts, and mitochondria contain smaller ribosomes (similar to those in prokaryotes) Ribosomes aggregates called polysomes or polyribosomes.</p>	<p>They consist of RNA and protein mainly histone</p>	 <p>Ribosome Structure and Function in Protein Synthesis</p> <p>Figure 1</p>
<p>9- Nucleus The cell usually contains a single nucleus but there are also cells which have numerous nuclei. The nucleus is usually more or less spherical though nuclei with other shapes have also been observed. The nucleus is surrounded by an envelope and contains the nuclear matrix and one or more nucleoli. In the nucleoplasm chromosomes consisting of deoxyribonucleic acid (DNA) and proteins are present. The complex of DNA and protein in the chromosomes which has an affinity to basic dyes is called chromatin</p>		 <p>Anatomy of the Nucleus</p> <p>Figure 1</p>