محاضرات المستوى الأول
قسم علوم البيئة
جامعة الموصل

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INTRODUCTION TO BOTANY

The oldest plants identified by ancient man and wheat occupied the first place among grain crops for its superiority in nutritional value has been found wheat grains charred in the excavations of the village (Garmo) eastern Iraq and is the oldest village has been discovered dating back to (6700 BC). It accompanies man in his food as well as in the manufacture of ships, houses, and hunting weapons... For these reasons, botany gained importance.

Botany:

Botany is one of the branches of biology and specializes in the study of plants in terms of structure, properties, classification, diseases, biochemical reactions, and interaction with the environment, and human interest in plants began early for their importance in his life, as it is a major source of food and medicines

Departments of Botany

1. Plant Morphology.

The science of phenomorphology deals with the structure and shape of plants and includes some subdivisions such as cytology, cell study, history,

histology, anatomy, the study of tissue organization in plant organs, the study of life cycles, and the study of evolution and development, as this science describes the shape of the plant in all its parts from roots to leaves, flowers, and seeds.

2. Plant physiology.

is a branch of botany, which includes all the internal chemical and physical activities of plants, and it is also concerned with studying the functions of all the organs of the plant, explaining how these organs perform their functions, and also including ways in which the plant produces and exploits its food, and how to help the different cells of the plant to grow and multiply, and how the plant responds to the surrounding world.

3. Plant taxonomy:

is a science responsible for the classification and naming of plants, taxonomy divides plants based on their relationships with each other, and is also interested in the study of plant remains, and fossils, and this science or modern taxonomy was established thanks to the Swedish science Carlos Linnaeus, and modern classification uses a binary naming system.

4. Plant Genetics:

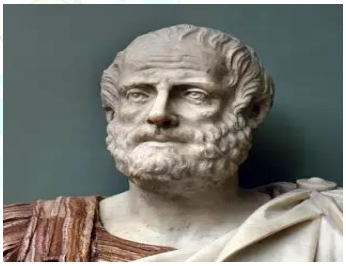
Genetics is the study of genes, and the function of genes, and many modern plants have been analyzed to use plant DNA and their genomic information, in order to study plants more accurately than before, molecular biology has opened up to taxonomists to classify plant species based on DNA, and plants have been classified into different families, and renamed as a result.

5. Plant pathology: (plant epidemiology)

Is the scientific study of diseases affecting plants caused by pathogens (infectious organisms) and environmental conditions (physiological factors), including organisms that cause infectious diseases, fungi, bacteria, and viruses.

One of the most important botanists in history:

1. Aristotle (384-323 BC)



The summit of the Golden Age of Plant Sciences established the first botanical garden and attributed botany to the proportion of water it contains. So do the longevity of trees because of their low water content and the short life of herbs due to their large water content.

2. The Greek philosopher Theophrastus (371-285 BC) or an attempt to divide plants divided into trees, shrubs, and herbs and defined the plant parts into roots, stems, and leaves according to their functional characteristics.

3. Descoris (37 BC) was the first to write about the science of plant medicine.

4. The Arabs have a long history of translating the works of the Greeks and added a lot of their own studies.
5. Jabir Ibn Hayyan (700-765 AD) is concerned with the chemical composition of the plant.
6. Ibn Sina (980-1037 AD) was interested in medicinal plants.
7. Ibn al-Bitar (1197-1248 AD) was born in Spain and traveled in search of plants to Tunisia, Egypt, Syria, Hijaz, and Iraq and described 400 plants he saw.

In the seventeenth and eighteenth centuries, the modern scientific renaissance began, and scientific societies and academies appeared, so the discoveries and studies that had a great impact on the prosperity of various scientific researches and the most important scientists for that period

1. **Levenhoek (1632-1732 AD)**

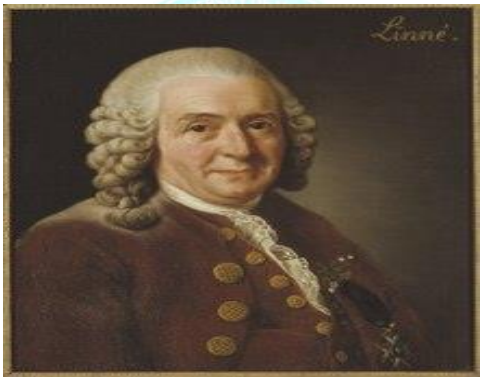
Made composite lenses and discovered and drew bacteria.

2. Robert Hooke (1632-1702 AD) defined the cell as the unit of structure in plants.

3. Marcello malpighi: (1628 – 1694 AD)

Discovered the stomata in the leaves and knew their usefulness and discovered the plant's breathing and stressed the importance of leaves in making food.

4. Carl Linnaeus



(1707 – 1778 AD A Swedish scientist classified plants according to their structure and similarity with other species, and gave all known plants a two-syllable name, which is known by the binomial nomenclature that is still used today.

And from specialists in the field of botany at the University of Mosul, where I work and learned a lot from them.

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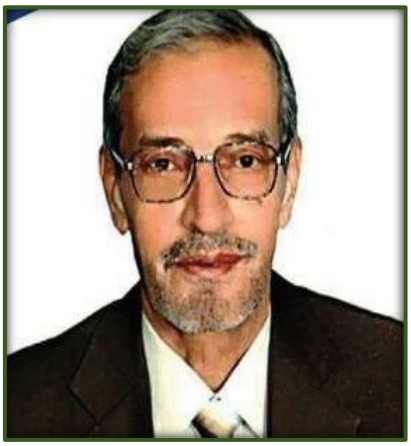
From the Department of Biology at the University of Mosul, the department from which I graduated .

The Prof. Dr. Abdul Muttalib Sayed Muhammad Ali Al-Araji (1945-2022).



He has many contributions in the field of plant physiology and plant tissue culture technology and has five patents and books in the field of botany and photosynthesis and providing the library with many master's and doctoral theses in the field of botany.

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Plant cell

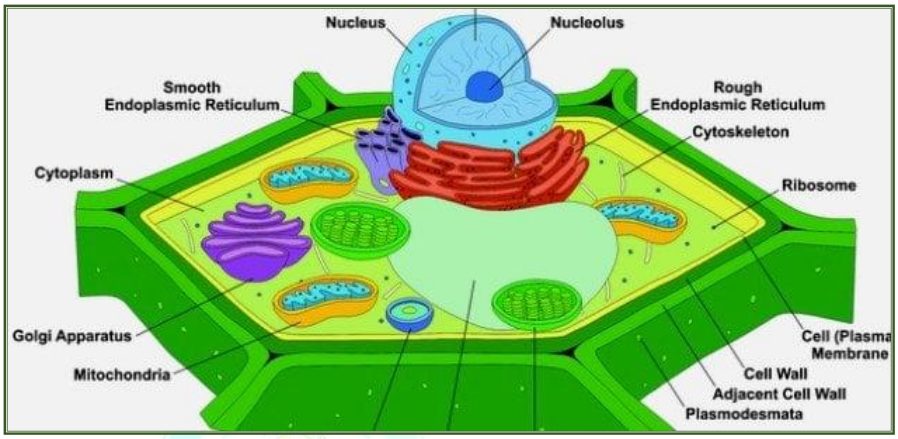

Fig.1: Plant cell

The structure of the plant cell varies according to the functions it performs, it generally contains organelles in the animal cell itself, in addition to chloroplasts and a number of large vacuoles.

1. **Plasma membrane:** It is a very thin membrane that surrounds the cell, and plays an important role in the passage of nutrients and waste into and out of the cell. The cell wall in both animal and plant cells and bacteria is made up of protein complexes and phosphorylated lipids. One of its functions.

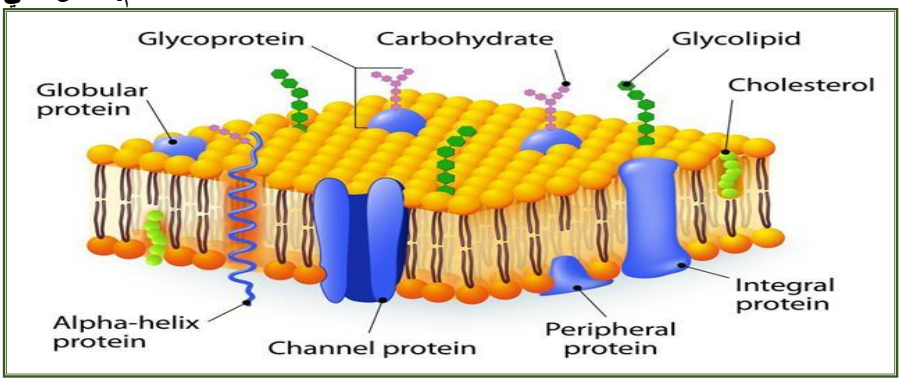

Fig. 2: Plasma membrane

a. Cytoplasm preservation

b. Regulating the entry of food and waste into and out of the cell.

c. Cell protection

2. **Cytoplasm:** It is the protoplasmic mass where the organelles of the cell are embedded in it. At present, it is believed that not all essential compounds combine with specific organelles found in the cytoplasm. Most enzymes are found in the cytoplasm.

Organelles are located in the cytoplasm

a. Endoplasmic reticulum and ribosomes: The endoplasmic reticulum is a network of closed-branched membrane channels that penetrate the cytoplasm and do not open in it, but connect the plasma membrane in the nuclear envelope (a membrane surrounding the nucleus). In the cell, there are two types of endoplasmic reticulum, one smooth and the other rough-surfaced, covered with existing granules containing 80% of the RNA in the cell, and these granules are called ribosomes, which are a plant for building proteins on the cell.

Among the functions of the endoplasmic reticulum are: the formation of lipids and the transfer of products of structural processes.

Ribosomes

Ribosomes are found in the cell either accompanied by the endoplasmic network or free in the cytoplasm or in the mitochondria or plastids and range in diameter between 0.1 - 0.3 microns and contain 50-60% RNA acid and 40 - 50% protein, meaning that it is a collection of RNA molecules and protein and the common RNA in the construction of the ribosome is called RNA (r- RNA) and ribosomes are usually found in cluster groups or in the form of swimming or polyribosomes, which are the active places for the representation of peptides when they are associated with messenger RNA or(m-RNA).

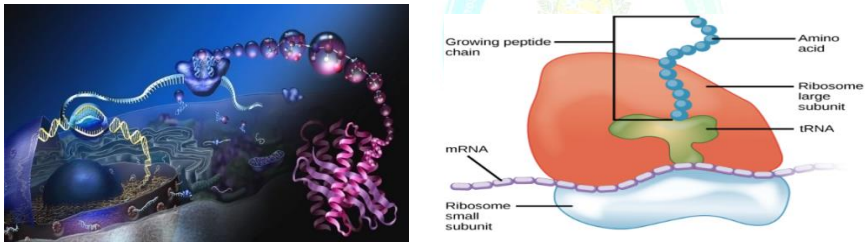

Fig.3: Ribosomes

b. **Golgi complex:** are vesicles stacked in parallel rows with smooth membranes, and often the body of Golgi complex to a channel and acts as a station in the way of transporting materials produced from other organelles, for example, in some cells Golgi bodies work to store proteins formed in the endoplasmic network temporarily in order to transport and secrete out through the cell membrane The Golgi system forms secretory substances, such as the raw materials that make up enzymes.

c. Lysosomes:

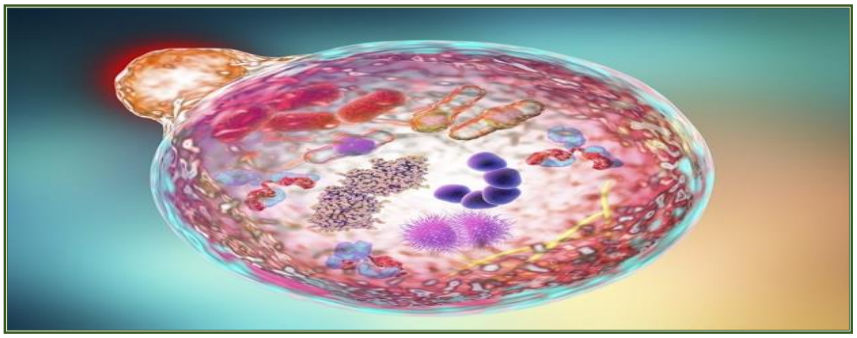

Fig.5: Lysosomes

The lysosomes form the digestive system in the cell, as they contain a number of decomposing enzymes that have PH in an acidic range and have the ability to digest organic matter, where the lysosomal bodies merge with various organic substances and enzymes work to digest them and then put the digestion products into the cytosol, where the cell benefits from them as a food source or energy source, and when the cell dies or is harmed and the membrane of the current particle is torn, the decomposing enzymes will be liberated and lead to the analysis (digestion) of the cell contents Auto degradation.

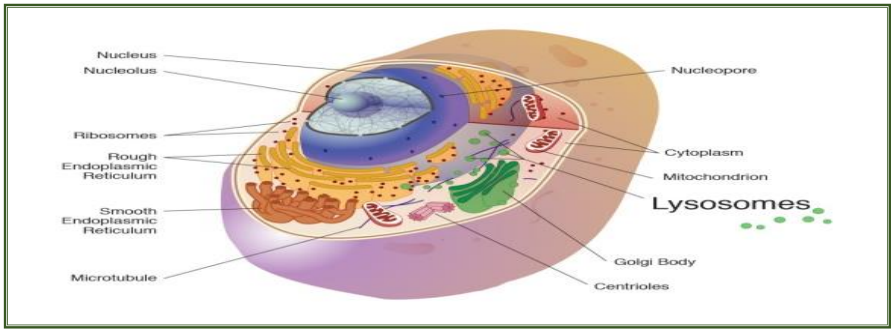

Fig.6: plant cell with Organelles