Non-Living components

1- Vacuoles : They are cytoplasmic organelles of varying size, surrounded by a membrane called the vacuole membrane and filled with a fluid called the cell sap. The vacuole membrane is characterized by being a single true membrane with selective permeability. In animal cells vacuole are generally small and help isolate some material from the cell cytoplasm. In plant cells, the vacuole helps maintain water balance. Sometimes a single vacuole can occupy most of the internal space of an adult plant cell, which may reach 90% of the cell volume.

There are different type of vacuoles, the most important of which are the following:

1-Contractile vacuoles :are vacuole found in unicellular animals Protozoa such as Paramecium and algae. It is contain an expandable membrane and work to collect waste from the cell's cytoplasm and then unite with the plasma membrane to explode in a process called contraction out of the cell.

2-Food Vacuole: which is formed by phagocytosis. The mechanism of action of food vacuoles is similar to the lysosome, due to the food molecules and is found in unicellular organisms such as Amoeba, protozoa and phagocytic cells of higher animals.

3-Central Vacuole: Is a large vacuole found in mature plant cells. This is formed from small vacuoles formed by the endoplasmic reticulum and Golgi bodies in growing cells. As the cell ages, these vacuole unite until they become a large central vacuole.

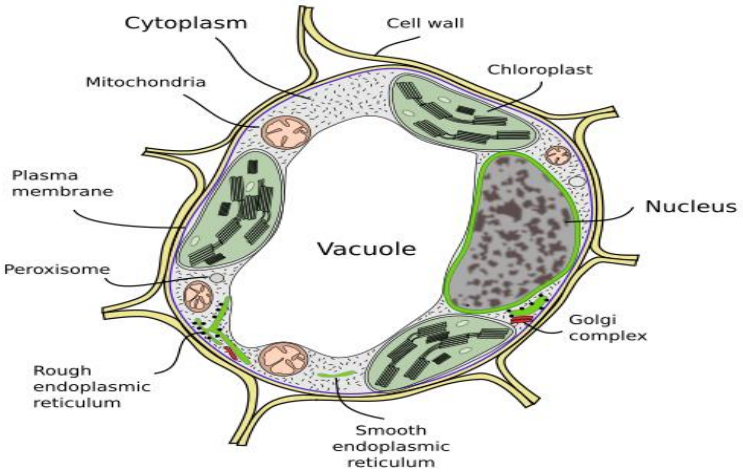
Functions of vacuoles:-

1-They play an important role in regulating water and material in the cell.

2-Storing material and using them at other time in the building process

3-There is evidence that vacuoles contain digestive enzymes that help analyze cytoplasmic and metabolic components, as they resemble lysosomes in animal cells

4-Strengthening the plant as a result of it is filling, especially the young parts.



2-Crystals: They are inorganic salts that precipitate in cells as a result of their increased concentraction. These salts are usually calcium salts and silicon dioxide. Crystals are characterized by their different shapes in cell, the most important of which are:-

A. The prismatic crystal: is rectangular or pyramidal in shape, as in dry onion leaves.

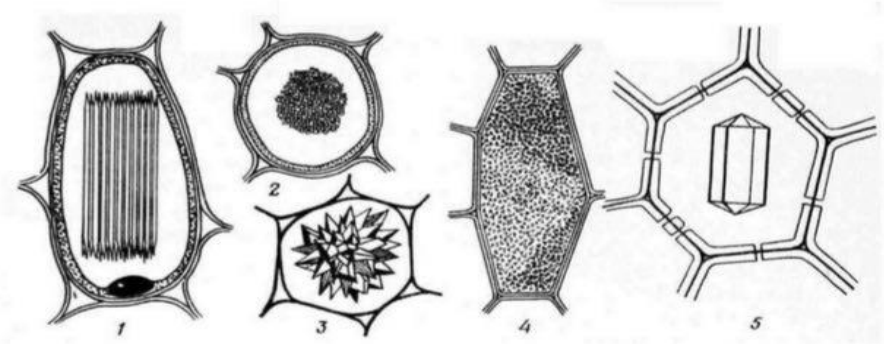
B. The druses or rosette shape crystal: is a collection of prismatic crystal in the shape of a star or rose, as in Datura leaves.

C. Sand crystals: They are very small prismatic crystals that are usually in the form of blocks, as in potatoes.

D. Needle or raphides crystals: They are needle-shaped crystals that are gathered and have tapered- ends, as they are found in grape leaves.

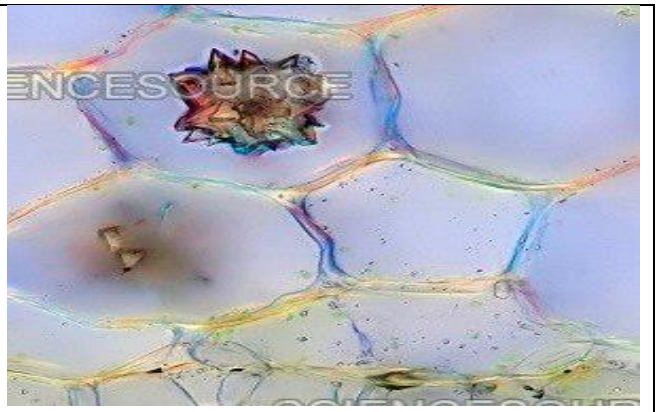
E. Suspended crystals or stone crop: They are found in higher plants, as they consist of the crystal-body made up of calcium carbonate and the stem made up of cellulose, as in berries.

Forms of crystals of calcium oxalate



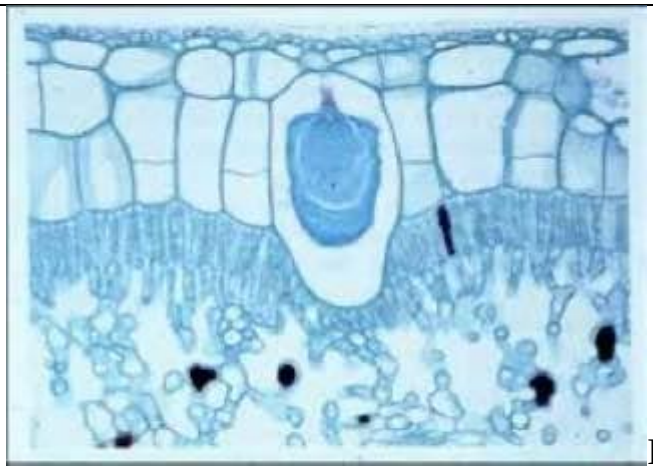
1,2 – raphides (1 – Lateral view, 2 – cross-section view); 3 – drusen; 4 – crystal sand; 5 – simple crystal

A



B

D



E

3-Starch grains: It is a carbohydrate consisting of a long chain of glucose sugar molecules and is considered one of the most important substances stored in cells, as in potatoes.

4- Pigments: Some plant and animals cells contain pigments, as in the melanin pigments, which gives the distinctive color to the skin and hair.

5- Lipids: It appears in the form of fat droplets of different size in the adipose tissue of animal lipid cells that specialized in manufacturing and storing fats, while in non-adipose tissue, fats are considered a source of energy or are used to manufacture some components of the cell, such as membranes and secretory materials of an lipid nature.