

## **Non -Living Components of plant cell**

### **1- Vacuoles**

Most plants cell Characterized by Vacuoles. The vacuoles contain the cell sap , and surrounding by Membrane called Tonoplast. The Vacuoles contains another Contents like Starch granules and another substances which is a metabolic products or stored materials. Number of Vacuoles deferent which depended on type , age , region of cell and Member that has this region.

In general the Vacuoles very small (Tiny) and Multiple in the early stage of growth, while it's size increase and number of decrease in each cell through the time.

The Vacuoles have important role In many biological processes special With regard of aquatic relationship between the plant and Periphery. So in Promote the mechanism of transmission of different materials from one area to another through the plant body.

### **2- Crystals**

It's exist in many types of plant cells and different in size and Chemical composition. The most part of crystal composited from calcium salts , In spite of the differing forms of it but it

create from single crystals which Accumulates with each other to form Specific shape. There is many type of crystals .:

## **A- Calcium Oxalate Crystals**

It's important for cell as the oxalic acid Considered a one of toxic acids. The cell working on transmute the oxalic acid to insoluble compounds For the purpose of reduce the toxic effects of oxalic acid. Therefore it transfer it as crystal form.

Some type of Calcium Oxalate crustal

### **1- Prismatic Crystals**

Which be in the form of prism in it's note in citrus and allium.

### **2- Druses Crystal**

It's Semi-spherical gatherings from Pyramidal or prismatic crystals , which notes in Middle tissue for some Leaf like : Nerium and Tilia and Castor Beans.

### **3- Raphides Crystals**

It's long crustal , thin and Tapered ends , Accumulate in packages form , Are abundant in Monocotyledon plants , and cane seen in Stems and leaves of the grape (*Vitis*) .

#### 4- Calcium Carbonate Crystals

Crystals are outstanding or vesicular or stone, and is composed from the crystal body, The crystal body consists of carbonate Calcium, either the neck consists of cellulose, and can be observed in the skin and leaves cells of fig (*Ficus*)

#### 3- Starch Grains

Grains consist of Carbohydrate substance. These grains differ in size and number depending on the plants. The grain is characterized by its hilum that is converted by starch layer, it may contain one or more hilum, The hilum may be central like Rice and Maize or non-central like Potato or Cracked like Bean, the starch grains classify to three types:.

##### **A-Simple**

Grain contains one hilum, accumulate around it starch layers.

##### **B-Semi-compound**

Grain contains more than one hilum and the starch layers accumulate around it and then a common layer accumulates around the hilum.

## **C- compound**

Grain contain more than one Hilum and the starch layers accumulates around it in separating shape from each other.

## **4- Aleurone grains**

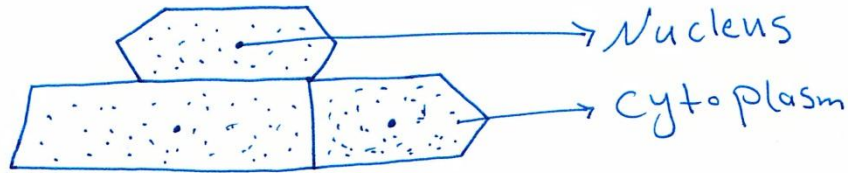
It's Proteinuria materials , the grain composed from Crystalline protein which is the crustal body , and amorphous protein which is spherical body. The grain surrounding by membrane. This grains exist in Seeds like Castor Beans seed.

## **5- Oils and Fats**

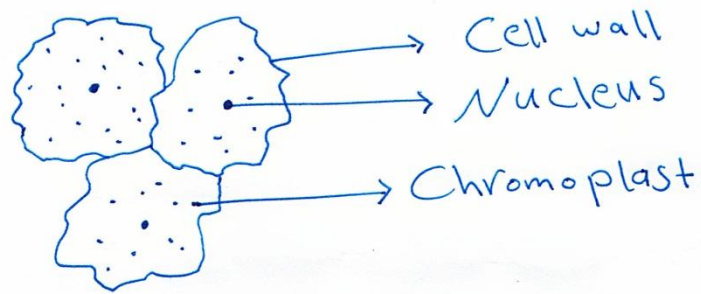
They are widespread in plant cells , the fats be solid and the oils liquid , they are stored as a foodstuffs in Seed tissue like *Helianthus annuus* Seeds .

## **6- Tannins**

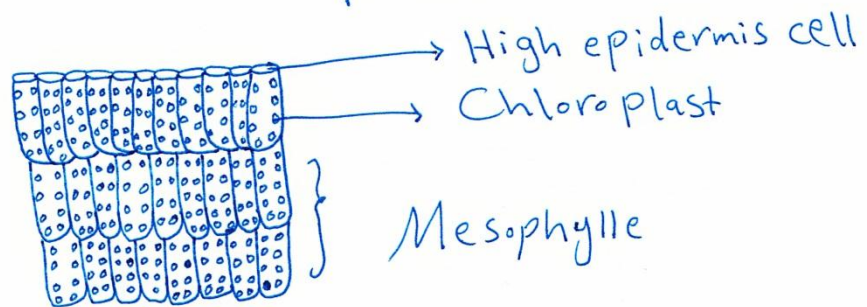
Complex organic compounds, believed to be the sources of aromatic compounds, are found in the bark of trees and mature fruits and leaves.



« Epidermis in Allium leaf cell »

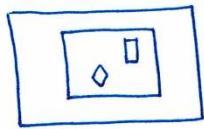


« Chromoplast »

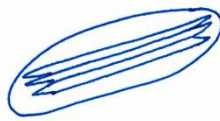


« Leaf in Chloroplast »

Third Lecture



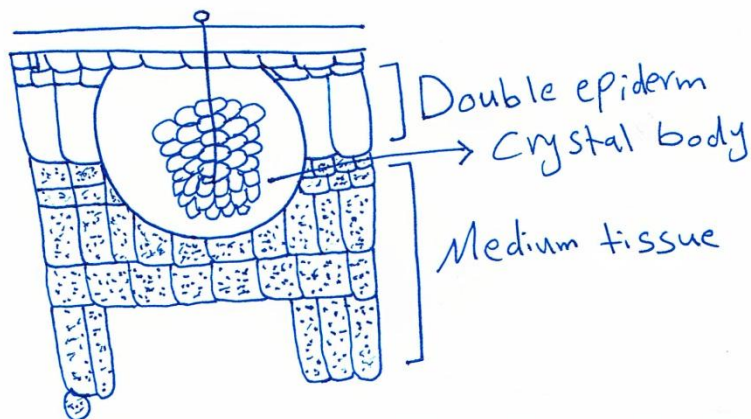
« Prismatic crystals »



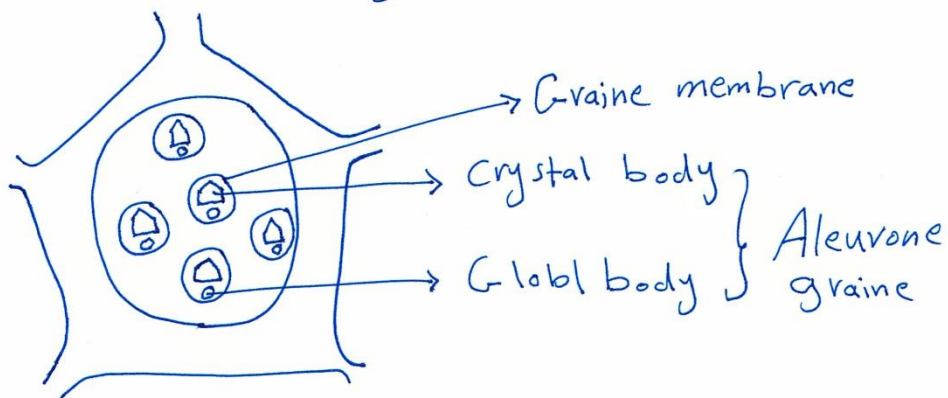
« Raphides crystals »



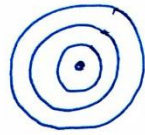
« Druses crystals »



« Calcium carbonate crystals »



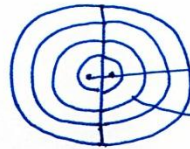
« Aleurone grains »



Hilum

Starch layer

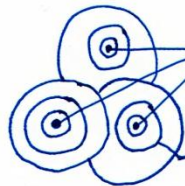
« Simple starch grains »



Hilum

Starch layer

« Semi-Compound starch grains »



Hilum

Starch layer

« Compound starch grains »

