Botany & Medicinal plants

Practical course

For 1st Year, 1st Term

Assistant lecturer:

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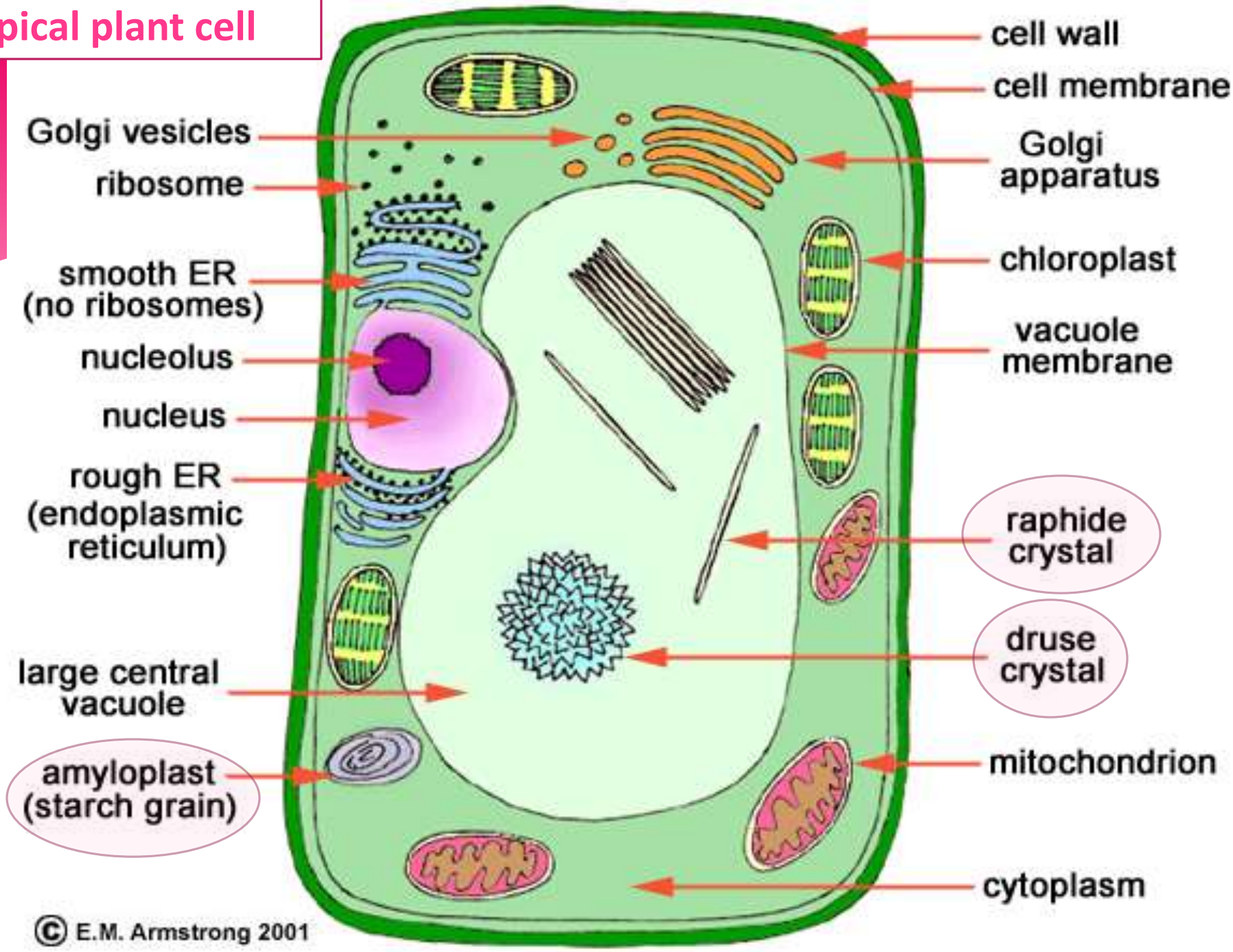
SEC-1

Ergastic substances

Objectives:

- **To identify the ergastic component of plant cells.**
- **To recognize them under microscope.**

Typical plant cell



Component of the cell

Living protoplasmic components:

e.g. nucleus, mitochondria,…

Non living component

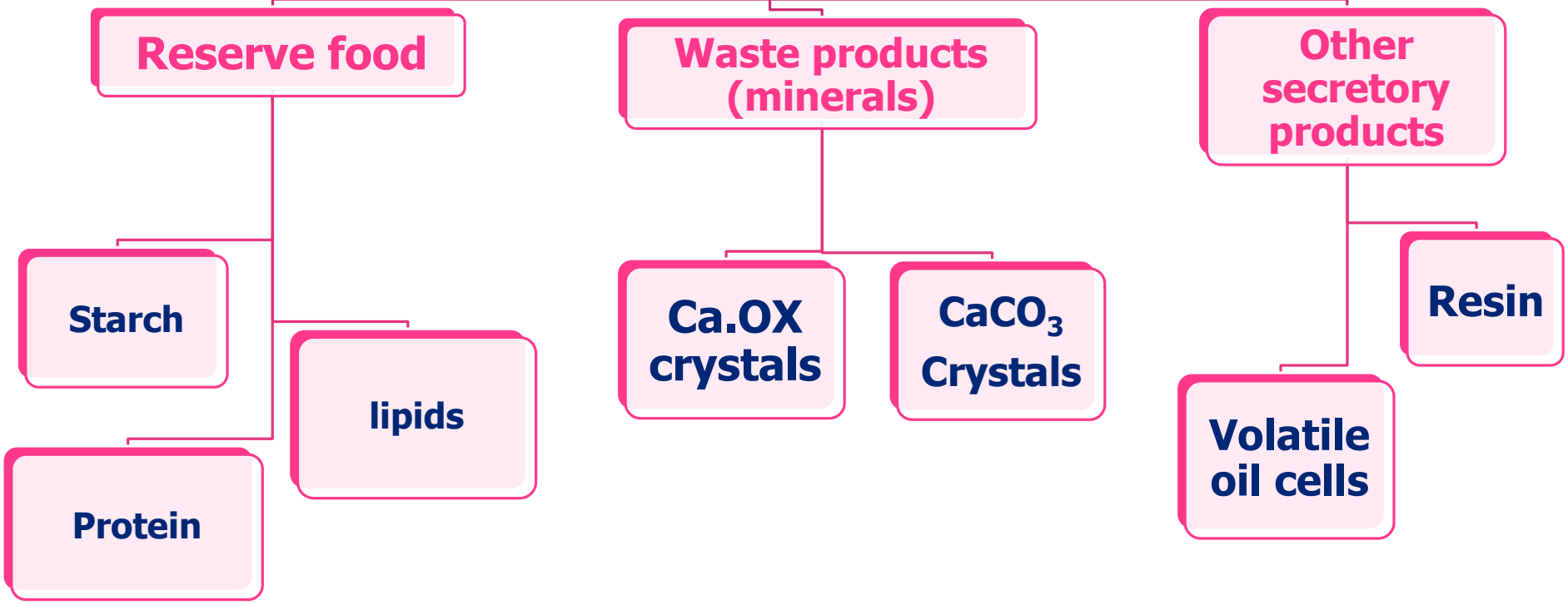
e.g. ergastic-substances

Ergastic substances (cell inclusions)

- **They are non-living organic or inorganic substances.**
- **May be present in soluble or insoluble state.**
- **They are raw materials, or arise as product of metabolism.**
- **They are present in:**
  - **Vacuoles**
  - **Cell wall**
  - **Associated with protoplasmic components**
- **They can be detected & identified by:**
  - **Microscopical examination**
  - **Physical and chemical test.**

Ergastic substances

(Ergastic bodies = cell inclusions)

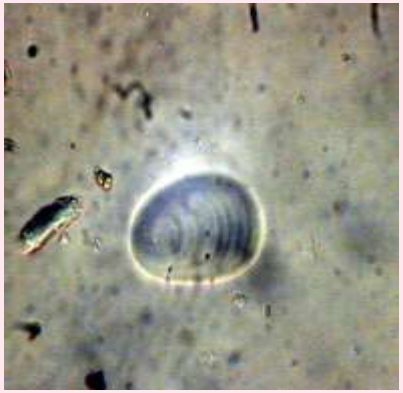


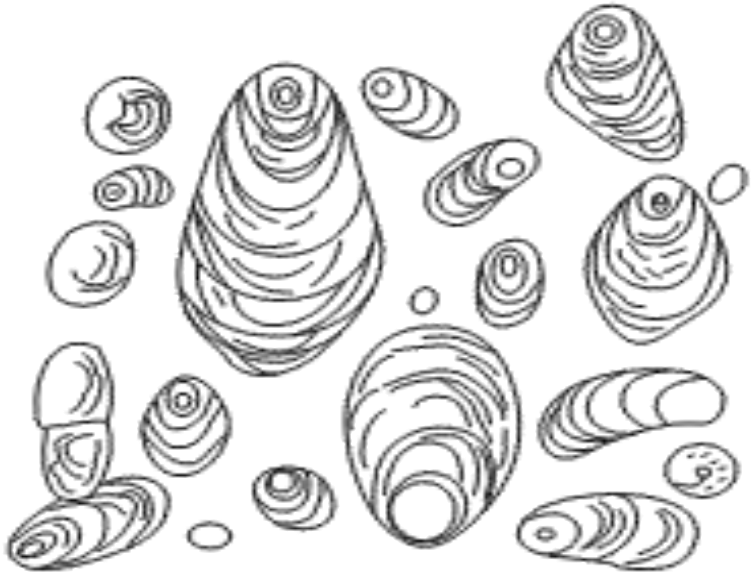
I) Reserve food (storage)

1- Carbohydrate form (Starch):

* Starch is simply a glucose polymer.
* It's present in different parts of the plant in the form of granules (either simple or compound) of varying sizes.
* Starch is found abundantly in:
  * Fruit, Seed, Root, Rhizome.
* Starches of pharmaceutical interest are obtained from:
  * Wheat
  * Potato
  * Maize
  * Rice

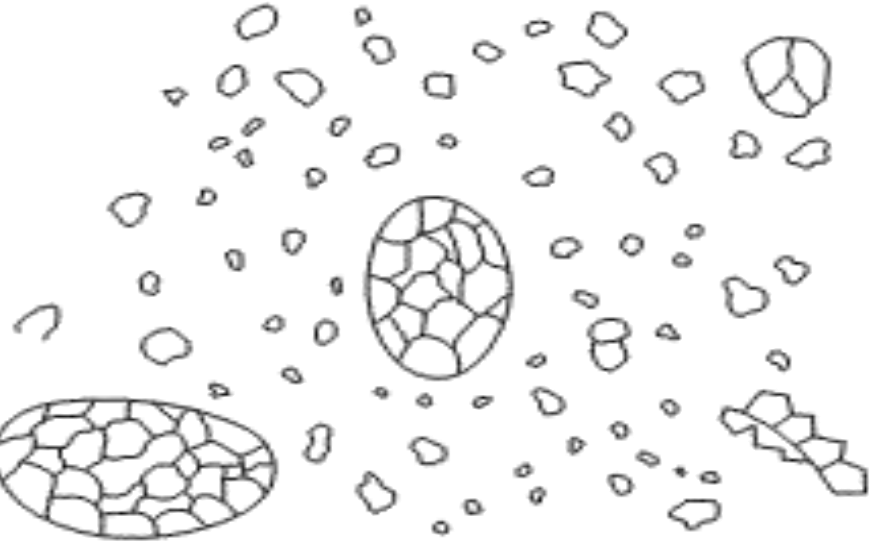
1- Carbohydrate form (Starch):

	Maize starch (نشا الذرة)	Rice starch (نشا الأرز)	Wheat starch (نشا القمح)	Potato starch (نشا البطاطس)
				
Shape	Polyhedral with blunt edges .	Polyhedral with sharp angles .	Spherical , rounded .	oval , sub-globular .
Hilum central protein area	Centric , cleft .	Invisible	Present , slit like	Pointed , eccentric .
Striation	Absent	Absent	Faint	Present



Patato starch

Wheat starch



Rice starch

Mai e starch

2-Lipid & fat form

Lipids are esters of fatty acids with glycerol.

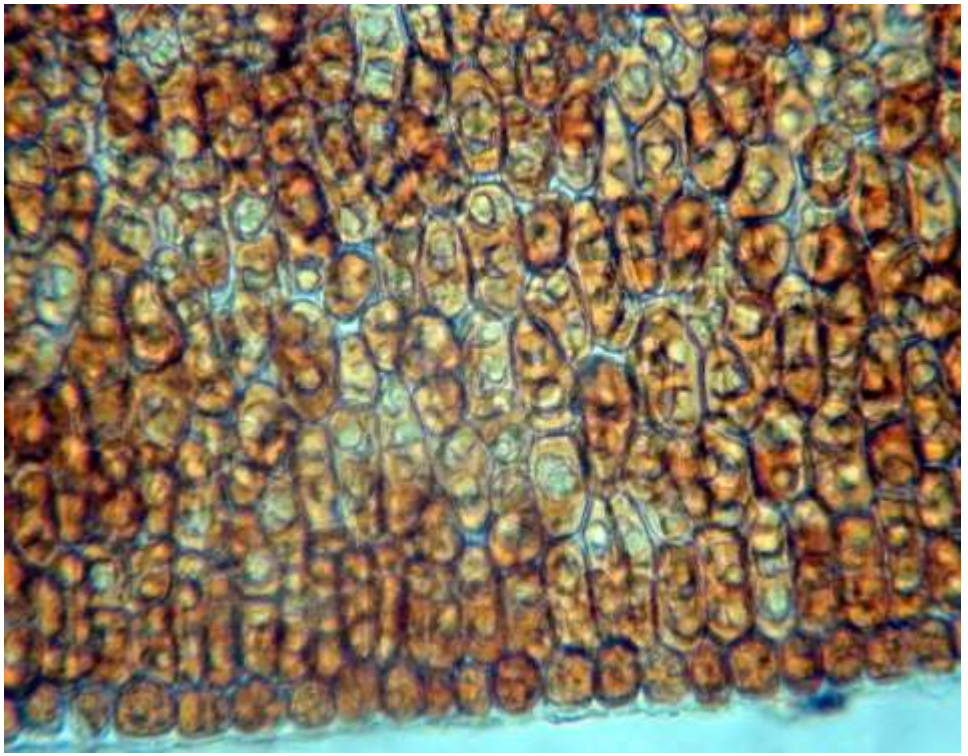
Fat droplets or globules occur abundantly inside the seeds

Solid fat:

- Wax
- Suberin
- cutin

Liquid fat:

- Lipid
- oils

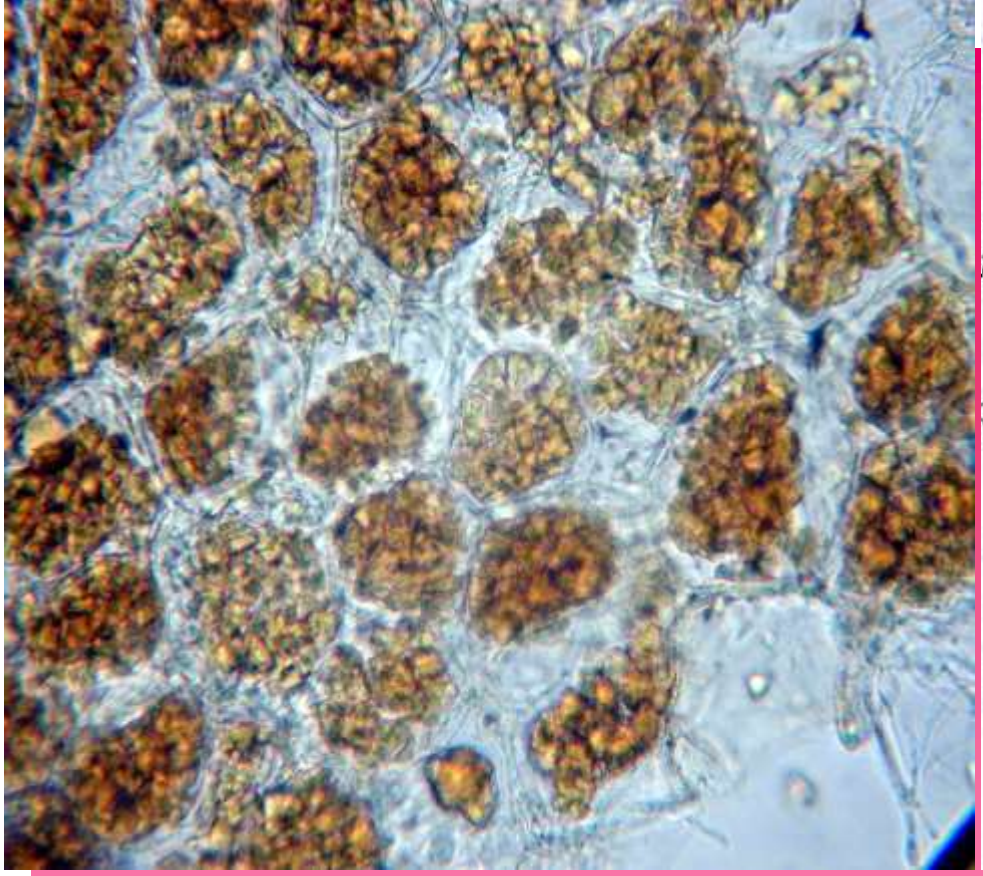


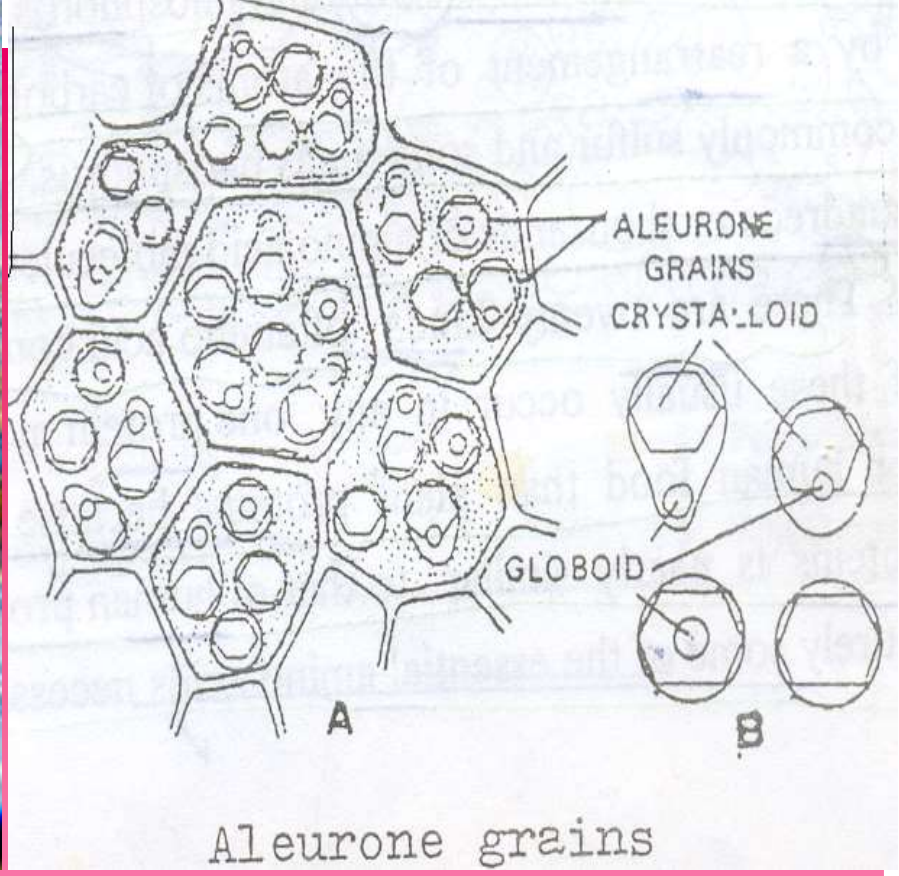
3-Proteins form:

It is found in the form of solid granules known as aleurone grain which is of common occurance in seeds.

The typical aleurone grain present in the form of

Amorphous	Crystalline
(globoid : mineral in nature) Contain the narrower portion of molecule	(crystalloide: protein in nature) Contain the major portion of the molecule





Aleurone grains

Aleurone grains

It stains

- Red with Millon's reagent
- Yellowish brown with Iodine
- Yellow with picric acid

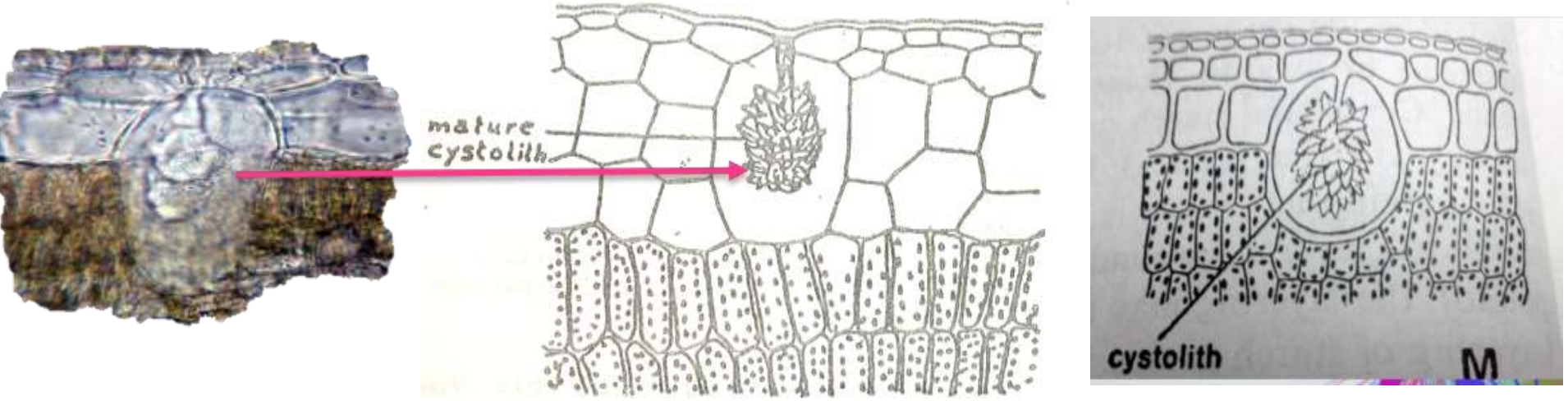
II) Waste products (minerals)

Inorganic deposits in plants

Calcium crystals

1-$CaCO_3$	2-Ca-Oxalate
It dissolve In dil. Acid.	It is dissolves in conc. Acid.
It gives effervescence.	Without effervescence.

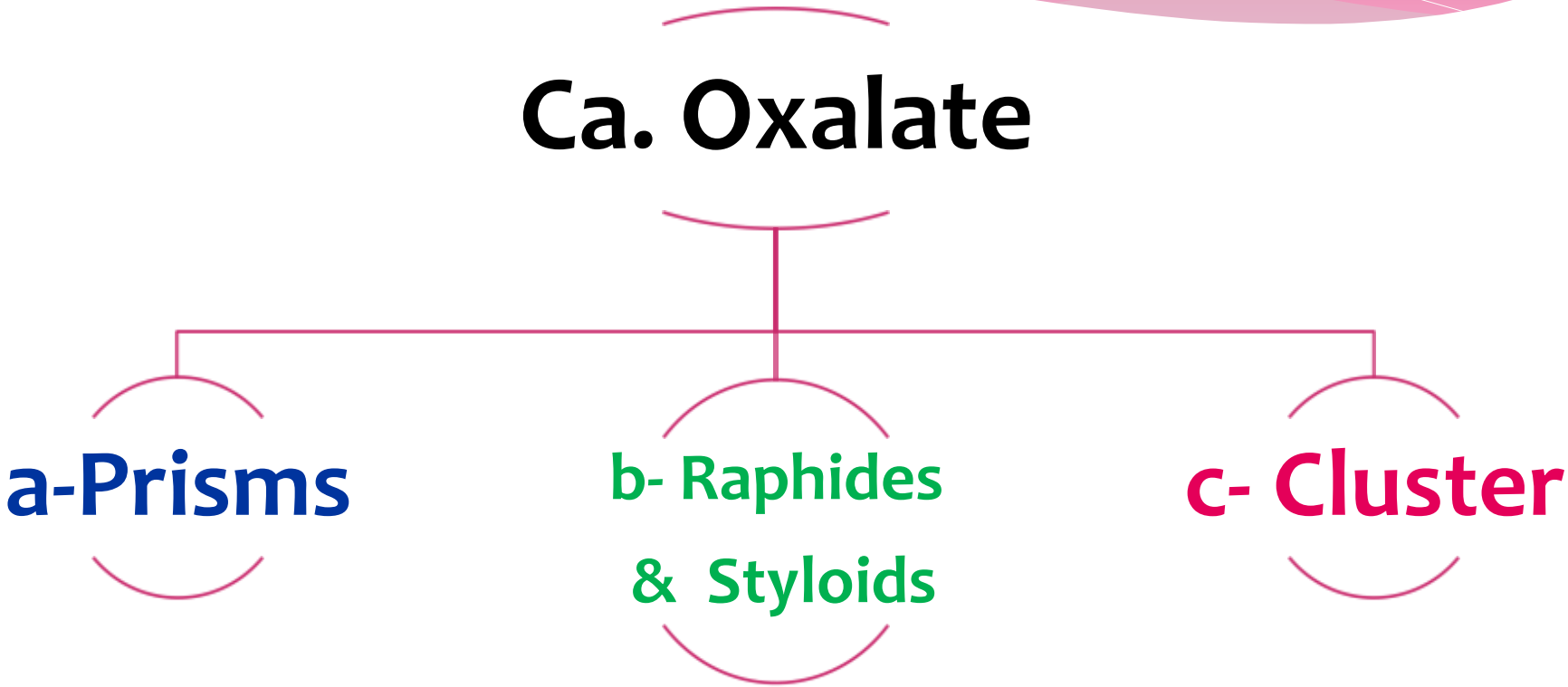
1-$CaCO_3$



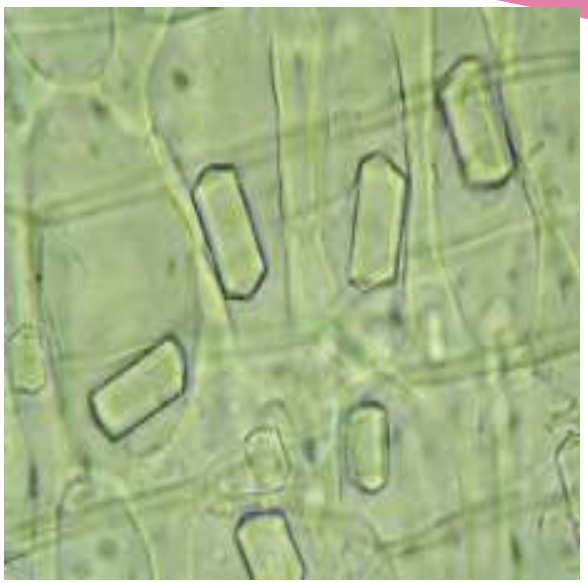
Calcium carbonate (Cystolith):

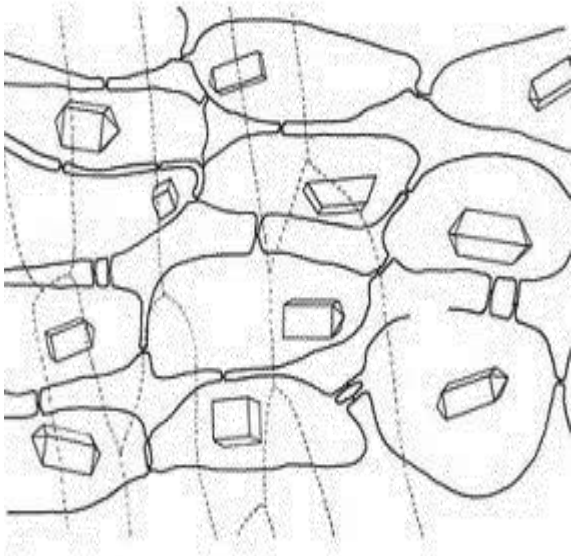
- **Internal outgrowth of cell wall occur in many plants as in Ficus**
- **Sacs-appear like bunch of Grapes**

2-Ca-OX



a- Calcium oxalates prisms

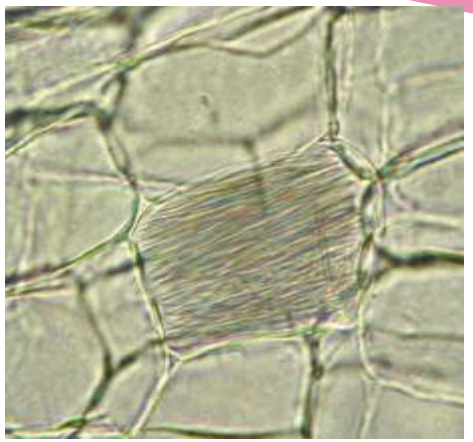


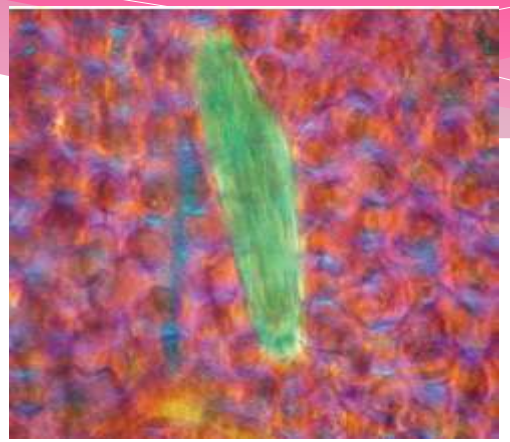


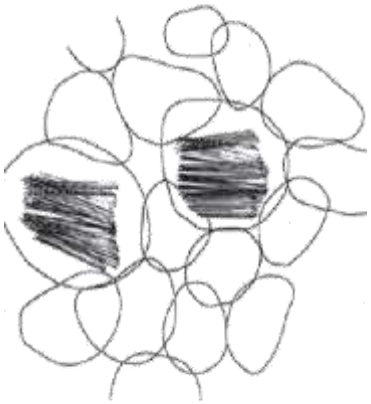
Ca.Ox Clusters in Senna leaves

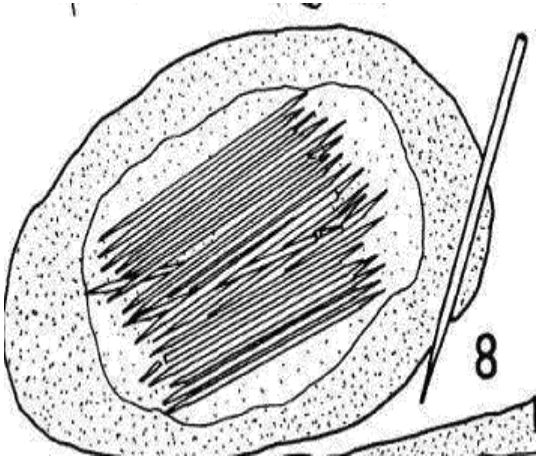
b- Calcium oxalate raphides

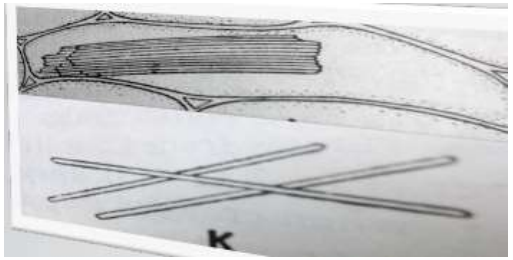
Ca-OX as single elongated needle crystal = (Styloids).
Or group of elongated needle crystals = (raphides)





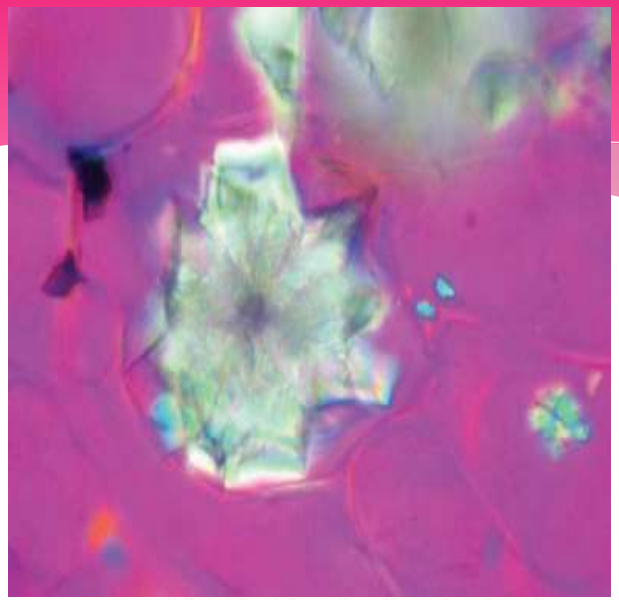


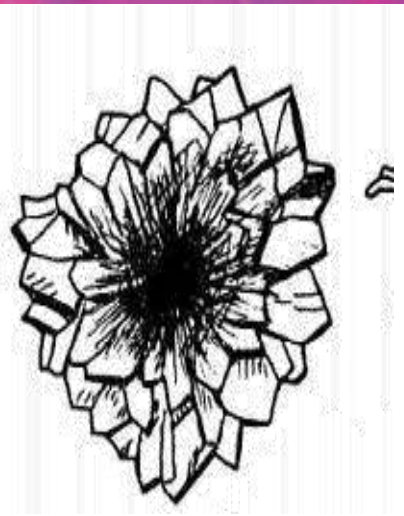


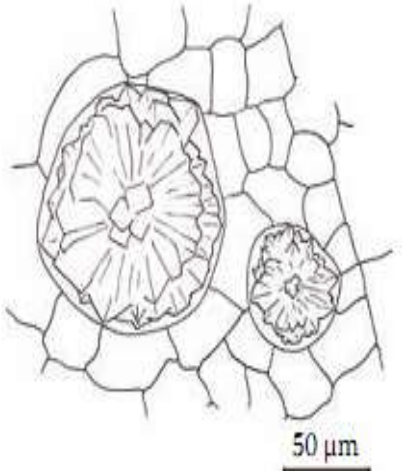


Ca-OX raphides in Squill leaves

c- Calcium oxalate Cluster



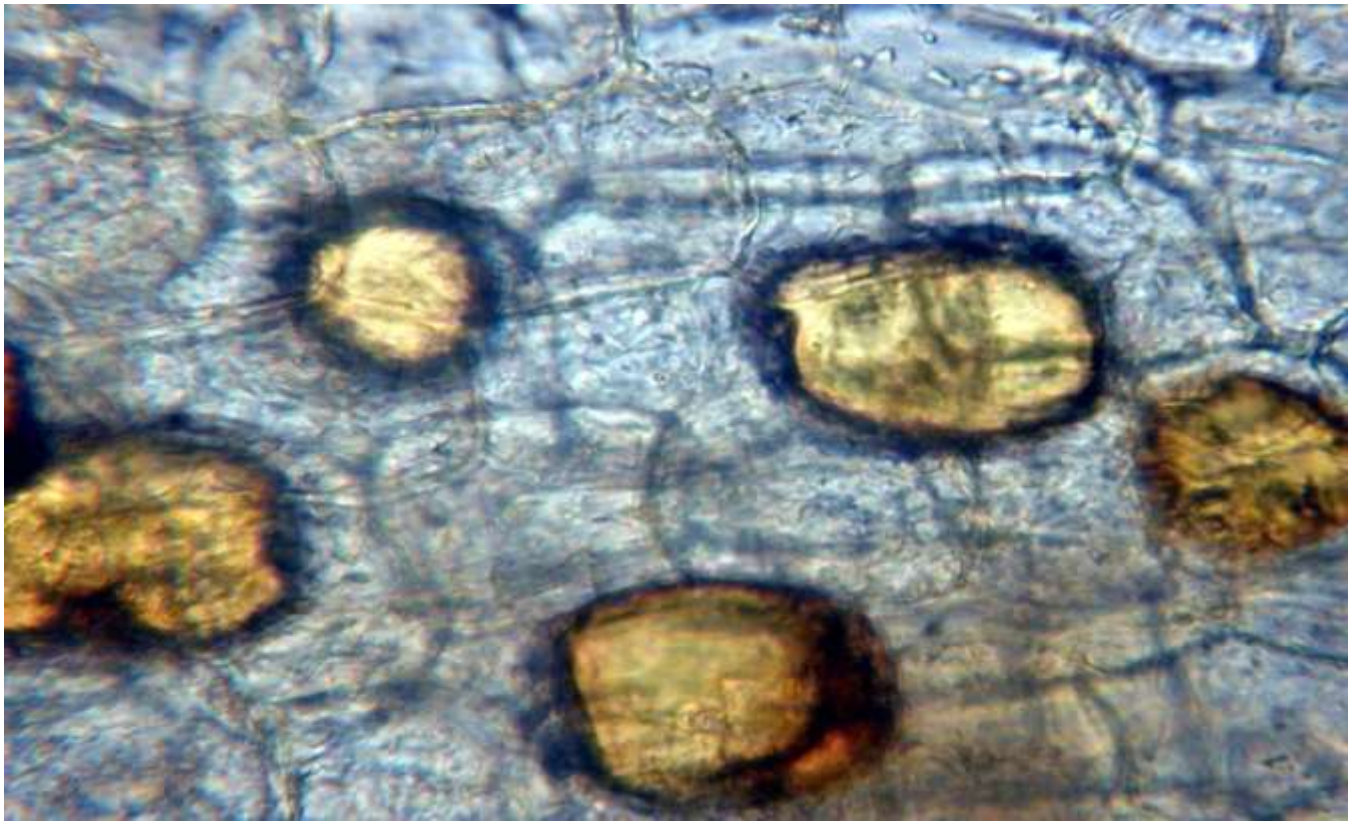




Ca.Ox Clusters in Rhubarb roots and rhizomes

III) Other secretory products

(Volatile oil cells)



Chemical test: Red color with sudan III

That’s all for today ….

Thanks