Practical pharmacognosy
second stage

Al-Nahrain university
College of pharmacy

Microscopical identification of crude drugs and cell contens

Lab 2





What is the crude drug ?

- Crude drugs : are drugs , which are obtained from natural sources like plants , animals and minerals . That have undergone only processes of collection and drying (without any modification)

- Crude drugs are two types : organized drugs (cellular drugs) and unorganized drugs (Acellular drugs)



Organized drugs

- It is obtained from definite anatomic parts of plant like leaves , fruits , seeds , barks , roots .
- We can identification of it by microscopic characters .

- leaves : Senna leaves ftuit : anise and lemon peel





- Flower : saffron clove roots and rhizomes : garlic







- Bark : cinnamon seed : almond





Unorganized drug

- It is obtained from plants or animals by means of physical process such as extraction , incision or natural secretion .
- Chemical test and physical standard are used for identification

- Leaf juice : aloe



volatile oil : rosemary



- waxes : beeswax



gum : Acacia



Evaluation of crude drugs

- Evaluation of a drug ensure the identity of a drug and determines the quality and purity of drugs.

- The main reasons behind the need for evaluation of crude drugs are determination of Biochemical variation in the drug, Effect of treatment and storage of drugs ,The adulterations and substitutions.

- Adulteration may be defined as mixing the original drug material with other supurious , inferior , defective , spoiled , useless other parts of same or different plant or harmful substances or drug which do not confirm with the official standard

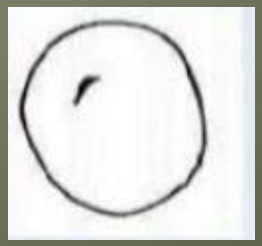
- **Macroscopic and morphological evaluation , microscopic evaluation , chemical evaluation , physical evaluation** and **biological evaluation** all are techniques to determine the quality and purity of crude drug and prevent the adulterations

- The European Pharmacopoeia and the British Pharmacopoeia and similar publications of other countries one will find detailed morphological and anatomical descriptions and microscopically characteristics of plant drug and how to identification of its .

Cell contents

- Cell contents represent either food storage products e.g. starch or by products of metabolism and these include proteins, alkaloids , glycosides, calcium oxalate, calcium carbonate, fat , fixed oil , voltile oil , etc,…

- Starch occurs in granules of varying sizes in almost all organs of plants, found in roots, rhizomes, fruits, and seeds. Starch granules may be simple or compound.
- Compound granules formed by aggregations of a large numbers of simple granules e.g rice granules .

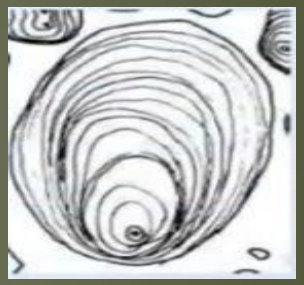




Starch

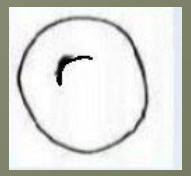
- Hilum is the starting point of formation of starch granules , the position of the hilum either central or eccentric .





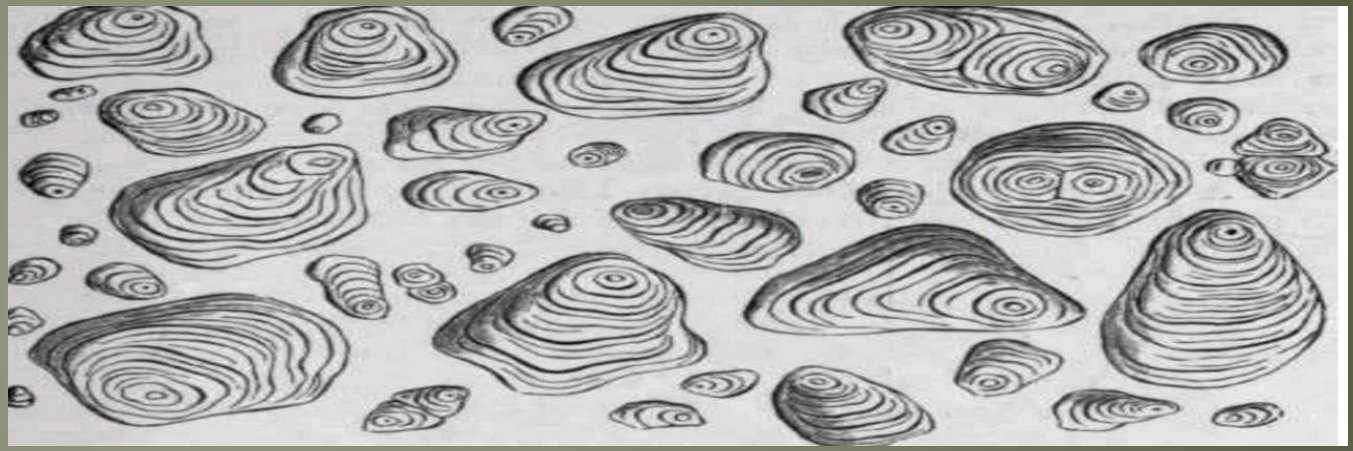
- There are different shapes of hilum (dot, curved, multiple clefts).



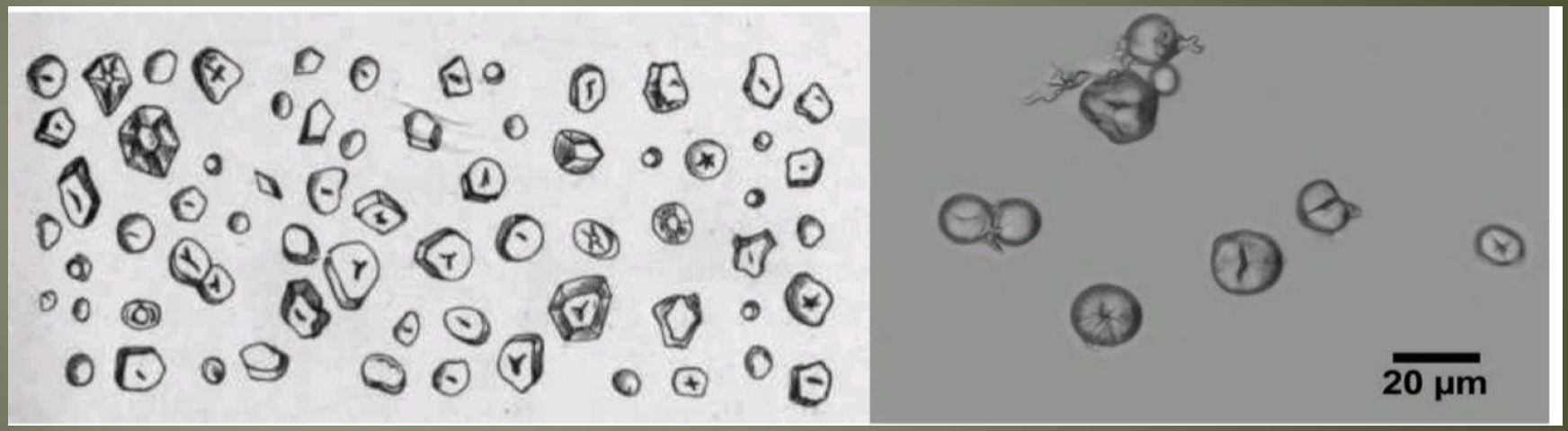




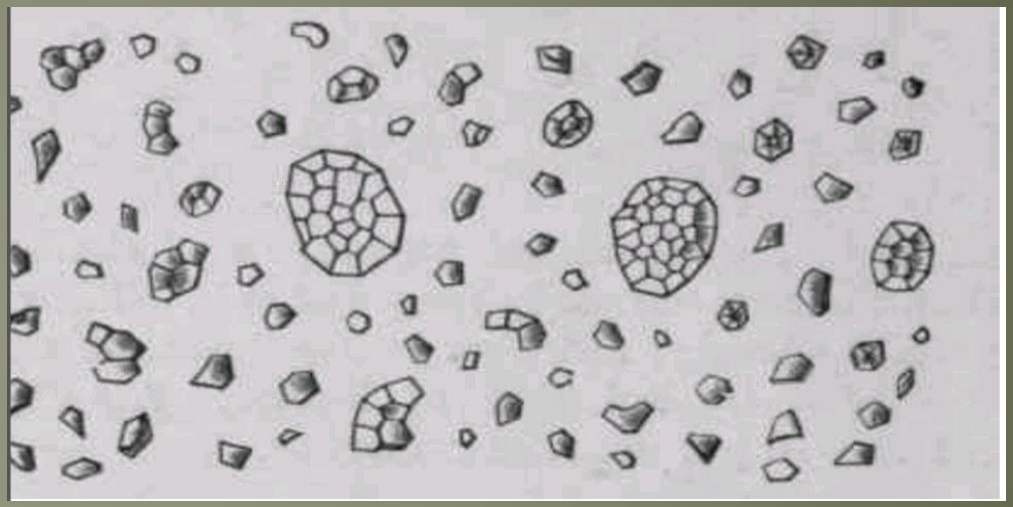
- Striations (deposition of successive layers around the hilum) also appear in starch granules.



Silde 1: Potato starch
Simple granules , mussel shapes
Hilum : point , ecentric with well marked striations

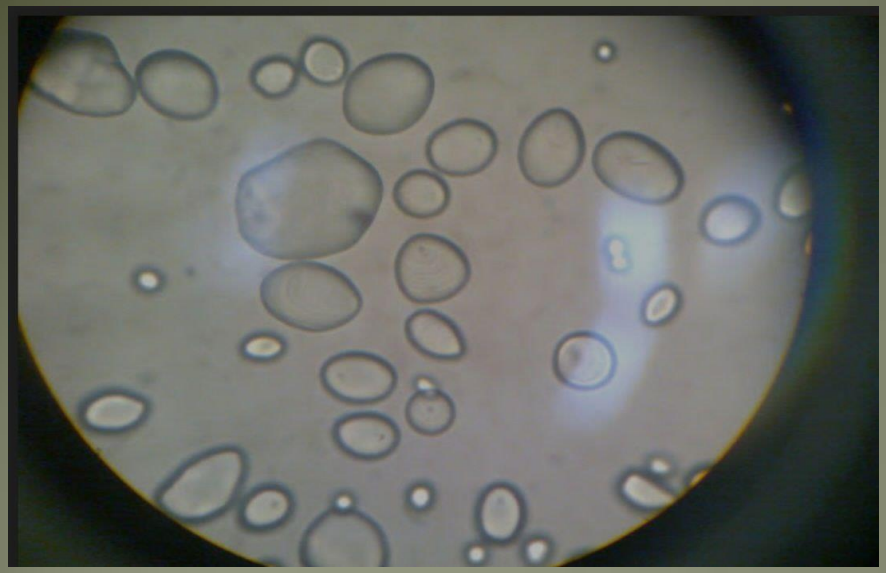


Silde 2 : Maize starch
Simple , polyhedral or sub spherical
Hilum : central triangles or 2-5 stellate clefts
Without striations

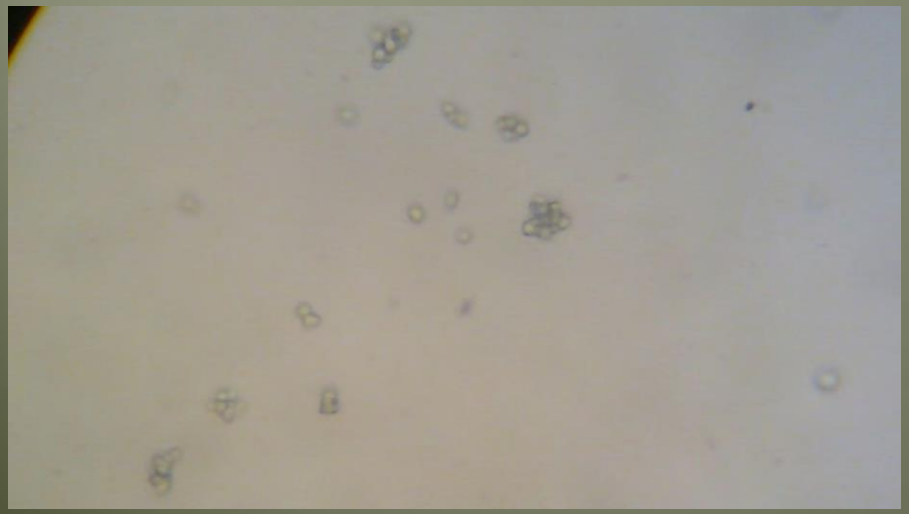


Slide 3 : Rice starch
Compound granules , polyhedral with sharp angles
Hilum : central point without striations

Types of starch	Shape	Size (um)	Hilum
Maize starch	Simple, polyhedral or sub spherical	10-30	Central triangles or 2-5 stellate clefts without striations.
Rice starch	Compound granules, polyhedral with sharp angles	4-6	Central point without striations.
Potato starch	Simple granules, mussel shapes.	45-65	Point eccentric with well-marked striations.







Calcium oxalate

- Calcium oxalate is a dimorphous salt both types occur in plants, these are tetragonal or monoclinic systems, these both types differ in the amount of water of crystallization.
- Tetragonal system ($CaC_2O_4 . 3H_2O$) e.g. Prism (Senna)
- Monoclinic system ($CaC_2O_4 . H_2O$) e.g. Raphide (Squill)

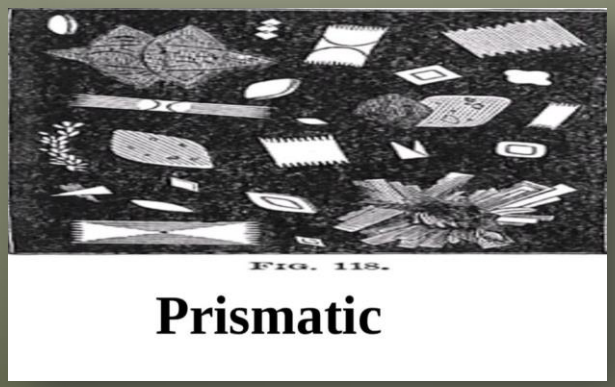
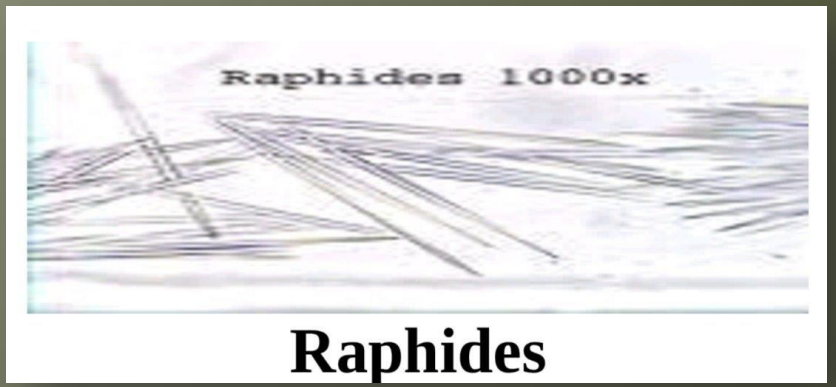


FIG. 118.

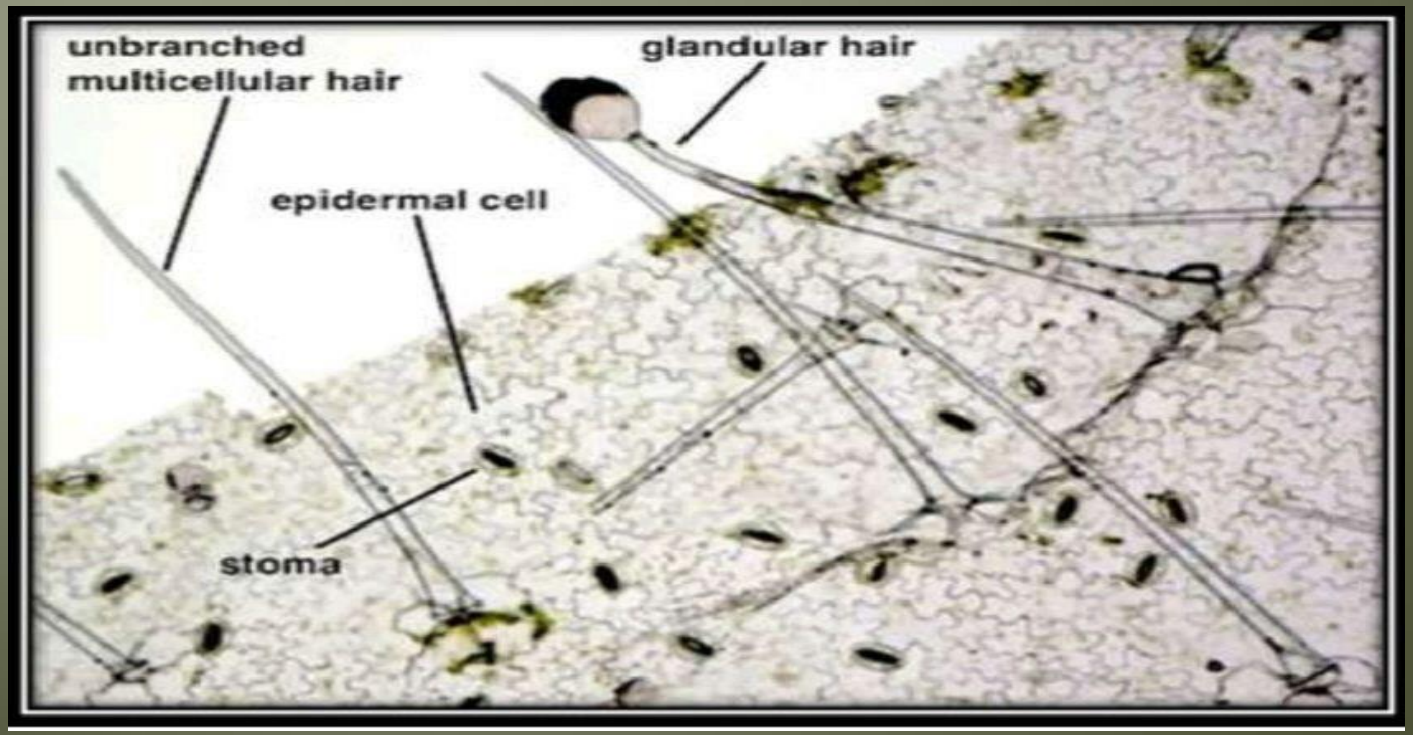
Prismatic



Raphides

The epidermis

- Single layer of cells covering the whole plant, the structure of the epidermis and stomata are of first important point in the microscopically identification of leaves.

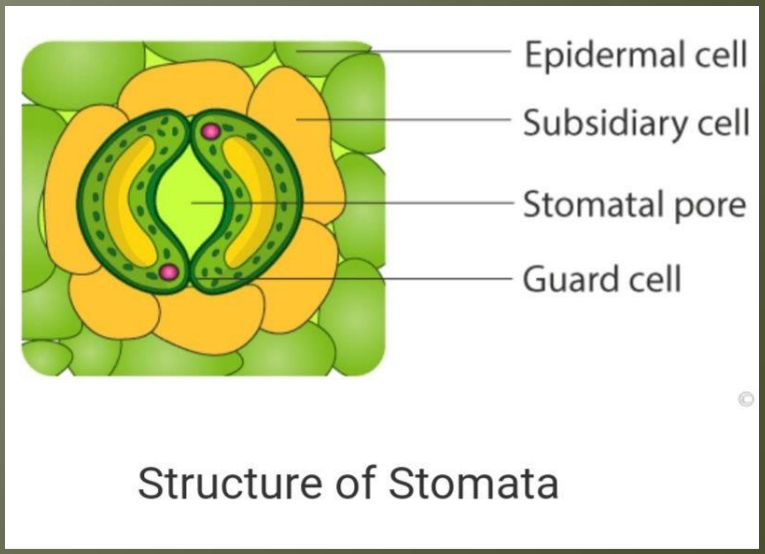


Stomata and trichomes

- Stomata are the tiny openings or pores present on the epidermis of leaves.Stomata play an important role in gaseous exchange .

- Trichomes are hairlike structures cover the epidermis layer of the plants . The major function of trichome is throught to be in plant defense against external conditions .

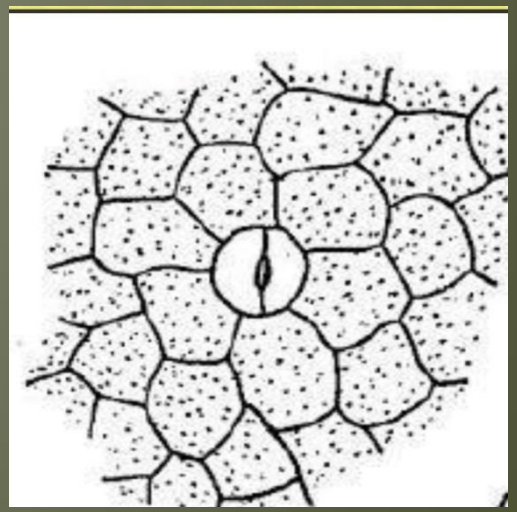




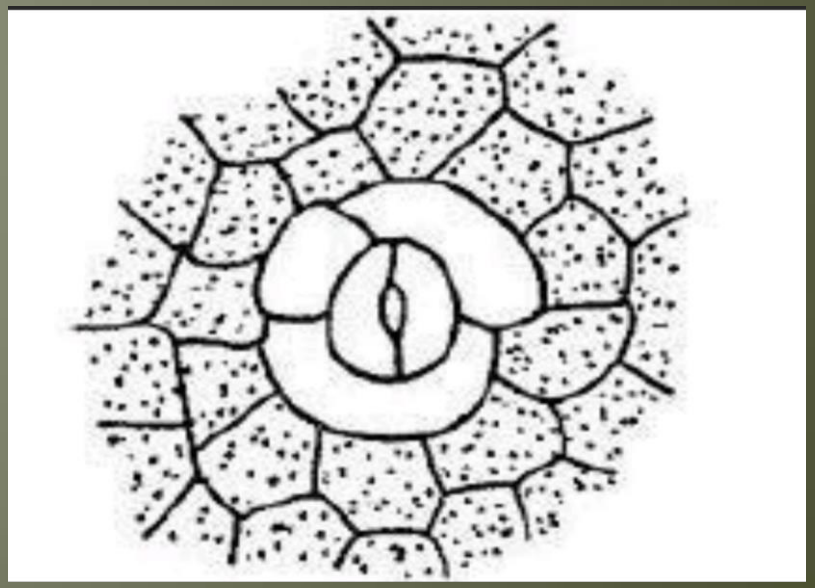
Structure of Stomata

Types of stomata

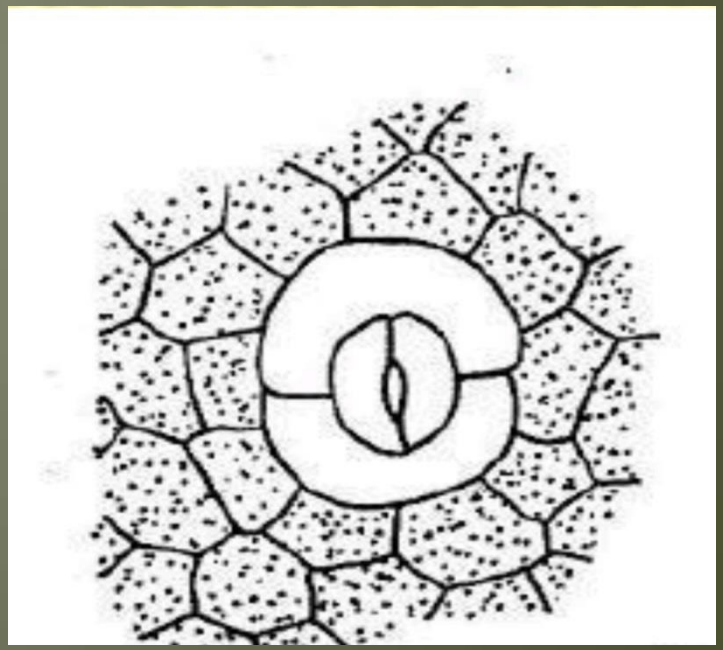
1. nomocytic (irregular-celled) type: The stoma is surrounded by a definite number of cells that are not different from the remainder of the epidermis e.g. *Digitalis purpurea* leaves



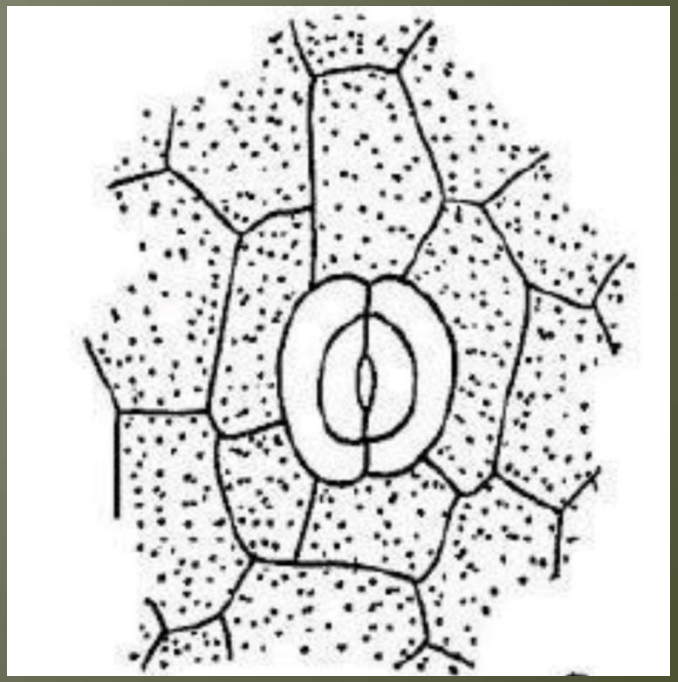
2. Anisocytic stomata: With the stoma surrounded by 3 or 4 subsidiary cells, one of which is markedly smaller than other. e.g. *Atropa belladonna* leaves



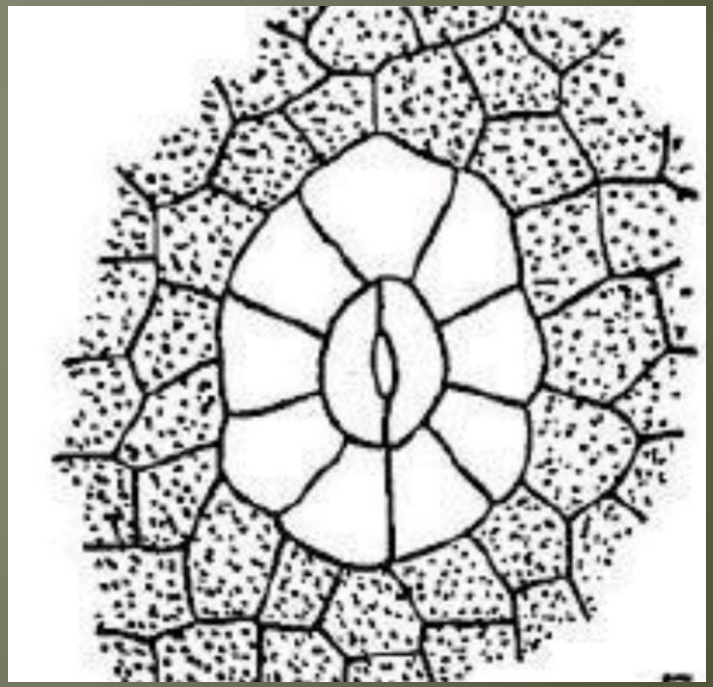
3. Diacytic (Cross-celled)type: The stoma is enclosed by a pair of subsidiary cells whose common wall is at right angles to the guard cells e.g. *Mentha piperita* (Pepperment)

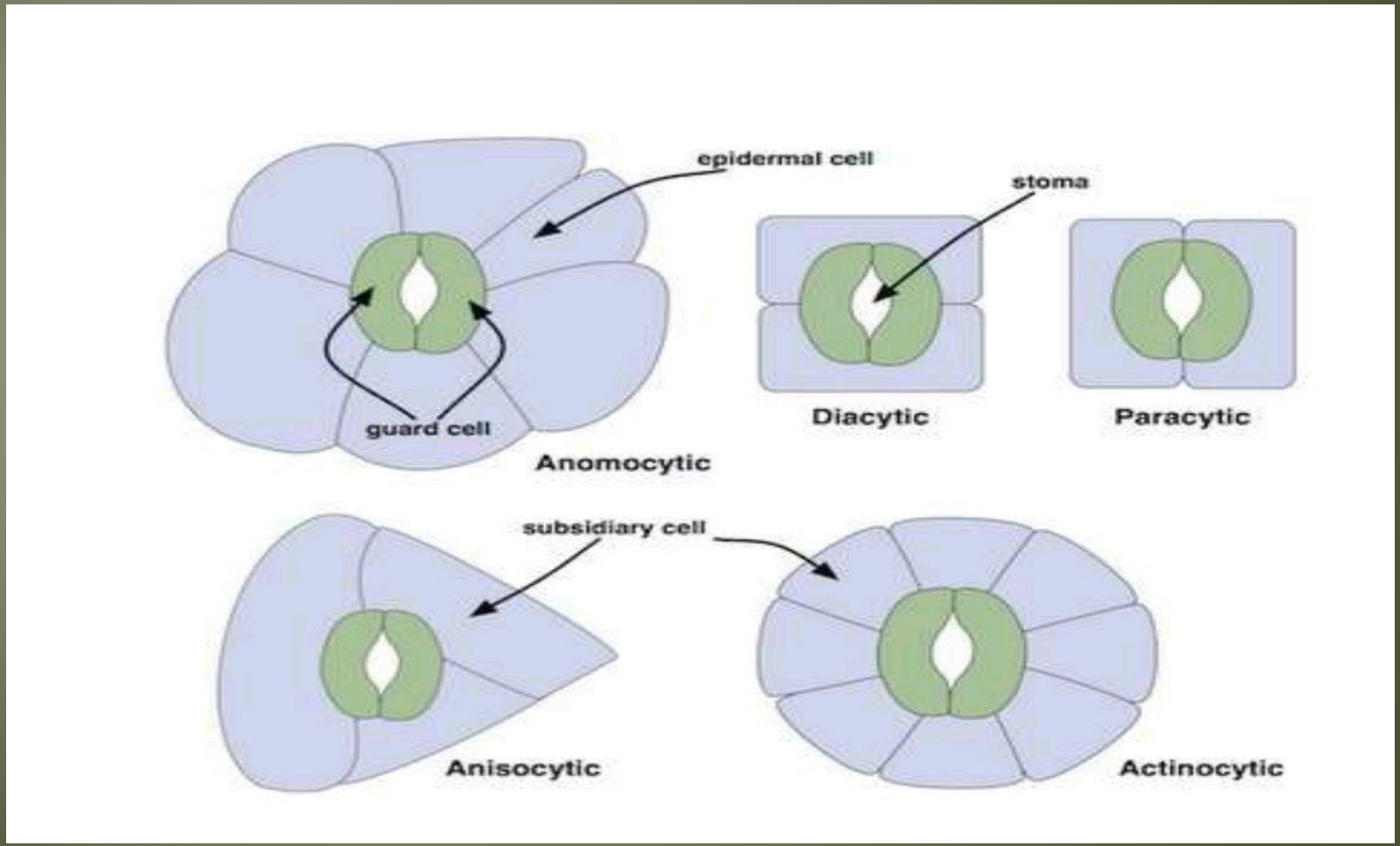


4. Paracytic stomata: With two subsidiary cells with their long axis parallel to the pore. e.g. *Cassia acutifolea* (Senna leaves)



5 . Actinocytic type: The stoma is surrounded by a circle of radiating cells e.g. *Pilocarpus jaborandi*




epidermal cell
stoma
guard cell
Anomocytic
Diacytic
Paracytic
subsidiary cell
Anisocytic
Actinocytic

Epidermal Trichomes

- Trichomes are glandular or non-glandular

A. non-glandular

1. Unicellular
2. Multicellular Unbranched, Uniseriate
3. Multicellular Branched Stellate
4. Multicellular Branched, Candelabra
5. Muticellular Branched, T-Shaped
6. Cystolytic Trichomes

Non-glandular trichomes

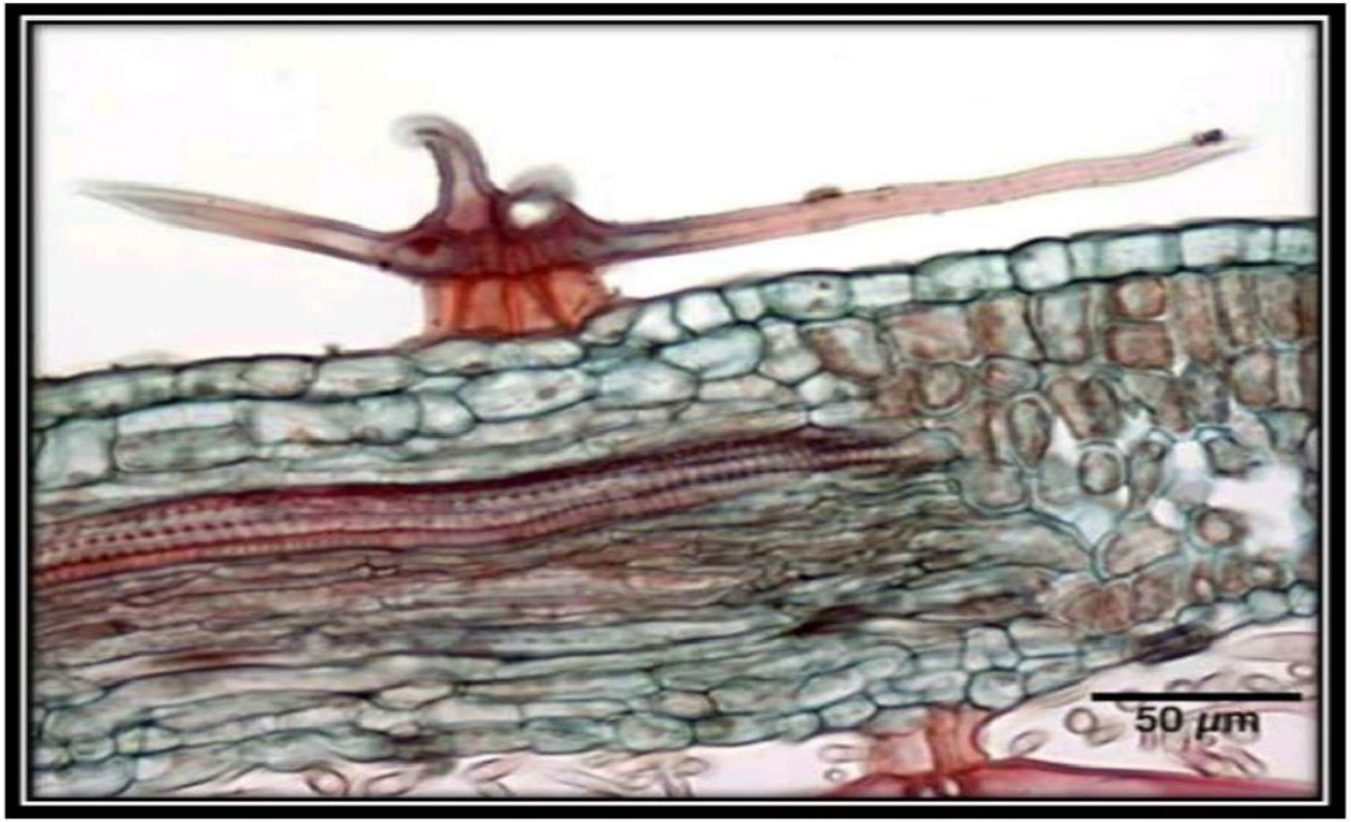


- Unicellular
- Multicellular
  - Unbranched
    - Uniserriate
    - Biserriate
    - Multiserriate
  - branched
    - Stallate
    - Candelabra









T-shaped trychome

glandular Trachoma

1. Unicellular stalk

a) Unicellular head

b) Bicellular head

c) Multicellular head

2. Multicellular Uniseriate Stalk

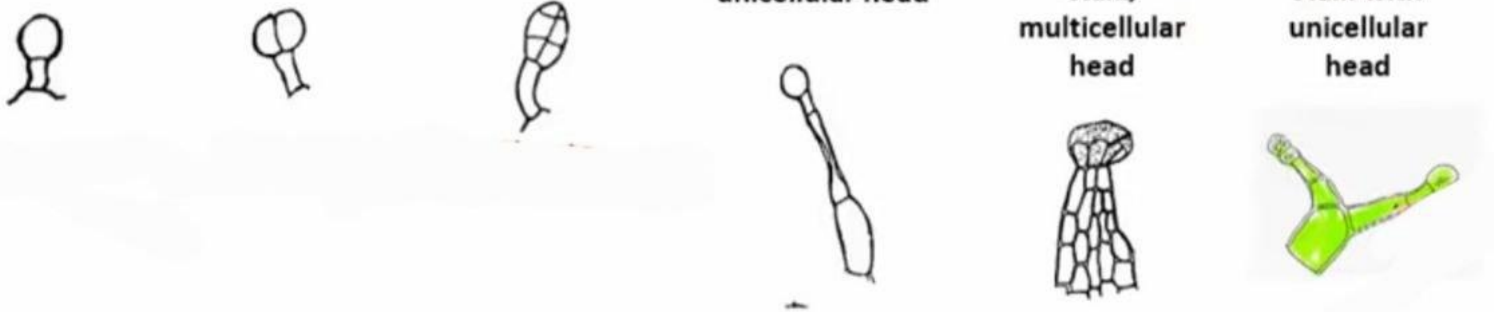
a) Unicellular head

b) Muticellular head

c) Multicellular Multiseriate Stalk With multicellular head

Glandular trichomes

- Unicellular stalk
  - Unicellular head
  - Bicellular head
  - Multicellular head
- Multicellular stalk
  - Uniseriate stalk, unicellular head
  - Multicellular stalk, multicellular head
  - Branched stalk with unicellular head




THANK YOU