



LECTURE 3

THEME: The plant tissues; their structure, function and localization in the organs. The classification of the plant tissues.

Tissue- is group of cells, which have same origin, structure and functions.

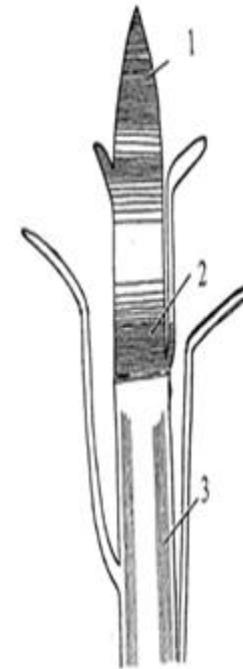
There are a lot of classifications of plant tissues and they are all conditional and are created to improve education in the field of this knowledge. We will classify them according to the function they perform:

formative (meristematic)

- dermal (covering)
- ground (parenchyma)
- mechanical,
- conductive (vascular)
- excretory

MERISTEMATIK(FORMATIVE) TISSUES

- From the Greek "meristos" - fissile, "stema" - tissue (dividing tissue). These are embryo-forming tissues that form other tissues and provide plant growth.
- Depending from the location in the plant organs they are divided into:
 - apical,
 - lateral,
 - a) primary (procambium, pericyclic)
 - b) secondary (cambium, phellogen)
 - intercalary,
 - wound.

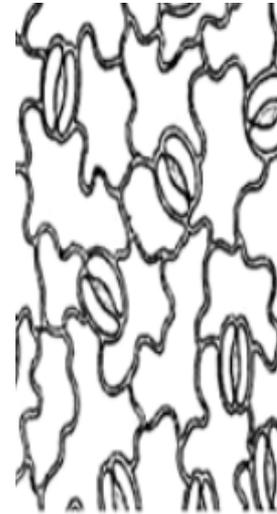


- Diagram of the longitudinal plant stem showing the location of meristematic tissues:
 1. Apical meristem
 2. Intercalary (intra-axillary) meristem
 3. Lateral meristem

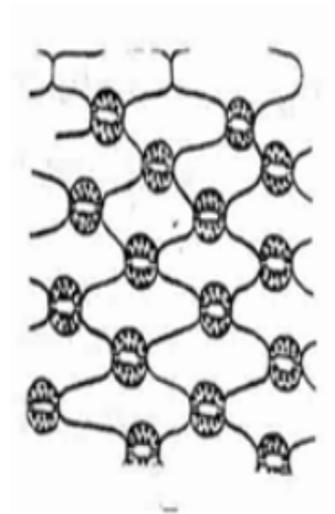
DERMAL(COVERING) TISSUE

include the epidermis, rhizodermis, phellem cork , periderm . By origin epidermis and rhizodermis - is the primary meristem; Other- secondary meristems.

- EPIDERMIS- (GREEK "epi" - on, "derma" - leather) is a cover cloth consisting of living cells and covering leaves, young shoots and a parts of flowers, the outer layer of fruits. Epidermal cells, depending on the environment and the unfavorable conditions from which they protect the plant, have protective elements. Such as cuticle, wax coating, hairs and others.

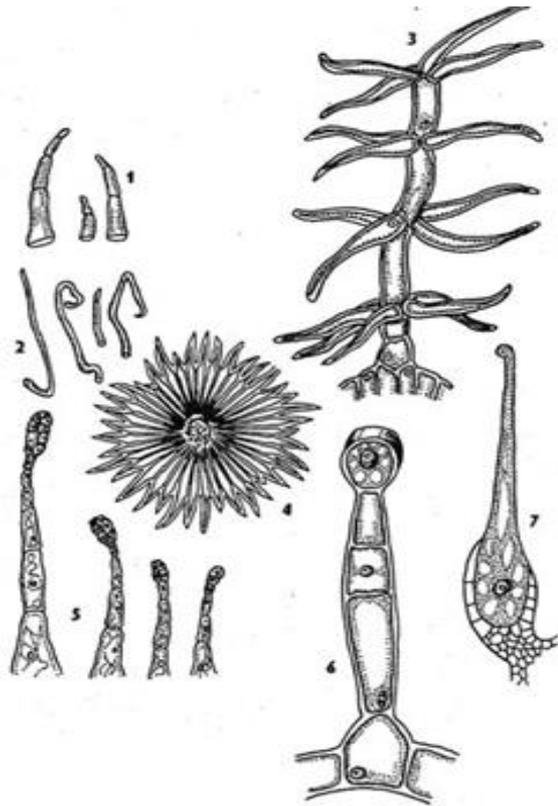


I



II

Epidermis:
dicots(I) and monocots(II)



The **HAIRS** can be capitate, stellate, forked, scaly, etc. Often they are mineralized, solidified, sharpened by the accumulation of calcium and silicon in them. Sometimes their cell walls are cutinizing and lignifying and become hard (like a pumpkin)

EMERGENCIES (lat. "Emergere" - protrude) - bulges on the epidermis, similar to hairs, but not only the cells of the epidermis, but also the layers of cells that lie under take part in their formation.

Trichomes (hairs) and emergents: 1 - simple multicellular hairs of potato, 2 - simple unicellular hairs of apple, 3 - branched multicellular hairs of mullein, 4 - stellate hairs of oleaster, 5 - glandular hairs of tobacco, 6 - glandular hair of geranium, 7 - burning hair Nettles (example of the formation of the emergencies)

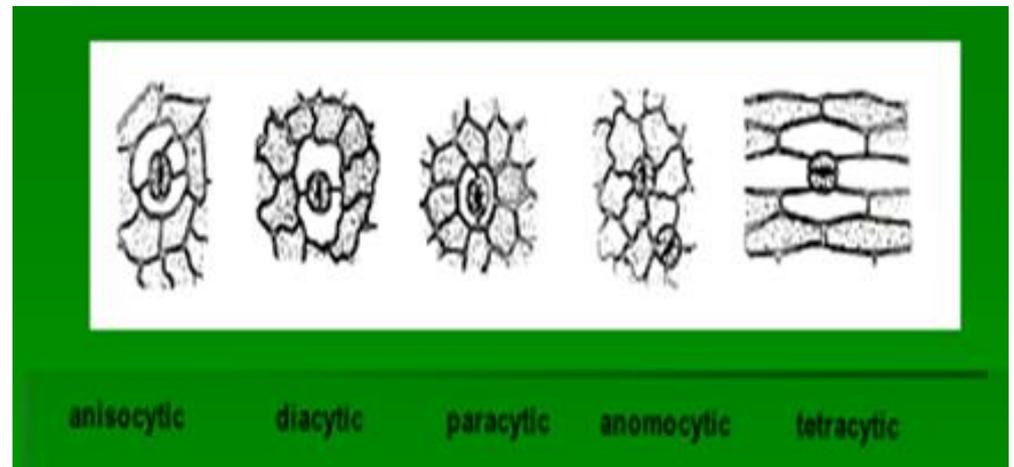
STOMATA are special structures of the epidermis consist of two guard cells between them present intercellular spaces, or slit(pore) which have function the gas exchange and transpiration.

There are also **HYDATHODES** - water (water) stomata, a modified pore, especially on a leaf, which exudes drops of water. They occur mainly in plants with weakened transpiration



The guard cells of stomata are surrounded by subsidiary cells. The pores, the guard cells, and the subsidiary cells together constitute the **STOMATAL APPARATUS**.

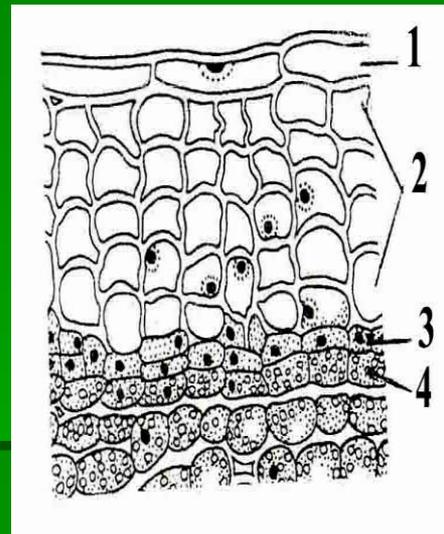
There are several kinds of stomatal apparatus



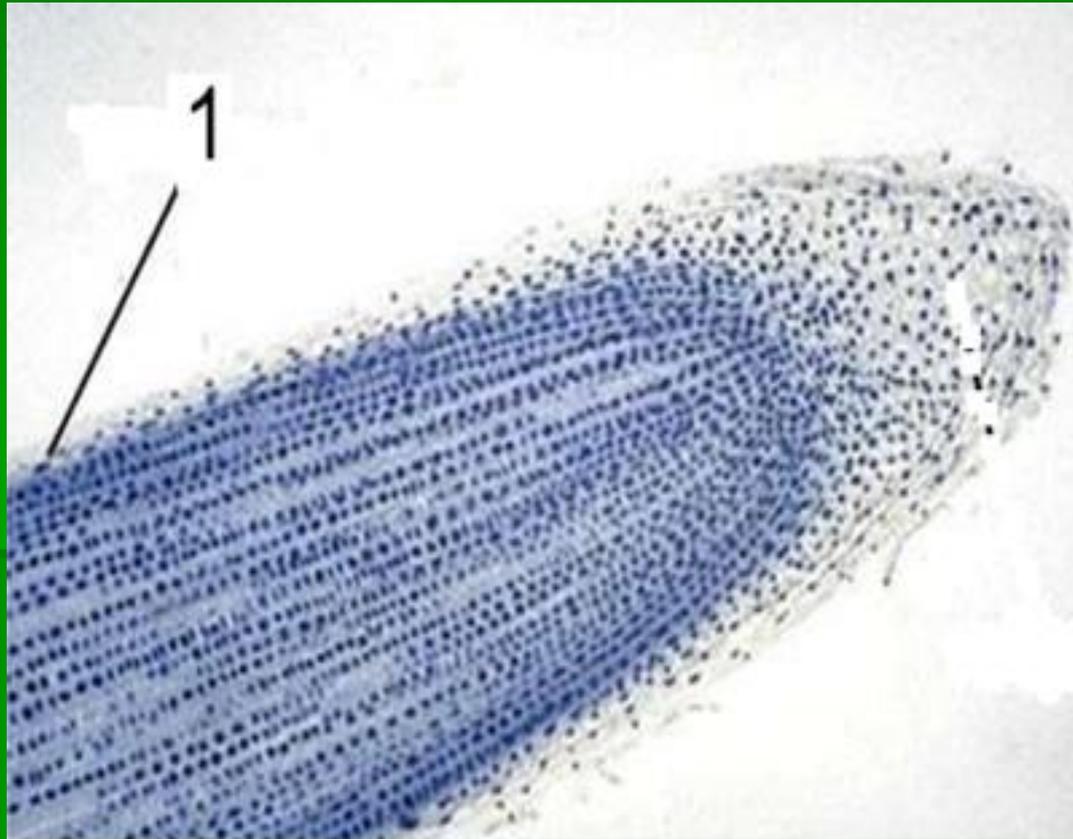
PERIDERM (GREAK. «PERI» – NEAR, «DERMA» - SCIN) – IS SECONDARY PLANT COVERING TISSUE

- .
- remains of epidermis
 1. cork cells (or phellem)
 2. phellogen (or cork cambium)
 3. phelloderm

cortex



**EPIBLEMA (OR RHIZODERMA-
1)- IS PRIMARY COVERING
TISSUE OF ROOT.**

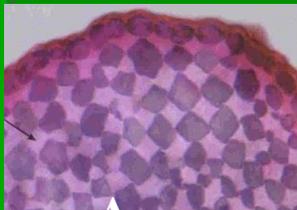
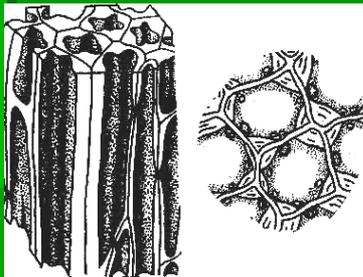


MECHANICAL TISSUES -

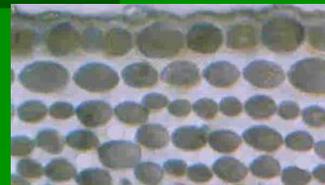
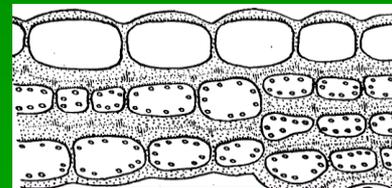
The group of specialized cells that support plant and protect it's organs from rupture, fracture, stretching and It is subdivided into a collenchyme, a sclerenchyma and a sclereids.

THE TYPES OF COLLENCHYME

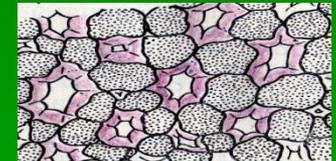
Angular A
Lamellar B
Lacunar C



A



B



C

*

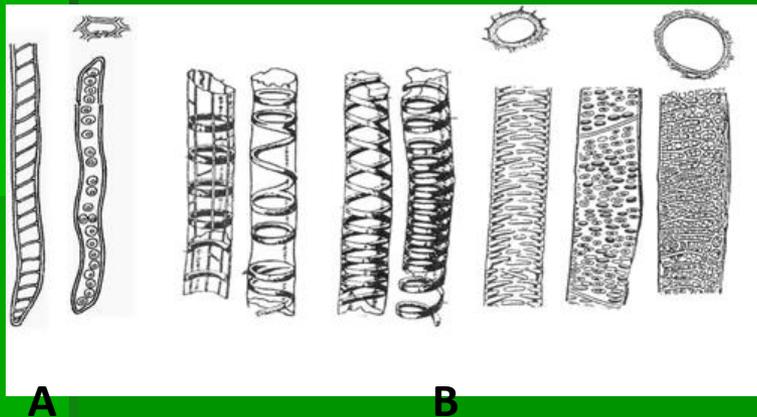
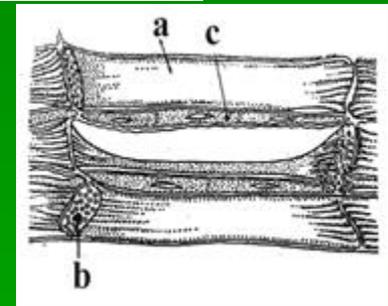
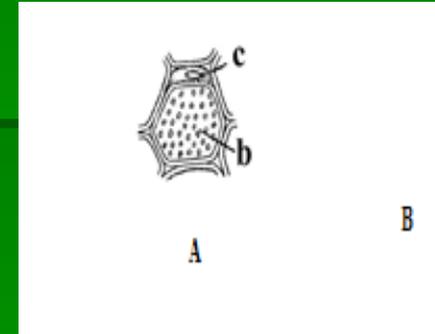
VASCULAR TISSUES

Vascular tissues are specialized for long- distance transport of water and dissolved solutes. They ramify throughout plant and are easily seen as veins in leaves.

There are two conduction tracts in the plants-upward(↑), and downward (↓). Upward tract is supported by xylem, downward- by phloem. Xylem and phloem are two kinds of vascular tissues in plants.

Xylem support upward conduction way, consisting of tracheas, vessels, parenchyma and sclerenchyma..

Phloem –consists of sieve cells or sieve tubes, fibers, and other specialized cells.



A-tracheids
B-vessels

Conductive elements of the descending current

A - in the cross section

B - in the longitudinal section

1. sieve tube with the companion cells

a. segment of the sieve tube;

a. sieve plate;

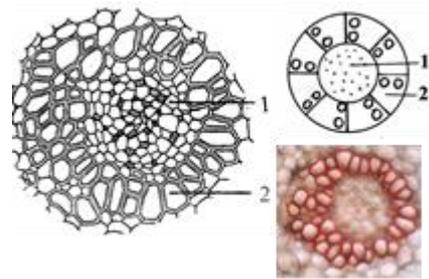
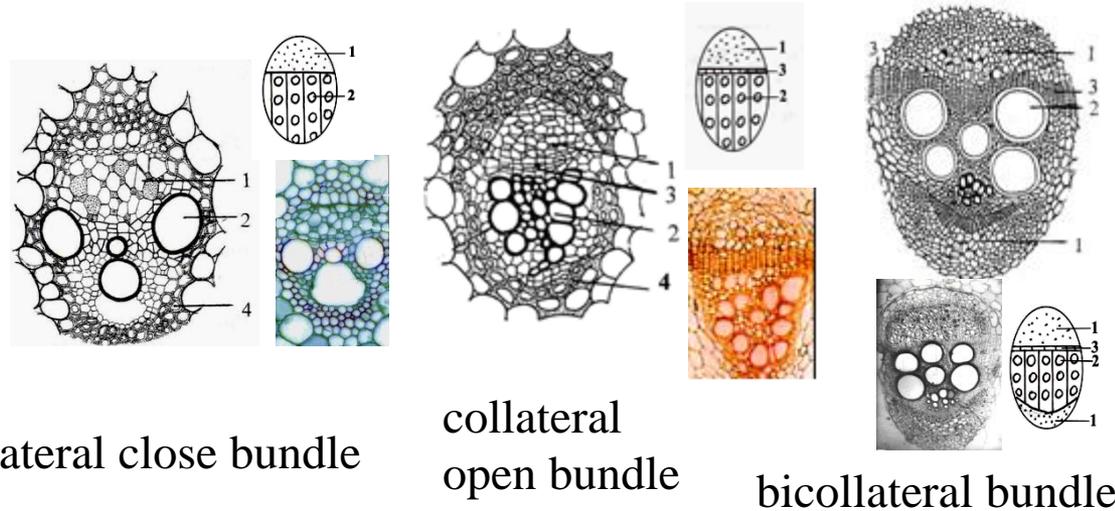
c. companion cell

VASCULAR BUNDLES

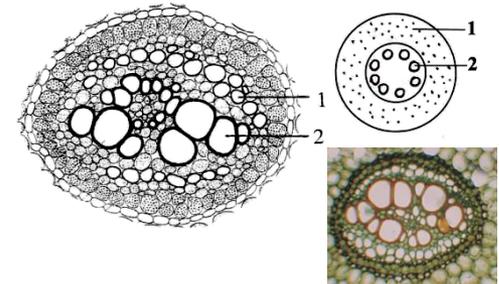
In a plant organism, the conductive tissues are arranged in the form of groups into bundles/ Bundles may be:

1) Simple; 2) Common; 3) Complicated; 4) Vascular bundles.

In the latter, the conductive tissues are shared with others. They are more perfect and widespread. They consist of xylem and phloem.



concentric bundle with the phloem in the center



concentric bundle with the xylem in the center



Radial bundles:

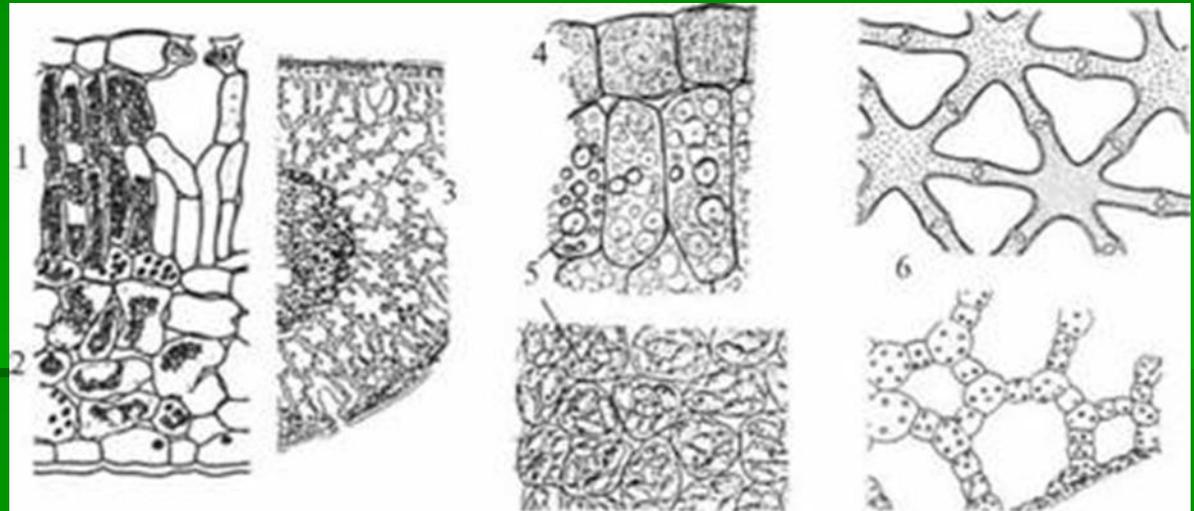
1 - phloem, 2 - xylem, 3 - cambium, 4 - sclerenchyma

BASIC TISSUE is the most common tissue in plants.

It is located between all the other tissues of the plant.

By localization in the plant body is divided into 5 groups:

- 1) Chlorenchyma (or chlorophyll-containing parenchyma).
- 2) Storage parenchyma.
- 3) Water-bearing (or hydrophoric)
- 4) Aerenchyma (or air-containing parenchyma).
- 5) Transfer(passing) cells



tissues: 1—3 —Chlorenchyma(palisade, spongy folded ; 4, 5 —Storage parenchyma with aleuronic and starch grains; 6 —aerenchyma

EXCRETORY TISSUES

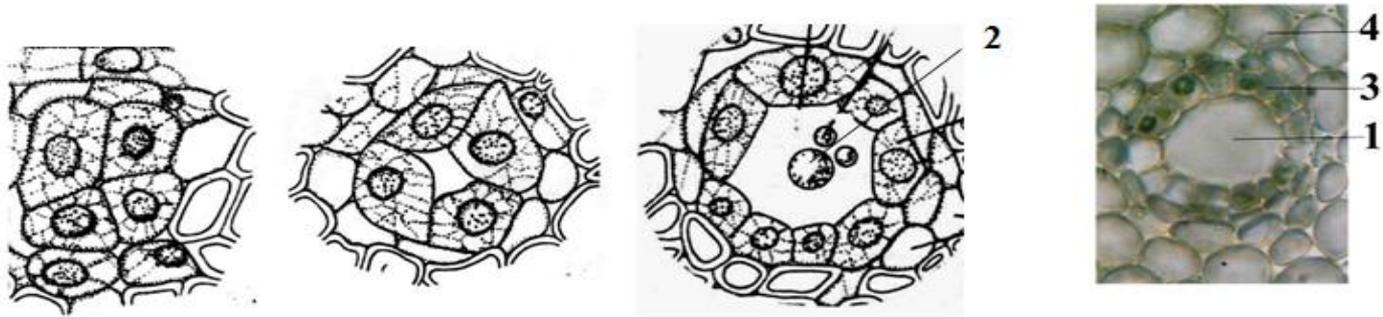
In the process of plant metabolism various substances are formed, which are not used later. They can accumulate in special cells, various tissues, receptacles. Excretory structures are divided into two types:

endogenous, or internal secretion, accumulating secrets or secrete them in tissues lying nearby and exogenous, or external (external) secretions, secreting secrets in the external environment.

Endogenous, or internal secretion - are schizogenious and lysigenicous receptacles, lacticifer, specialized cells-idioblast.

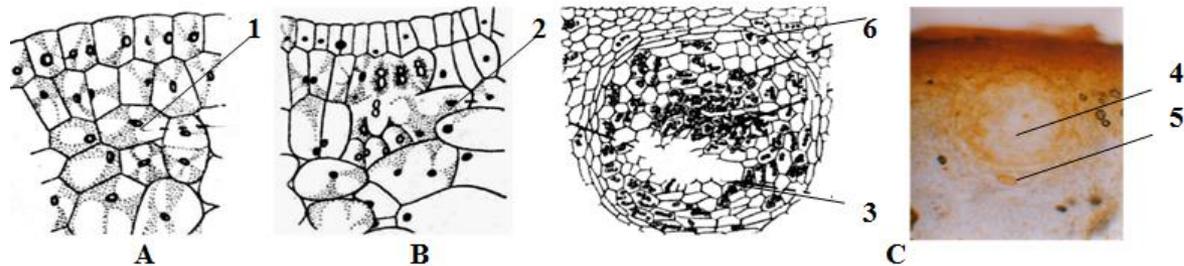
2) exogenous, or external (external) secretion it is the hydathodes, glandular hairs, glands, nectaries, osmophores (Greek osme- smell + phore -carry) special structures in plants that produce smell; . They are formed from various parts of the flower, etc.

SCHIZOGENOUS CONCEPTACLES(OR RESERVOIRS).



A - C- consecutive stages of the development. 1 - cavity of the container, 2 - drops of the essential oil, 3 - epithelial cells, 4 - cells of the basic parenchyma.

LYSIGENICIOUS CONCEPTACLES (OR RESERVOIRS)



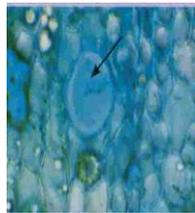
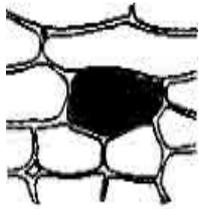
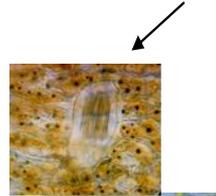
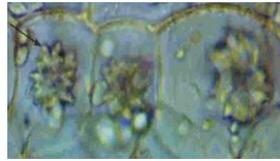
A - C - consecutive states of development.

1 - cells, accumulate the essential oil 2 - destructed cells, 3 - remains of the destructed cells, 4 - cavity of the container, 5 - drops of the essential oil, 6 - cells of the basic parenchyma.

Nectary(1) of flower on ovary

. Cells-idioblast (or secretory cells) with:

- A - crystal's
- B - tannins
- C - mucous
- D - ether oil



A

D

B

C

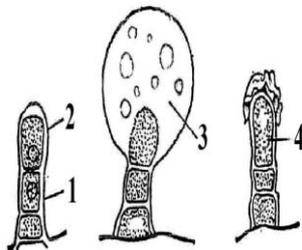


Process of capitated hair and glandule functioning.

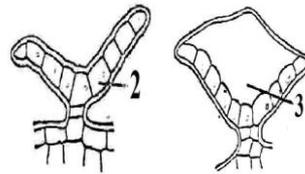
A - capitated hair (filament)

- 1 - stalk
- 2 - head without a secretion
- 3 - head with the secretion
- 4 - head after the excretion of the secretion

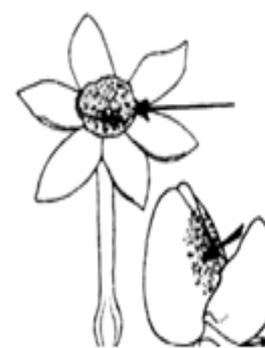
B - glandule



1

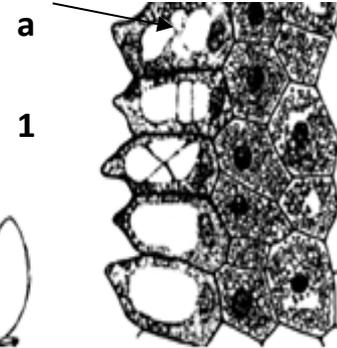


2



Osmophores.

- 1 - location in the flower
- 2 - microstructure in the beginning of the excretory activity:
- a - secretory epidermis



2

THANK YOU FOR ATTENTION!



DOCENT

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