

Ministry education and Science of Republic of Kazakhstan  
Karaganda State University named after academician Ye.A.  
Buketov

Biological and geographical faculty

Botany Department

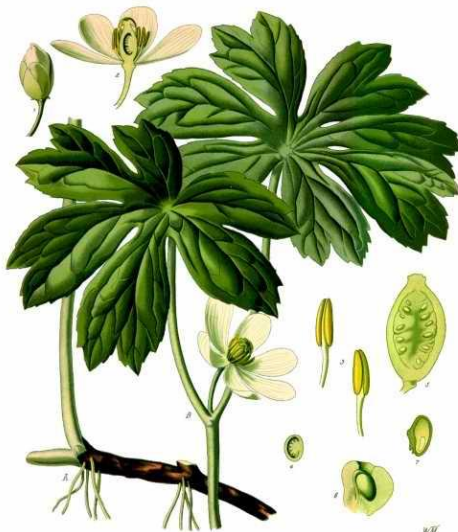
Course – Botany  
Specialty - 5B011300 – «Biology»

Lecture № 2

# **Meristem and cover tissues. Constant tissues: transport, mechanic**

(1 hour)

Lecturer: candidate of biological science, associated professor  
Ishmuratova Margarita Yulaevna



*Podophyllum peltatum* L.  
Image processed by Thomas Schoepke  
[www.plant-pictures.de](http://www.plant-pictures.de)

## **Plan of lecture:**

- 1 Meristem tissue ткани, classification, location and function.
- 2 Basic tissues, their function.
- 3 Covering tissues. Primary, secondary and tertiary covering tissues.
- 4 Excretory tissues.
- 5 Mechanic tissues. Collenchymas, sclerenchymas and sclereids.
- 6 Transport tissues: xylem and phloem. Type of transport bundles.

## **Basic literatures:**

- 1 Бавтуто Г.А. Практикум по анатомии и морфологии растений. – Минск: Новое знание, 2002. – 185 с.
- 2 Родман А.С. Ботаника. – М.: Колос, 2001. - 328 с.

## **Additional literatures:**

- 1 Ишмуратова М.Ю. Ботаника. Учебно-методическое пособие. - Караганда: РИО Болашак-Баспа, 2015. - 331 с.
- 2 Тусупбекова Г.Т. Основы естествознания. Ч. 1. Ботаника. – Астана: Фолиант, 2013. – 321 с.

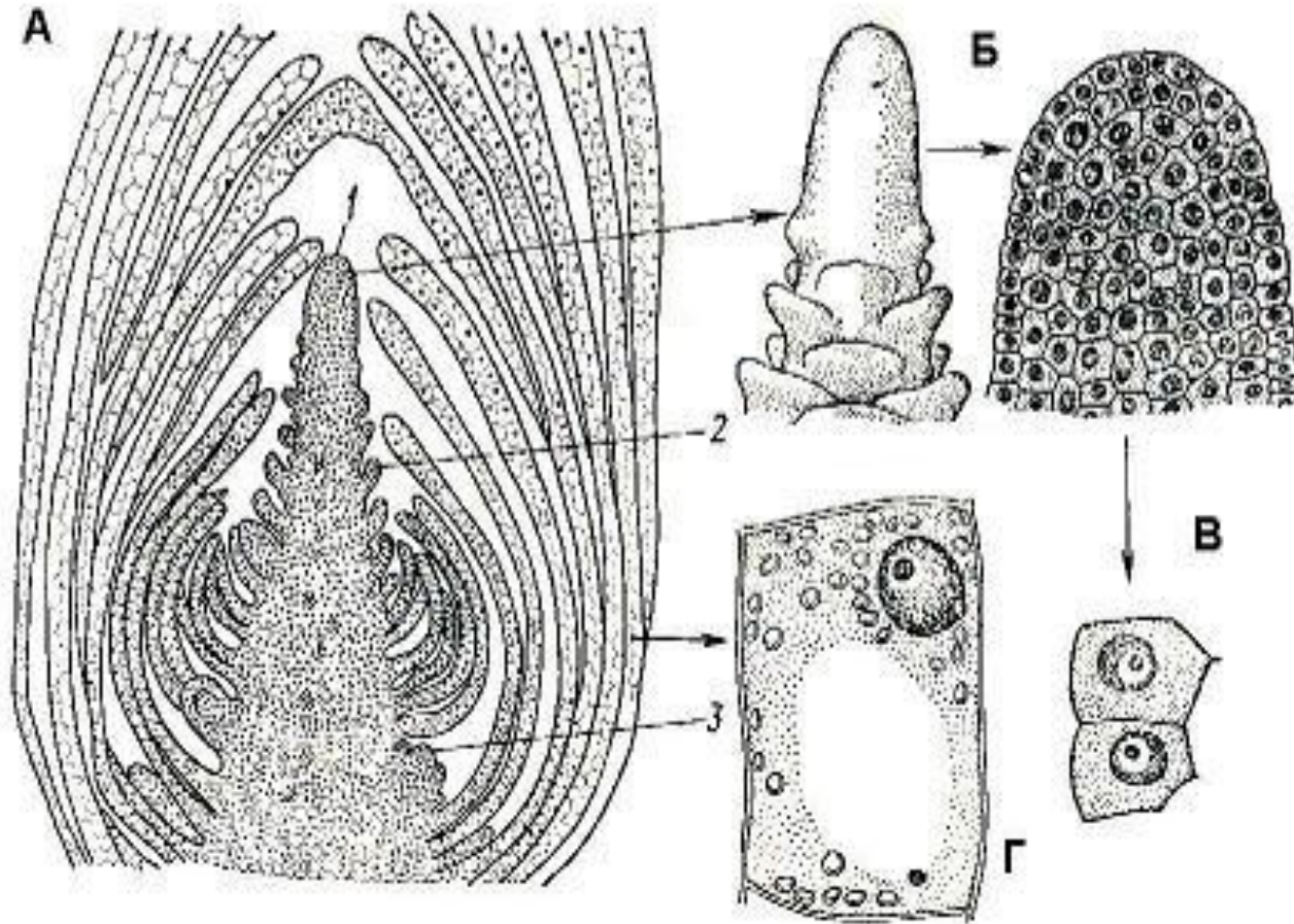
# Classification of meristem tissues

By origin: 1) *primary meristems*, which are origin from meristems of embryo;

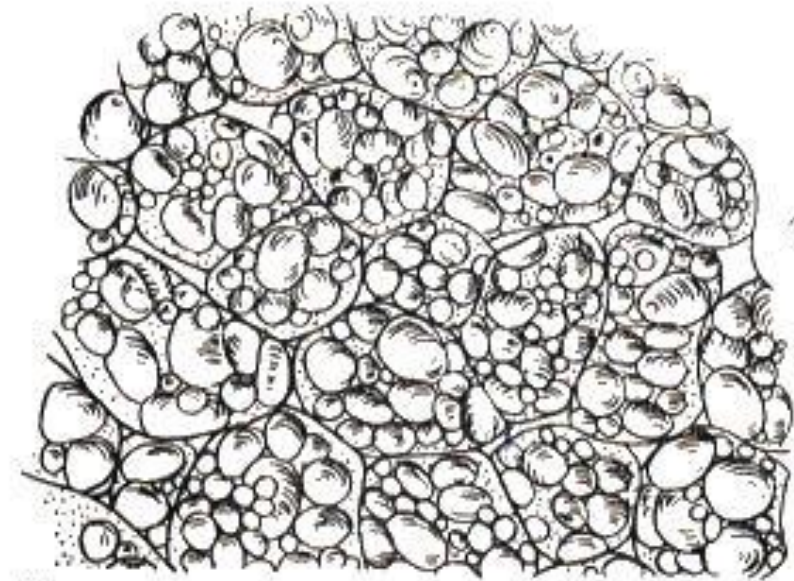
2) *Secondary meristems*, which are created from - or primary meristems, or de-differentiating of basic tissues.

By place of location are separated four types of meristems: 1) *apical*; 2) *lateral*; 3) *intercalary*; 4) *wound*.

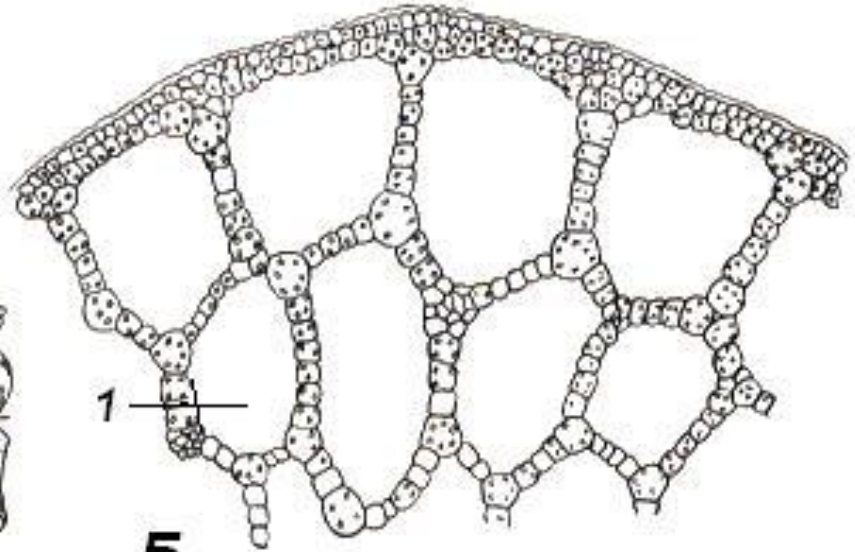
# Apex meristem of shrank of Elodea



A – lateral cut; Б – lateral cut of cones of growing; B – cells of primary meristem; Г – parenchyma cell of leaf, finished differentiating; 1 – cone of growing; 2 – primordium of leaf; 3 – primordium of shrank



**A**

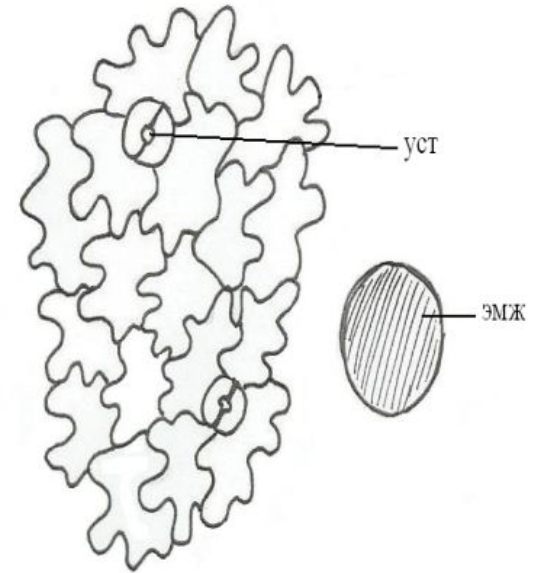
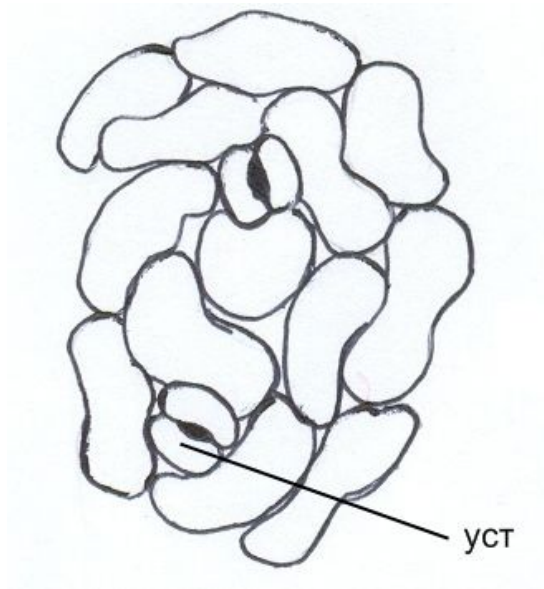
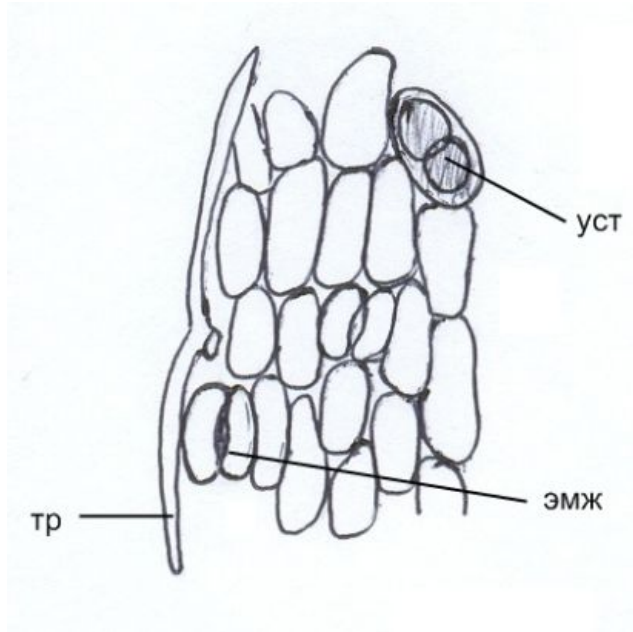


**Б**

Storage parenchyma of potato (A) and  
airenchyma of stalk of pondweed (Б); 1-  
exo-cellular stretch

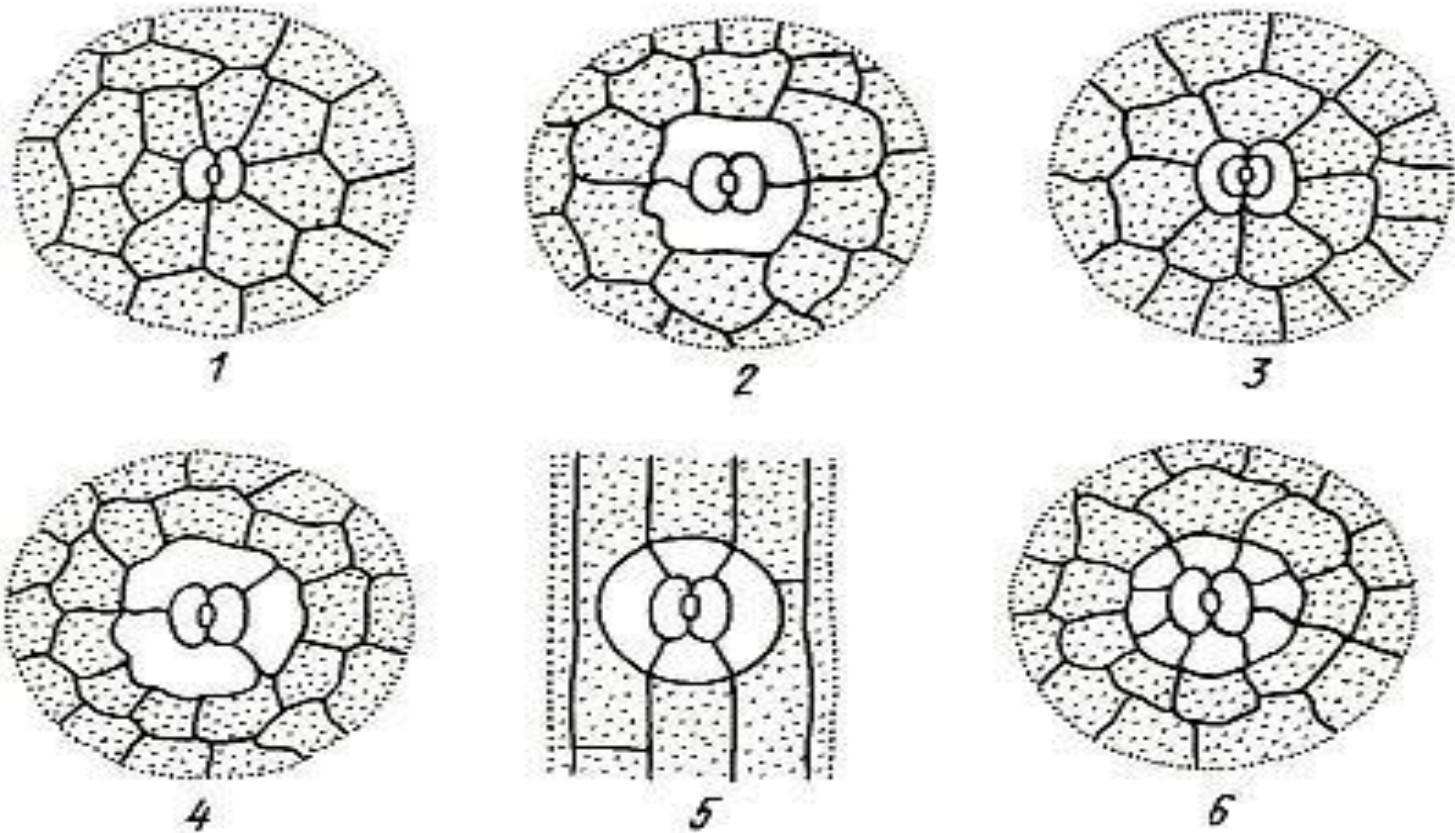


# Structure of epidermis of different plants



Тр – trichomes, уст – stoma, эмж – essential oil glandular

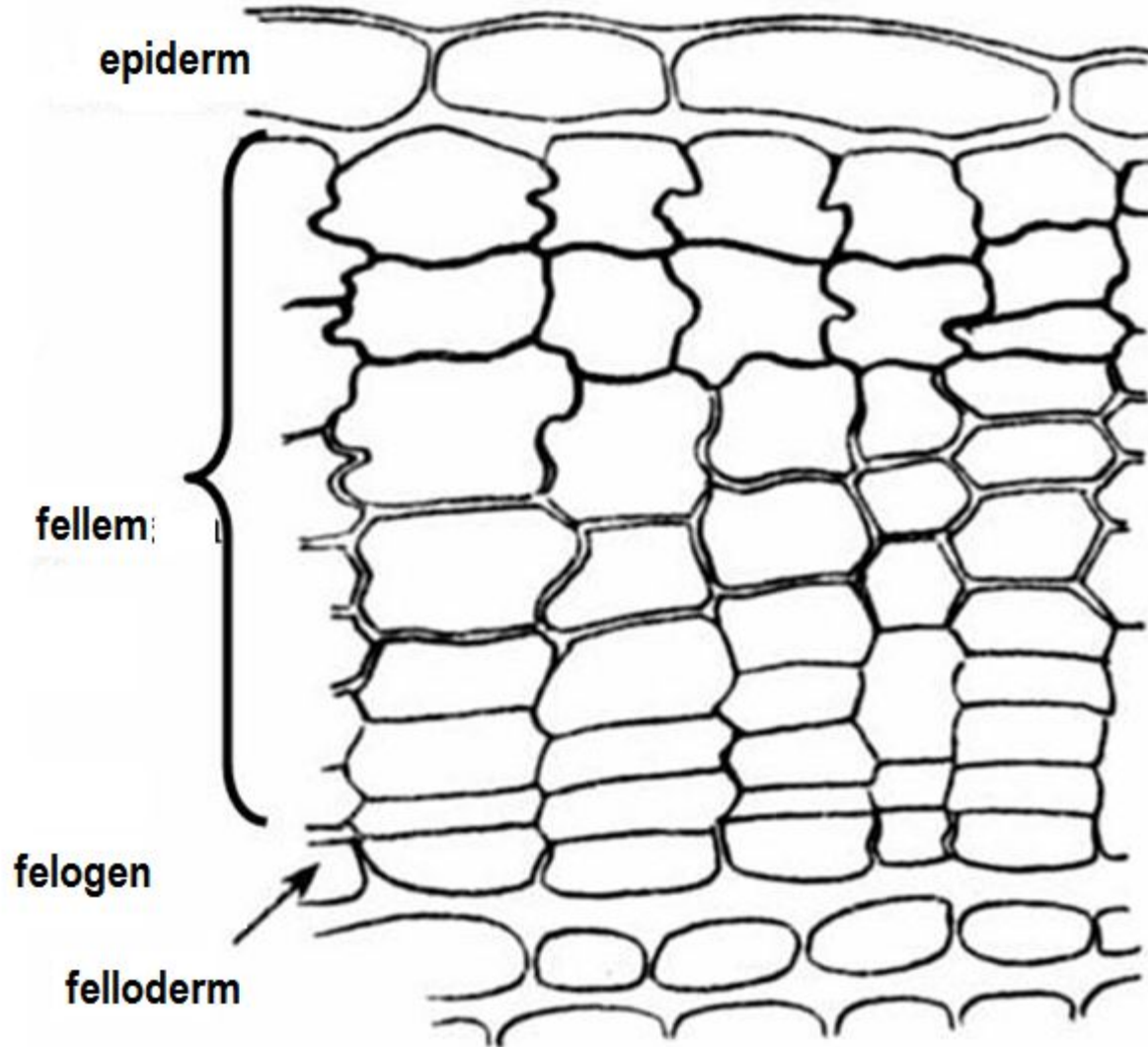
# Types of stoma apparatus of plants



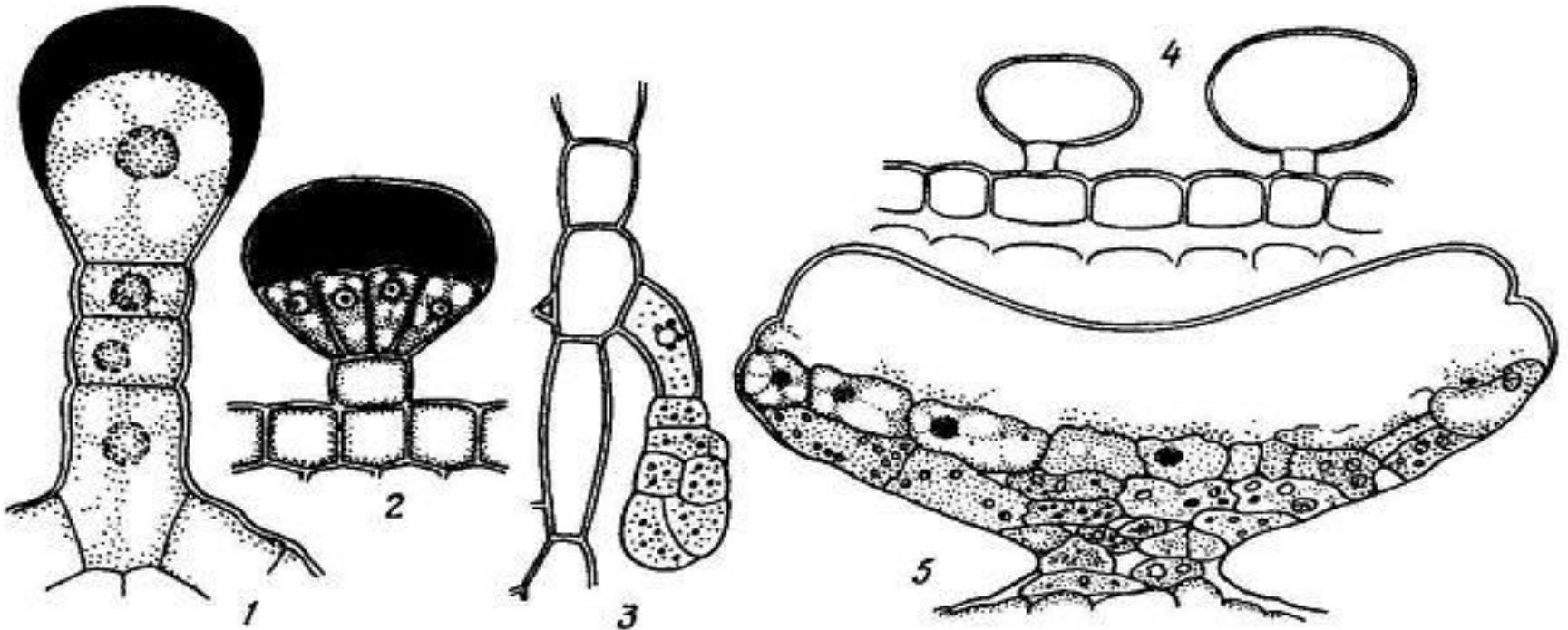
1 – anomocytes; 2 – diacytes; 3 – paracytes; 4 – anisocytes;  
5 – tetracytes; 5 – encyclocytes



# Structure of periderm of stalk of elder

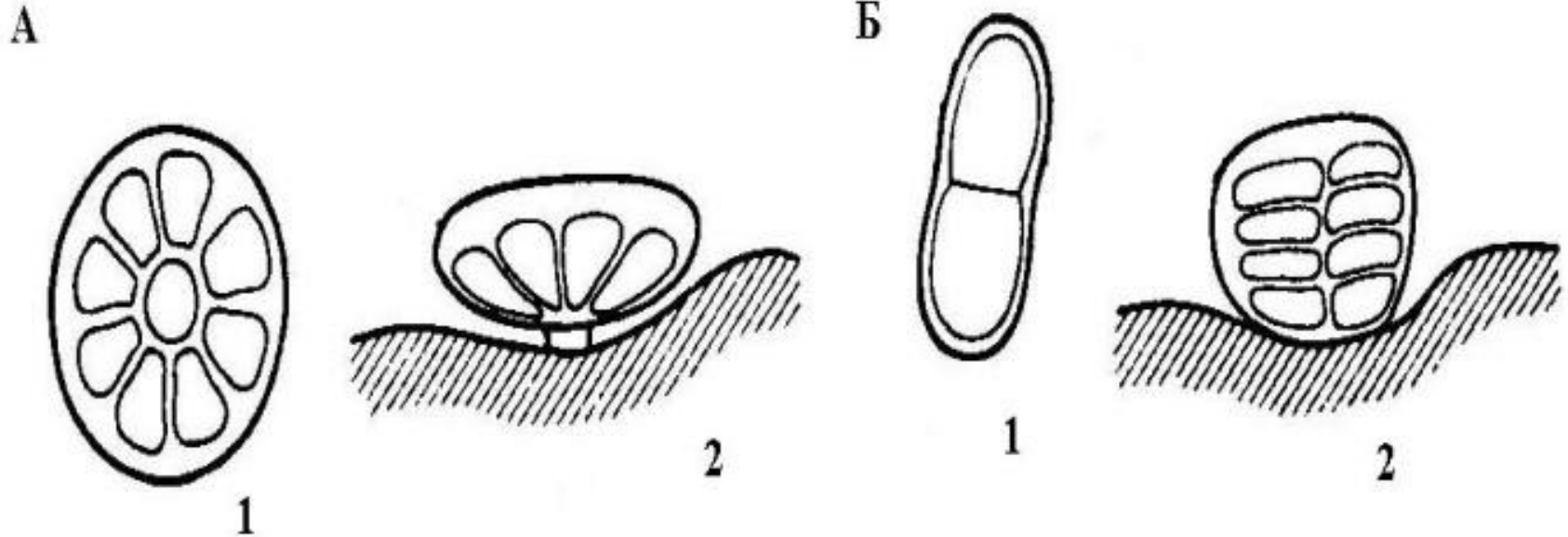


# Glandular trichomes and glandulars



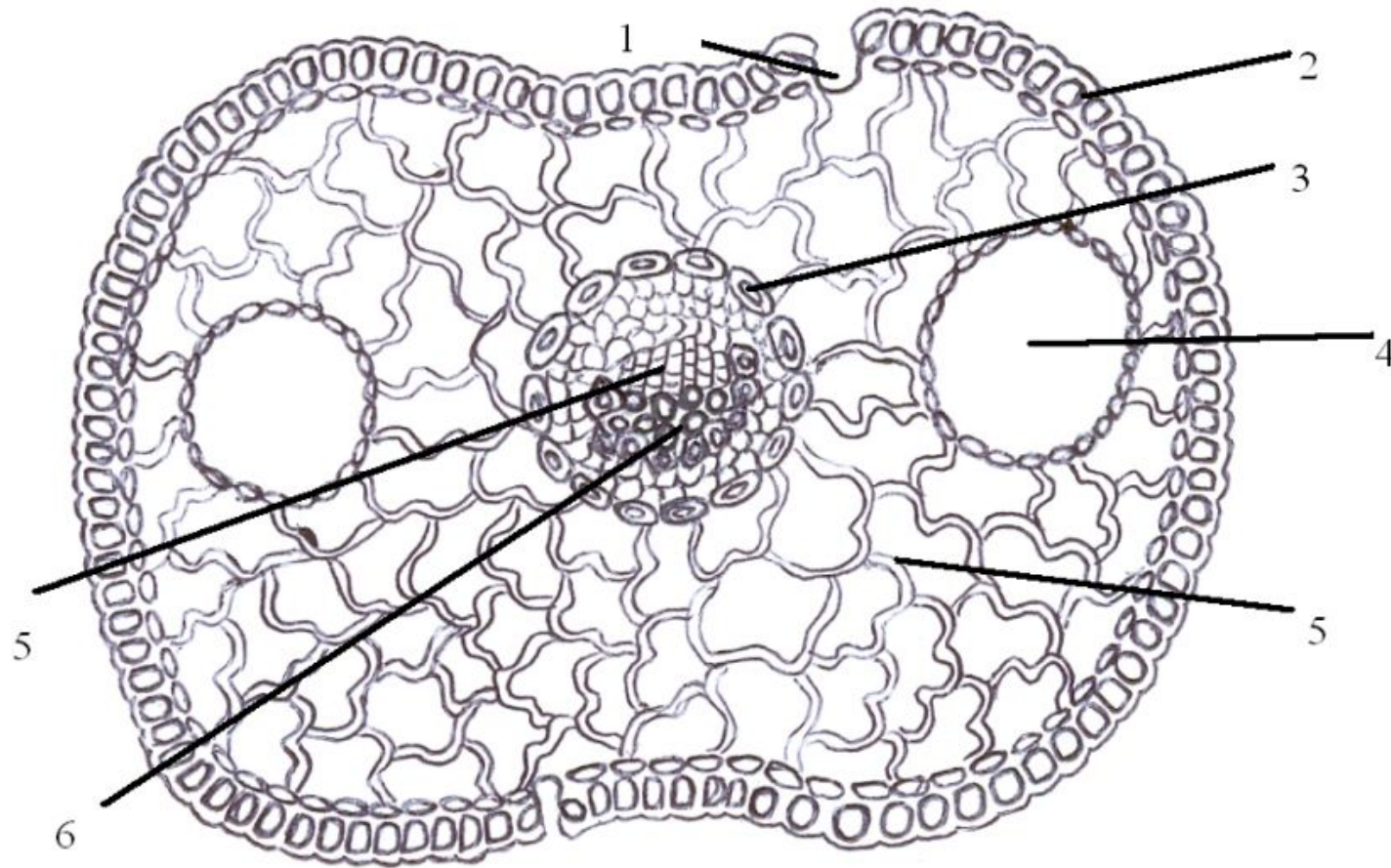
1- trichome of *Pelargonium* with essential oil, extracted under cuticula; 2 – glandular of *Rosmarinum*; 3 – trichome of potato; 4 – bubble trichomes of *Atriplex* with water and salt inside vacuoles; 5 – glandular of leaf of *Ribes nigrum*

# Structure of essential oil glandular of plants



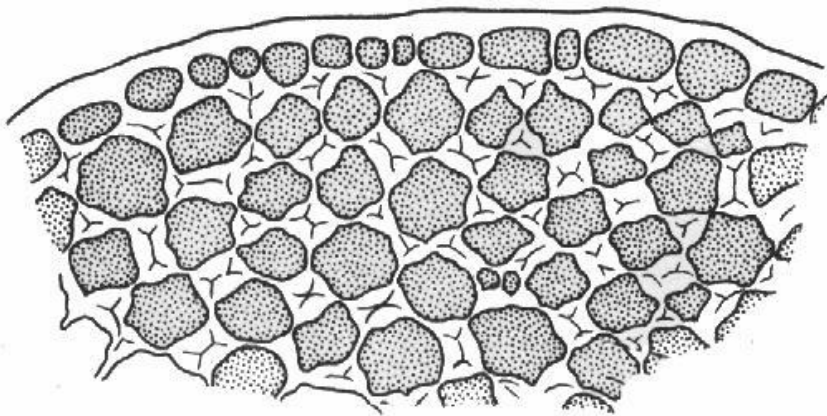
1 - view with cover; 2 – lateral view, A – Lamiaceae,  
Б - Asteraceae

# Cross-cut of leaf of *Juniperus sabina*

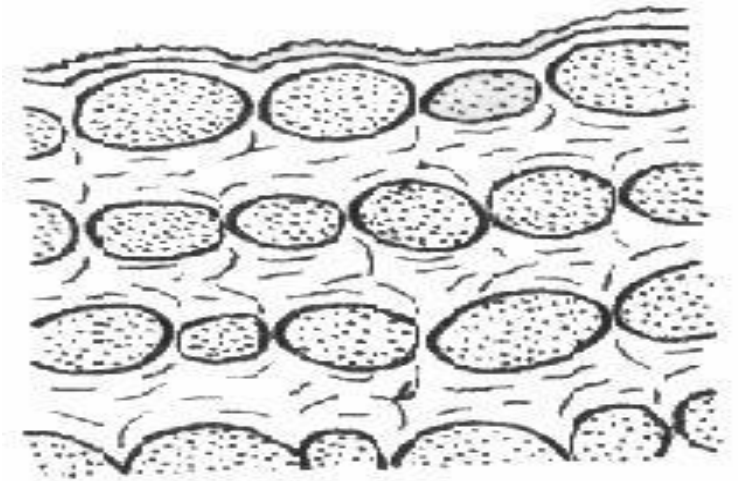


1 – epidermis, 2 – stoma, 3 – endoderm, 4 – pitch reservoir, 5 – mesophyll, 5 – phloem, 6 – xylem

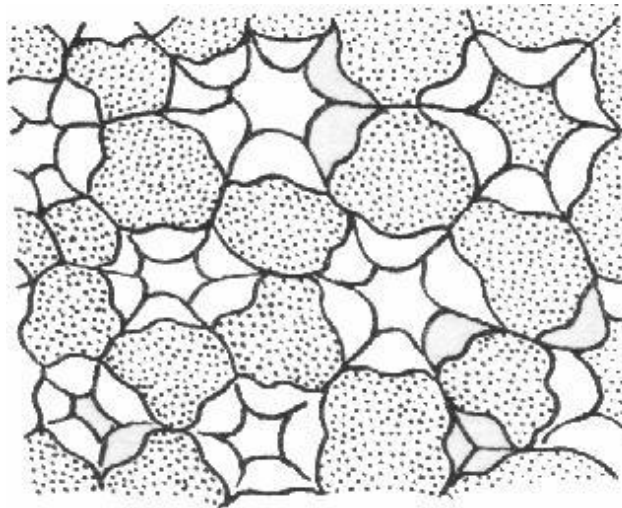
# Structure of collenchymas



**Angular**



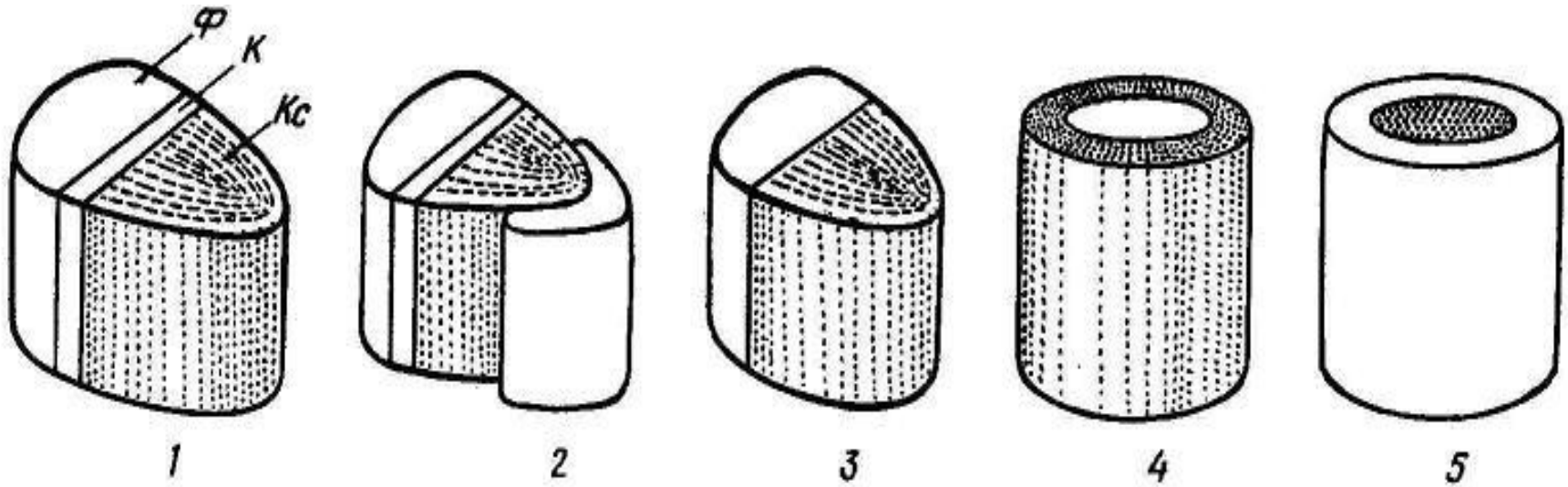
**Lammellar**



**Lacunar**



# Type of transport bundles



1 – open collateral; 2 – open collateral; 3 – closed collateral; 4 – concentrated closed center phloem; 5 – concentrated closed center xylem;  $K$  – cambium;  $Kc$  – xylem;  $\Phi$  – phloem

## **Control questions:**

- 1 Show simple and compound tissues, primary and secondary tissues. Give the examples.
- 2 Why covering tissues belongs to compound tissues? Describe their functions.
- 3 Which role do conduct transport and mechanic tissues in plant organism?
- 4 Which type of mechanic tissue is characterized for growing plants? Which type – for adult plants?
- 5 What kind of tissue does form year ring?
- 6 What are differences between exoetic and endoetic secretor tissues?
- 7 Which structure have amphycasal and amphycrinal bundles?

## Test question:

**From lateral meristem cambium is formed:**

- A) proto phloem and proto xylem
- B) endoderm
- C) essential oils
- Д) libriform
- E) parenchyma cells
- F) Trichomes
- G) Stoma
- H) Lenticel

**From fellogen is created:**

- A) cork
- B) collenchymas
- C) sclerenchyma
- Д) sclereids
- E) felloderm
- F) endoderm
- G) Pericycle
- H) procambium