Plant tissues.

Cover and excretory and basic tissues

Dermal tissues (surface tissues, cover tissues) are plant tissues located on the border with the external environment, and consisting of tightly closed cells.

The functions of the dermal tissues are all functions related to the interaction of the plant with the environment:

1. protection from adverse environmental influences: a sharp change in temperature, drying up, chemical and physical influences, eating by animals, etc.
2. gas exchange
3. transpiration
4. absorption of water and substances dissolved in it
5. excretion of excretory substances and chemical protection substances

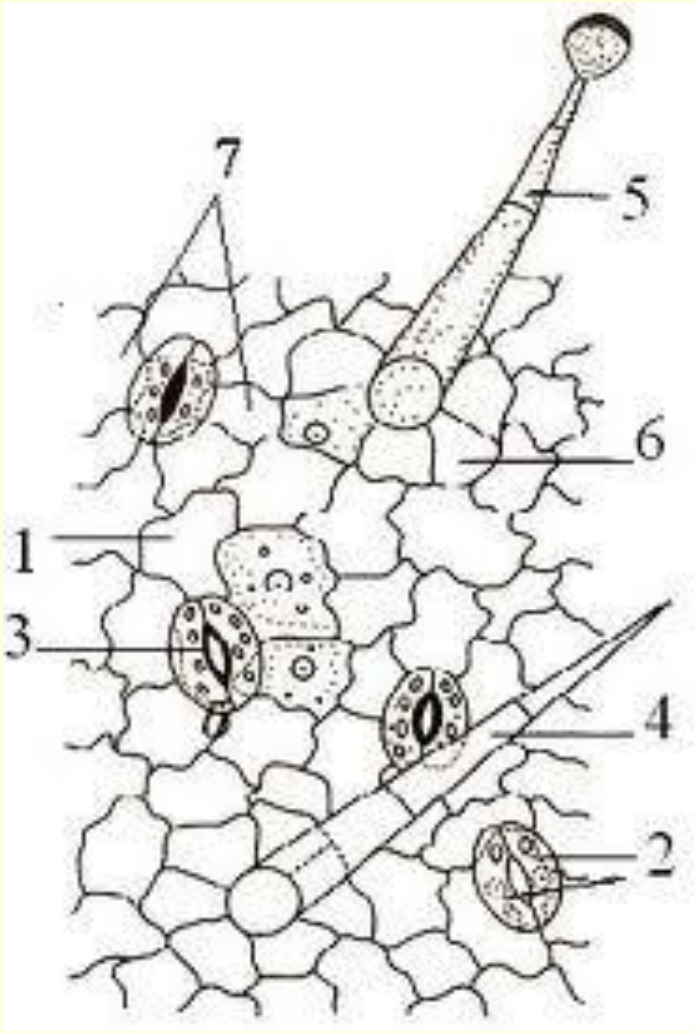
In addition, the dermal tissues can sometimes perform other functions:

6. synthesis of substances
7. accumulation of water and nutrients

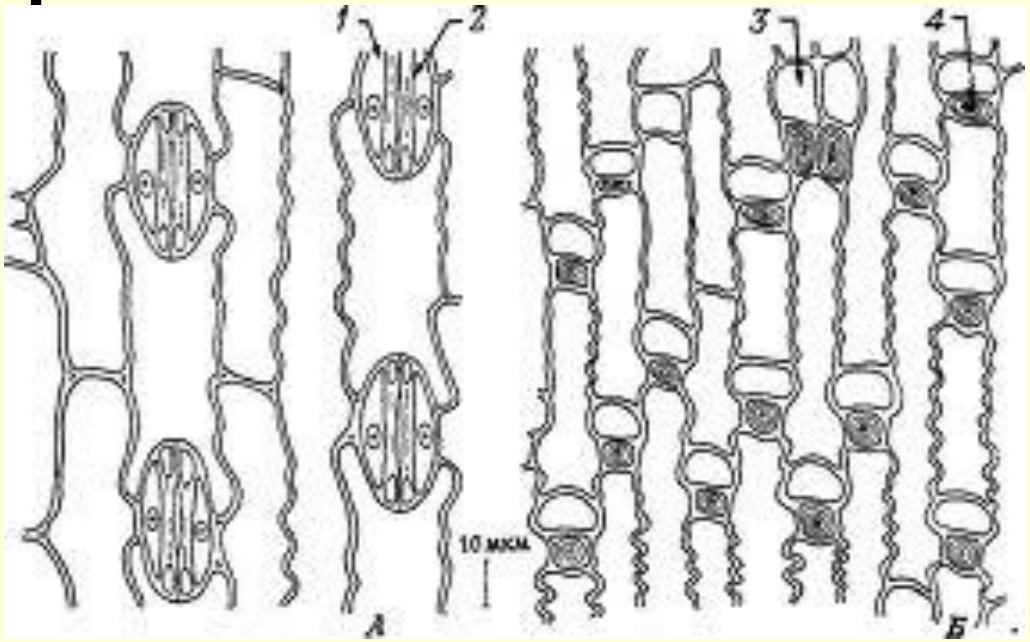
The epidermis is a complex tissue. The plant epidermis consists of three main cell types:

- pavement cells,
- guard cells and their subsidiary cells that surround the stomata (stomata complex)
- trichomes, otherwise known as leaf hairs.

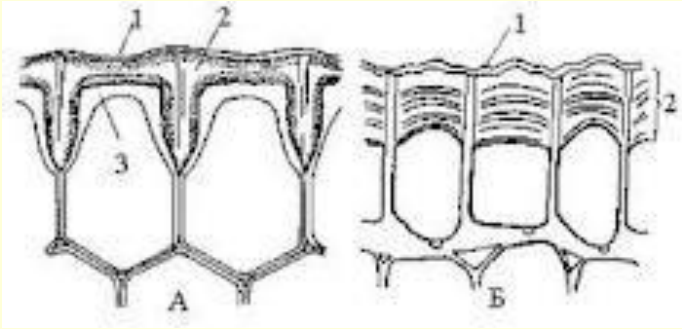
The epidermis



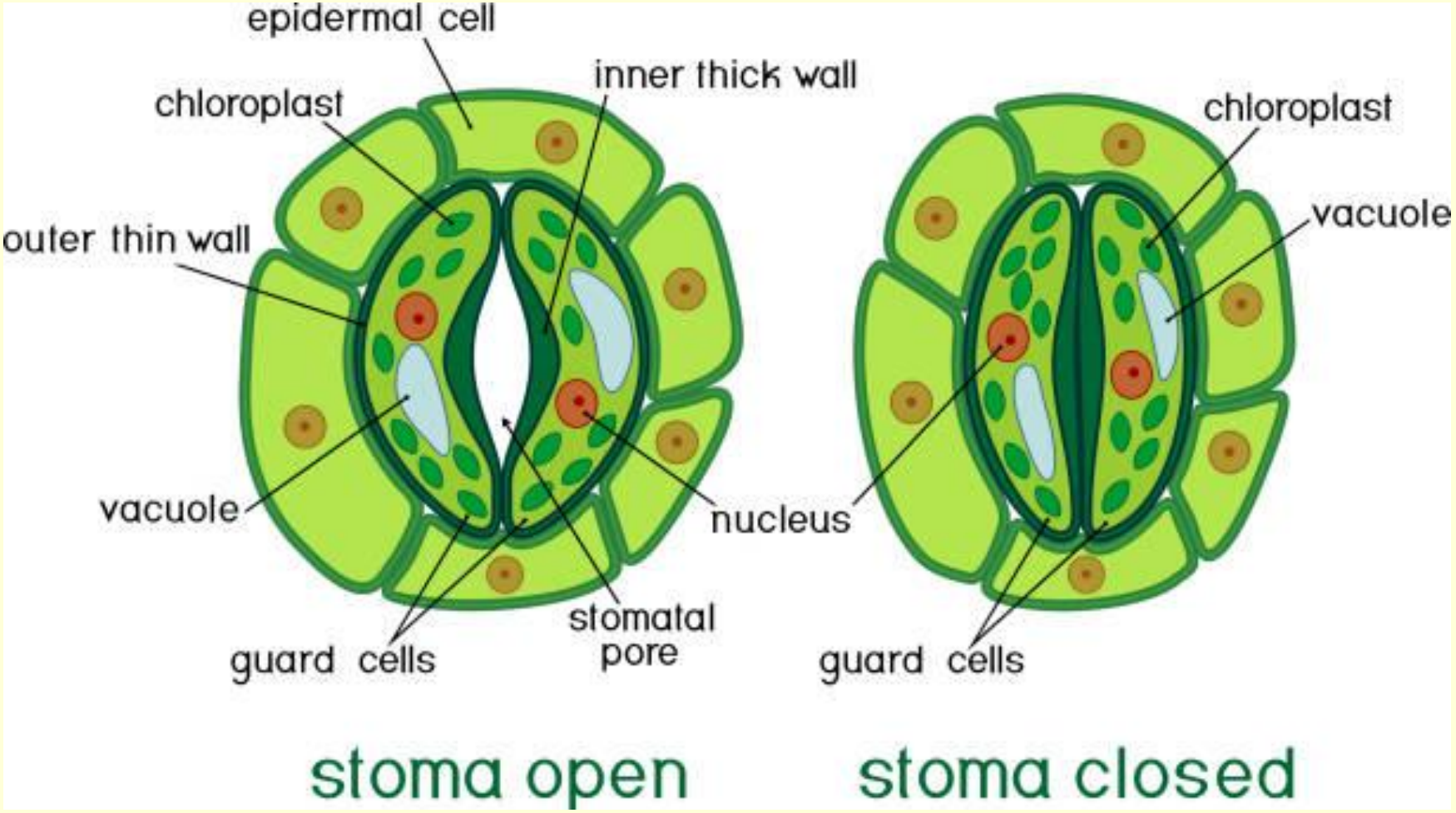
The epidermis of a dicotyledonous plant



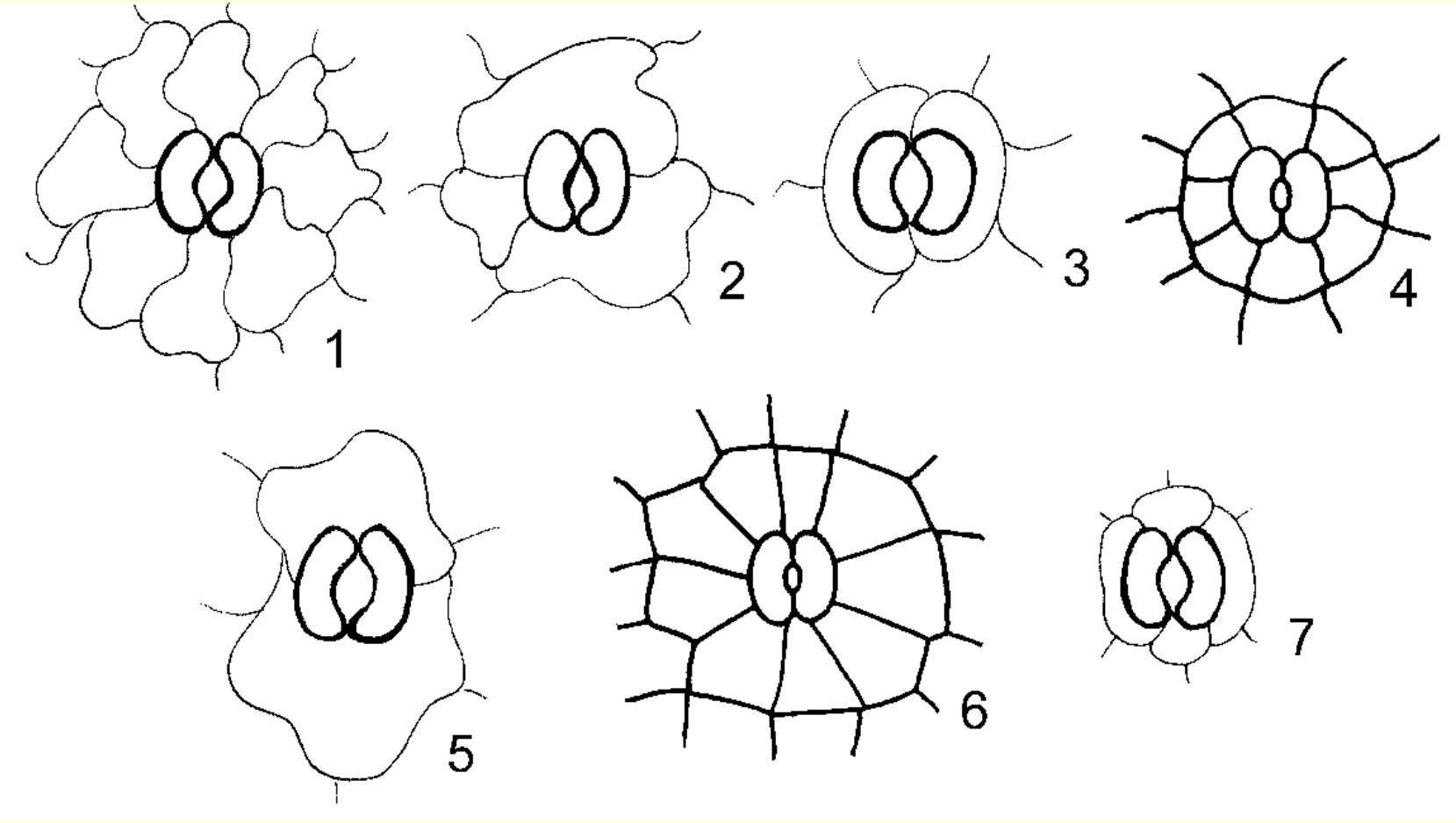
The epidermis of a monocotyledonous plant



Cuticle


epidermal cell
chloroplast
inner thick wall
outer thin wall
vacuole
nucleus
guard cells
stomatal pore
chloroplast
vacuole
guard cells
stoma open
stoma closed

Types of stomatal apparatus



1-anomocytic 2-anisocytic, 3-paracytic, 4-cyclocytic, 5-diacytic, 6-actinocytic, 7-tetracytic.

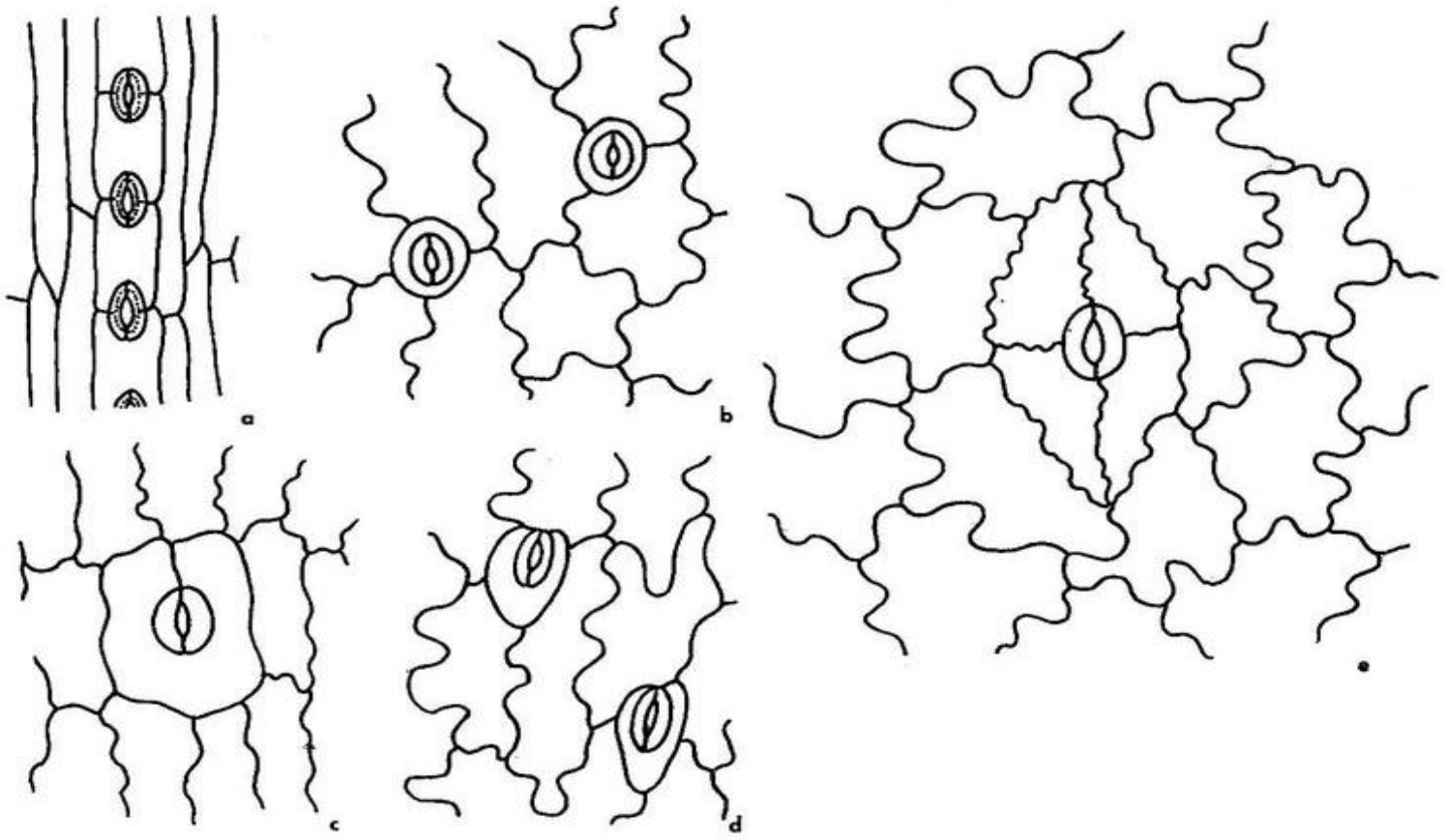
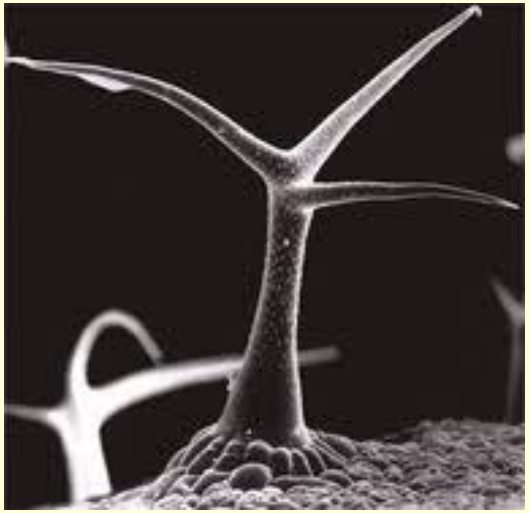
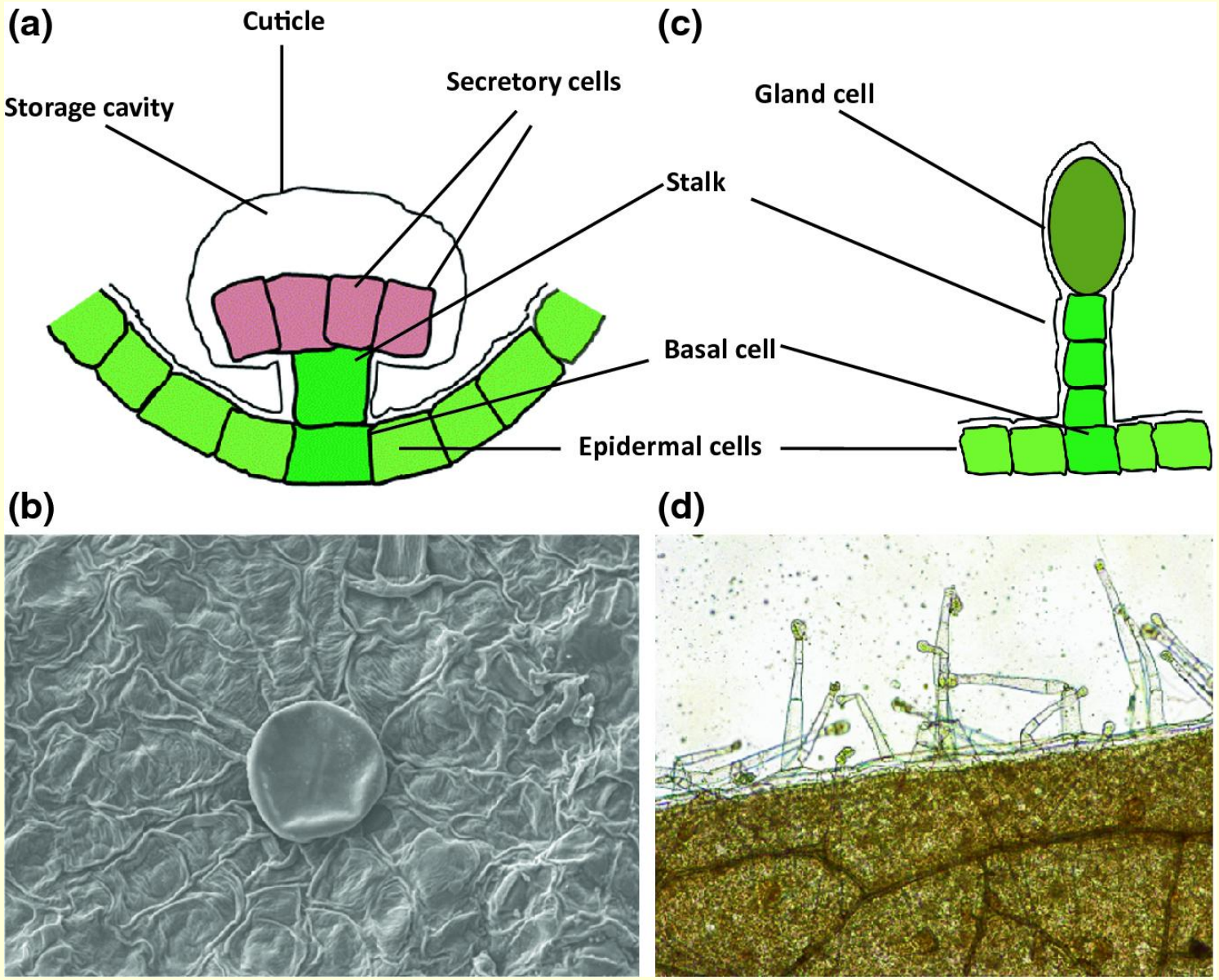


Fig. 2. — Stomatal types : **a**, hypocytic; **b**, pericytic; **c**, desmocytic; **d**, polocytic; **e**, staurocytic.

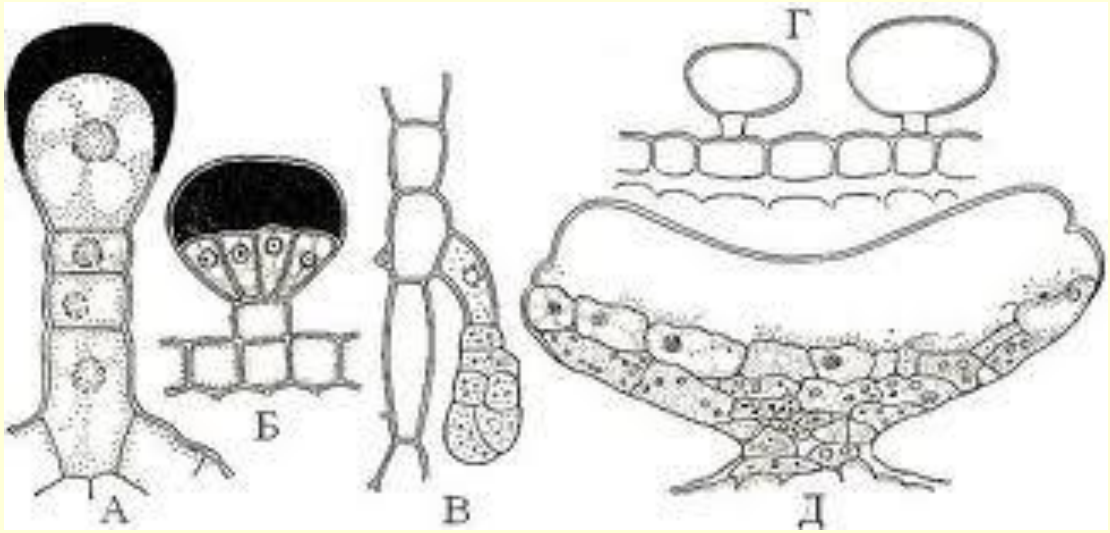
Trichomes are external outgrowths of epidermal cells, sometimes subepidermal layers take part in their formation.

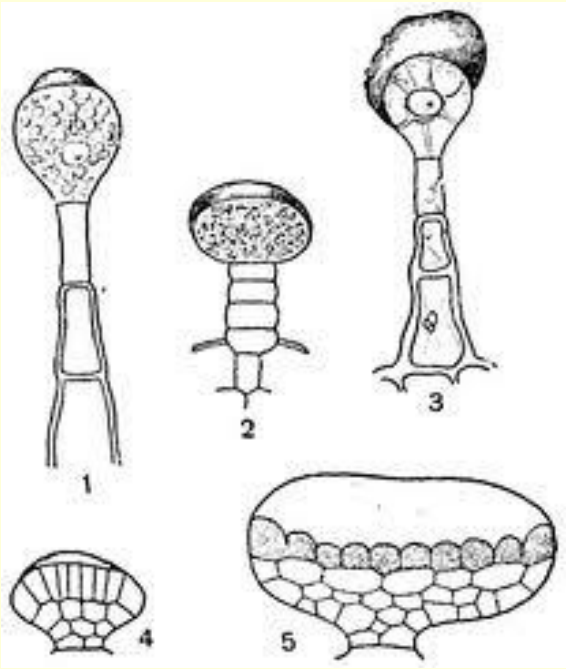




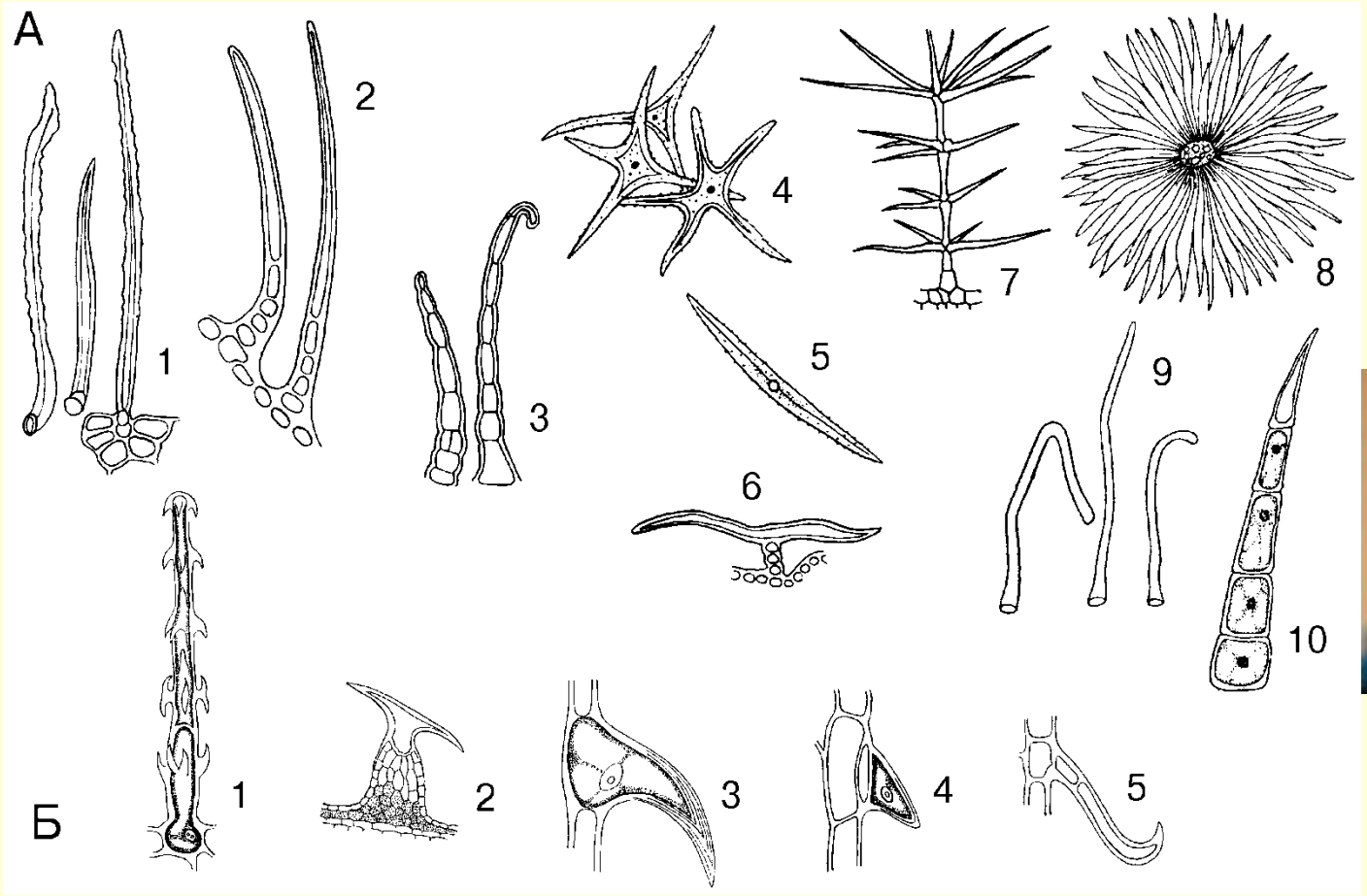
The structure of the glandular trichomes

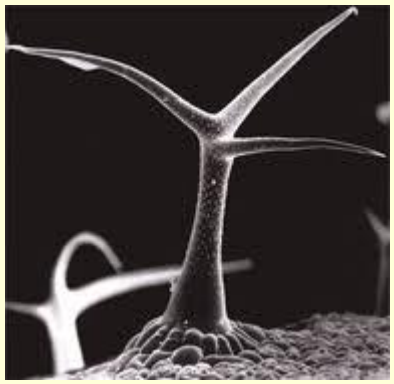
Glandular trichomes



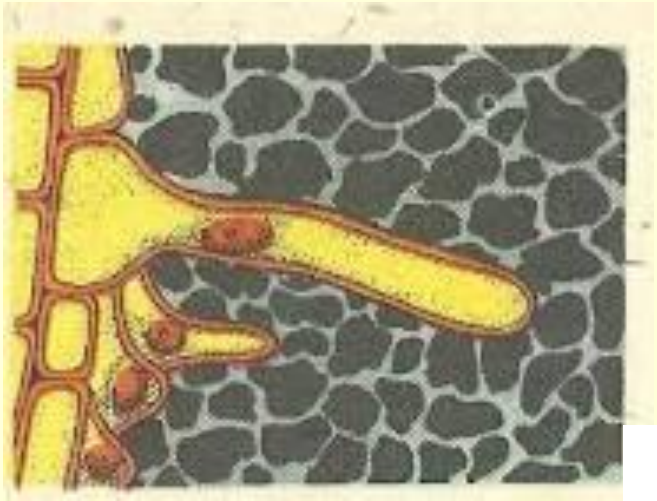


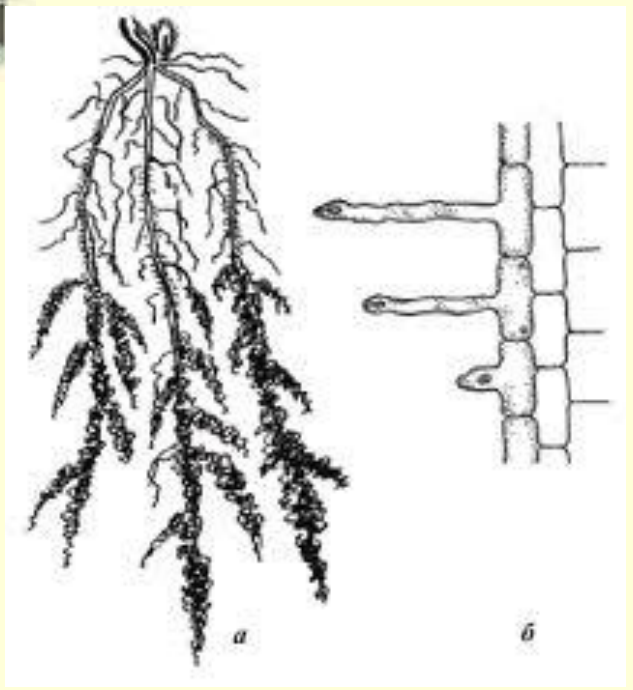
The covering trichomes have different structures, they can be unicellular, multicellular, branched, non-branched, stellate, scaly, etc.



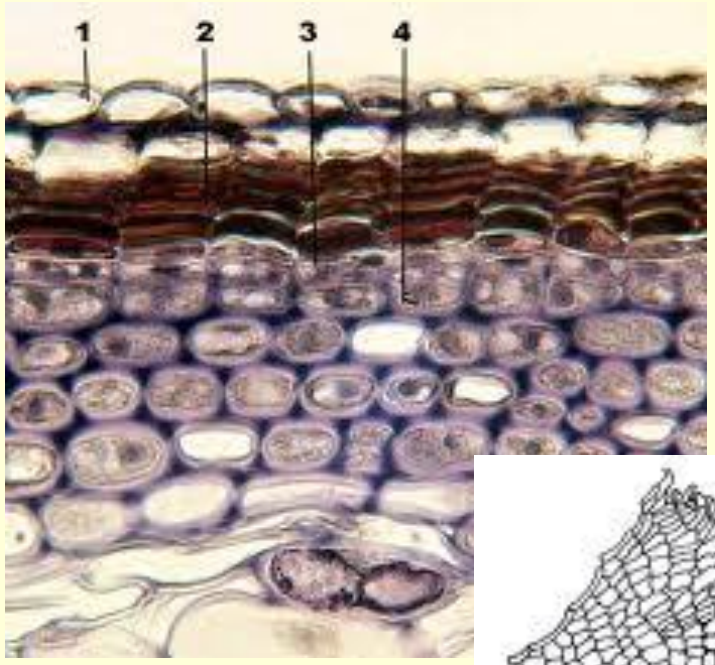


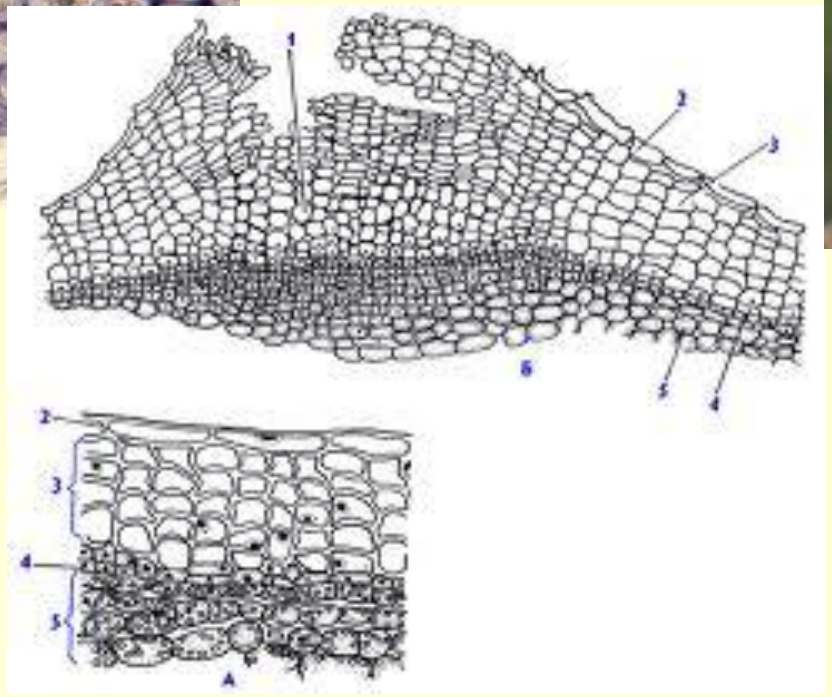
The epiblem (rhizodermis)



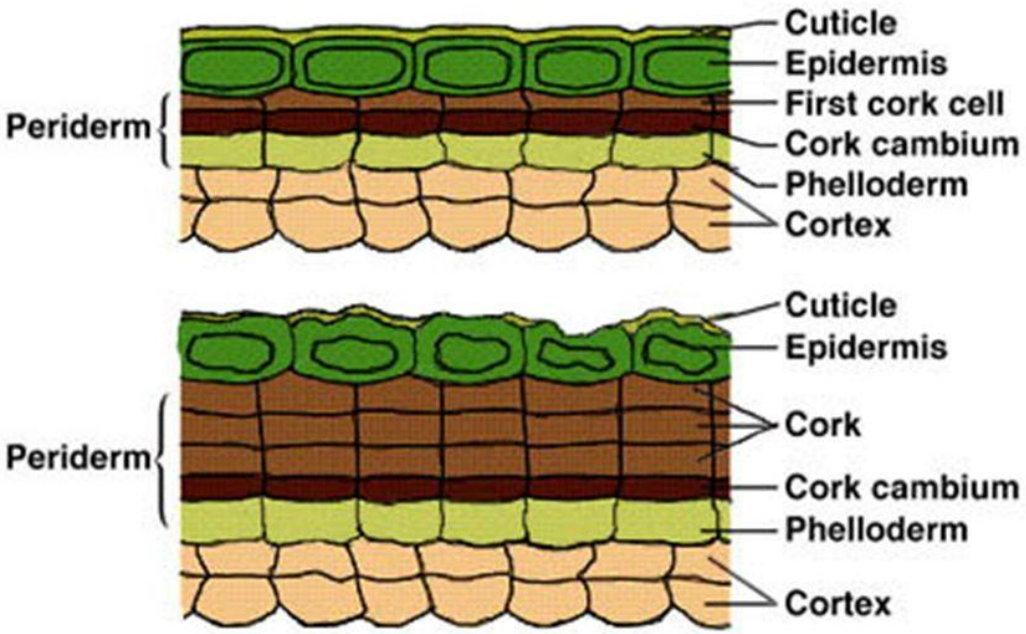


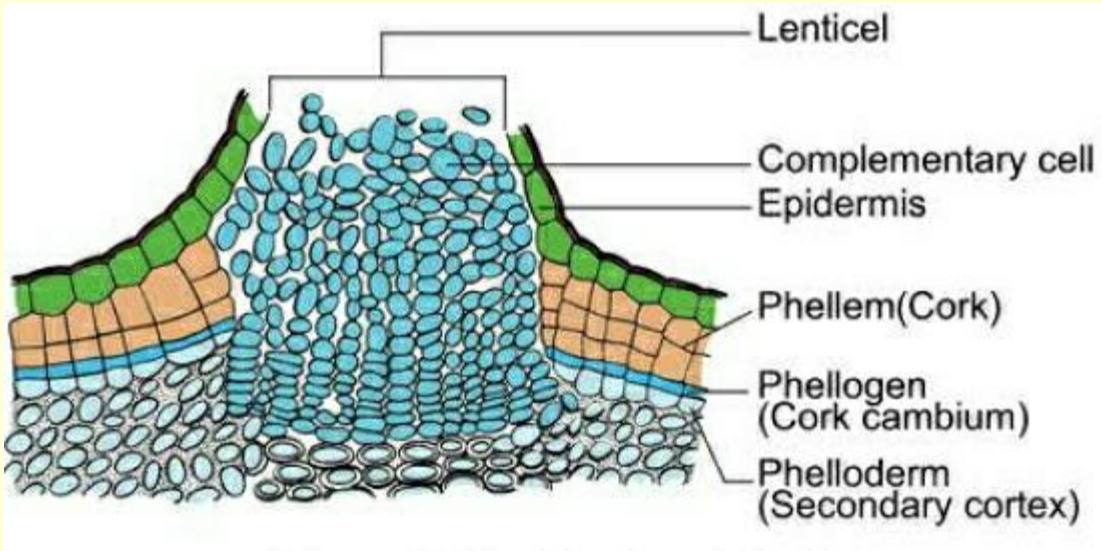
Перидерма



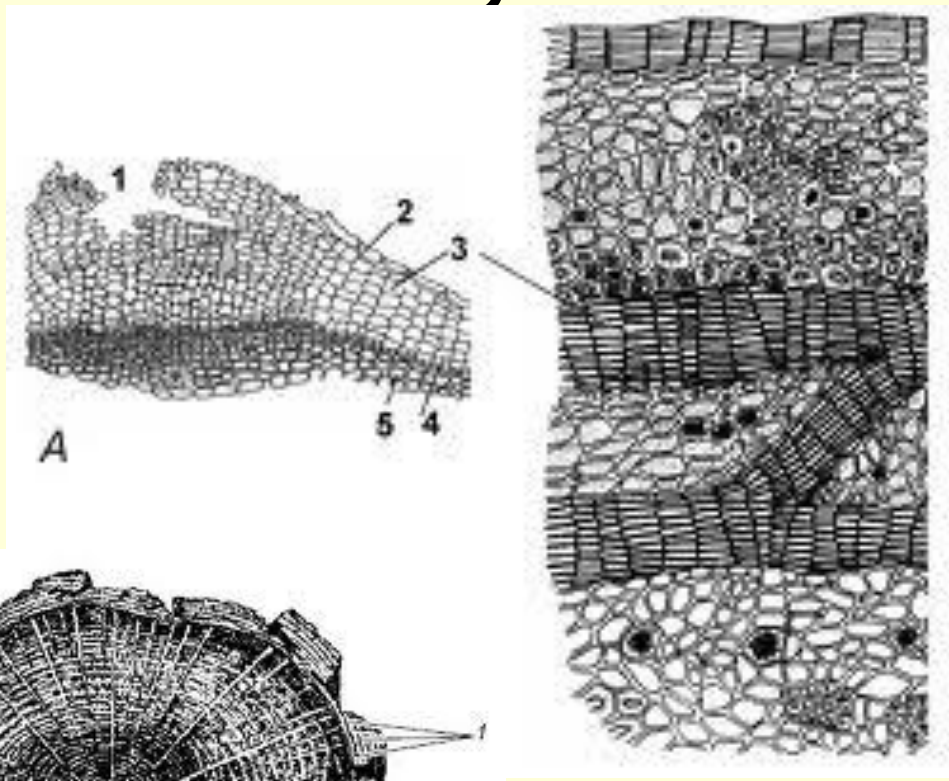


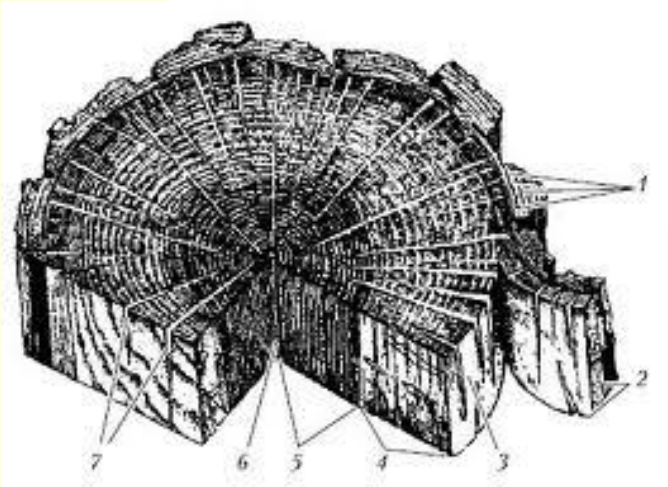
Development of Periderm



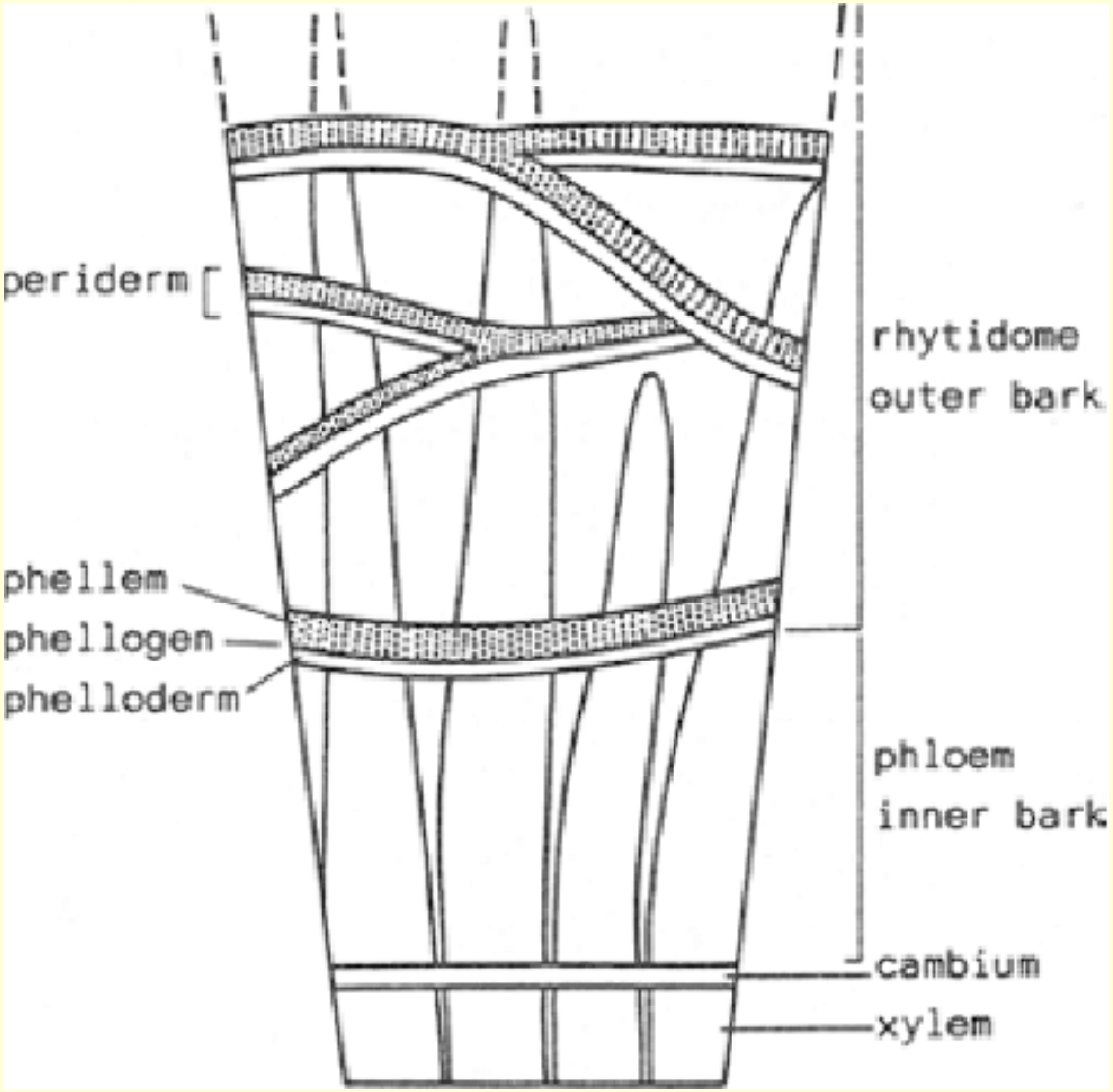


The rhytidome





The rhytidome is formed



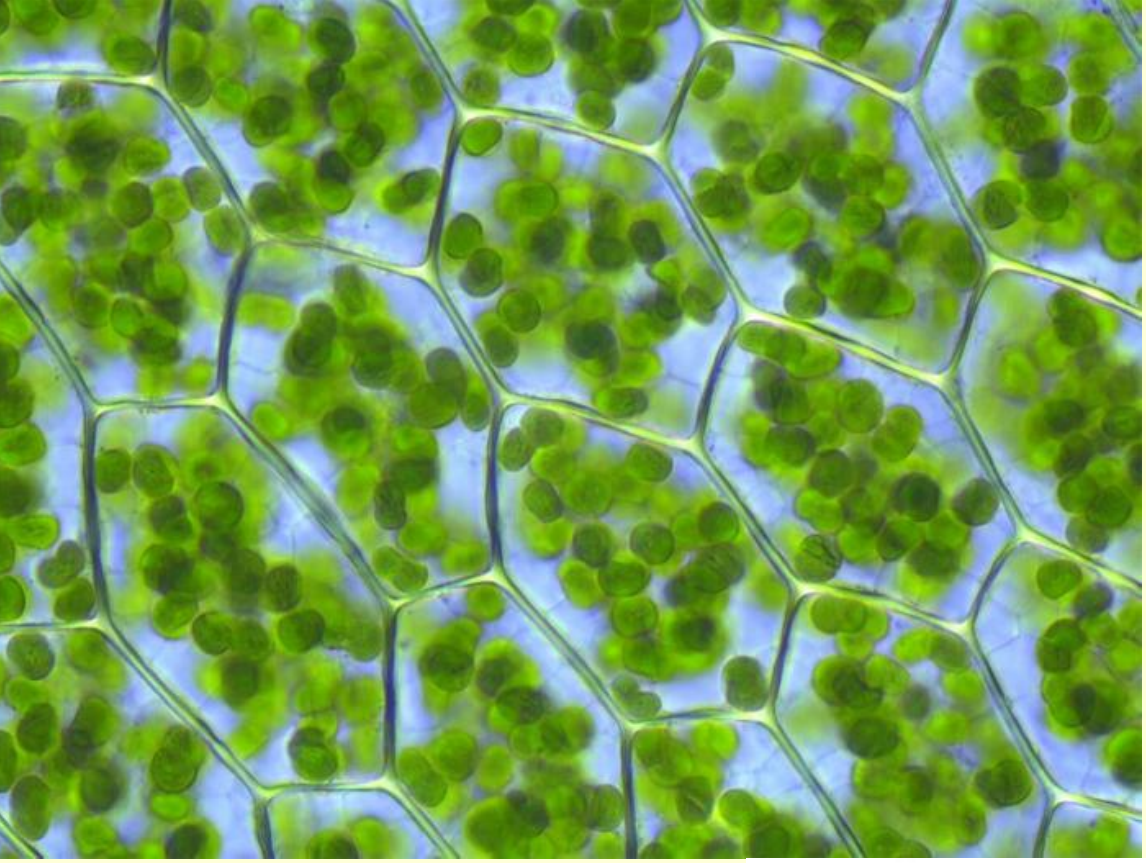
If a phellogen is repeatedly formed during the life of the plant – a secondary dermal (surface) tissue is formed, which called rhytidome.

The parenchymal tissues are poorly specialized tissues that occupy areas between other permanent tissues in all organs.

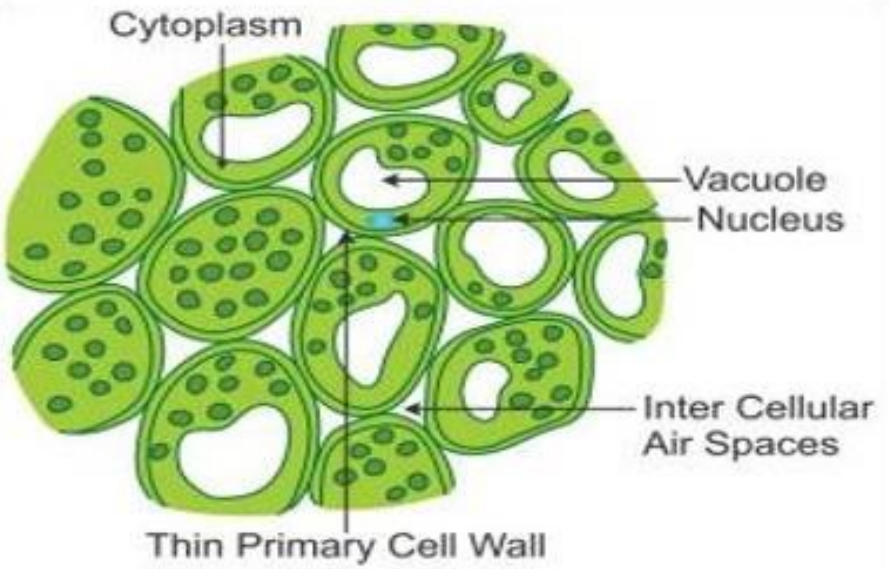
By origin, the parenchymal tissues can be both primary and secondary.

They are parenchymal in shape, with thin walls. The cytoplasm is pressed against the walls by vacuoles. Lignification and suberinization (corkiness) of the walls usually does not occur.

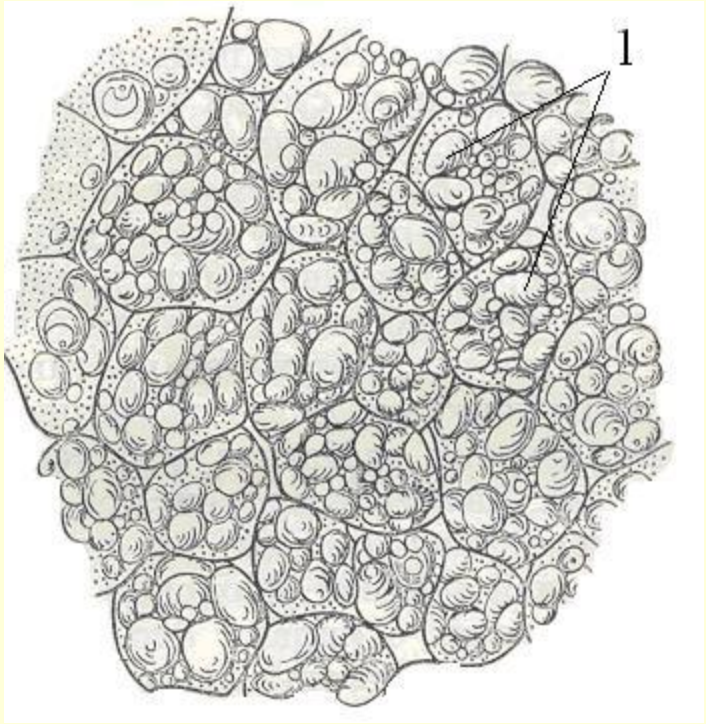
Assimilative parenchyma (chlorenchyme) (palisade tissue, mesophyll) is a living tissue that contains chloroplasts, performs photosynthesis. The bulk of this tissue is concentrated in the leaves, a smaller part in the young green stems of shoots, where it lies directly under the transparent epidermis.



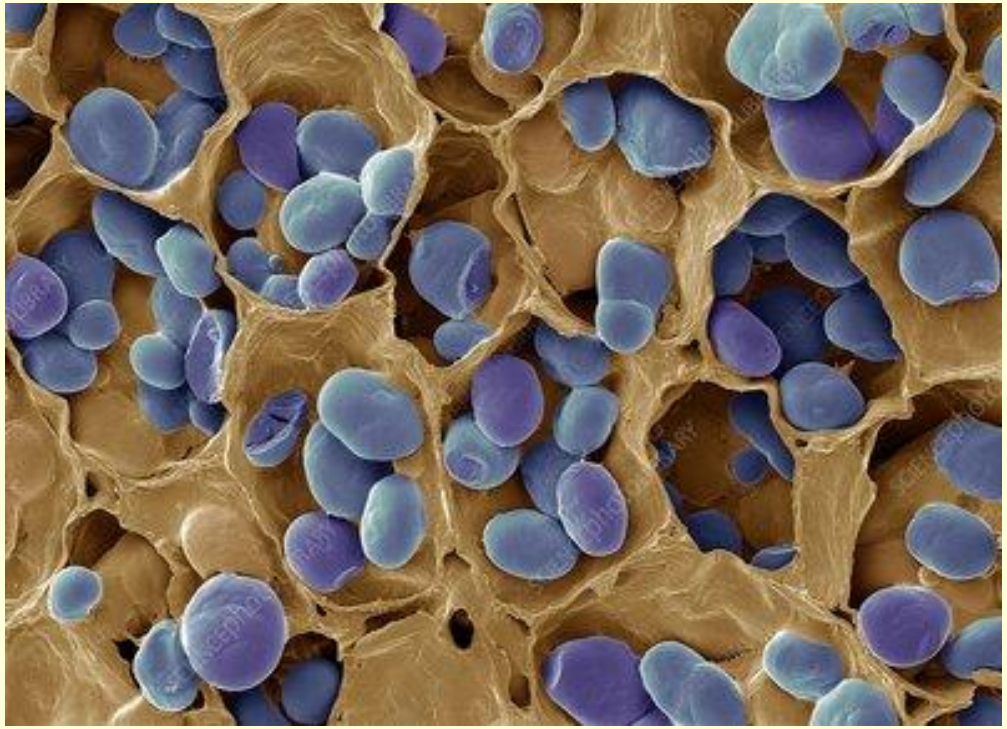
The chlorenchyma in the elodea leaf



The storage parenchyma is a tissue in which excess metabolic products are deposited during this period of plant development: proteins, fats, carbohydrates, etc. Usually these are living thin-walled cells, but sometimes the cell shells of the storage tissues can thicken, they have a mechanical function.



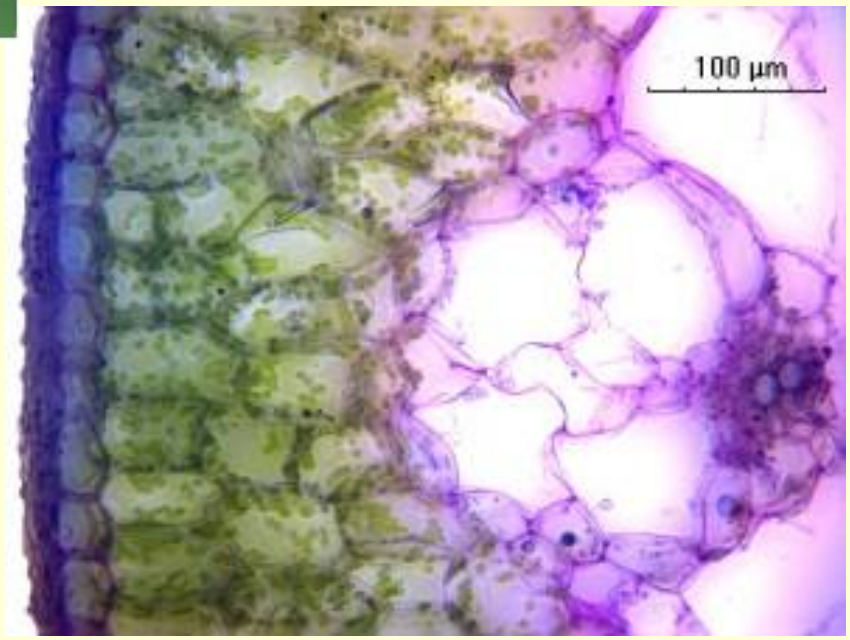
The storage parenchyma in potato tuber



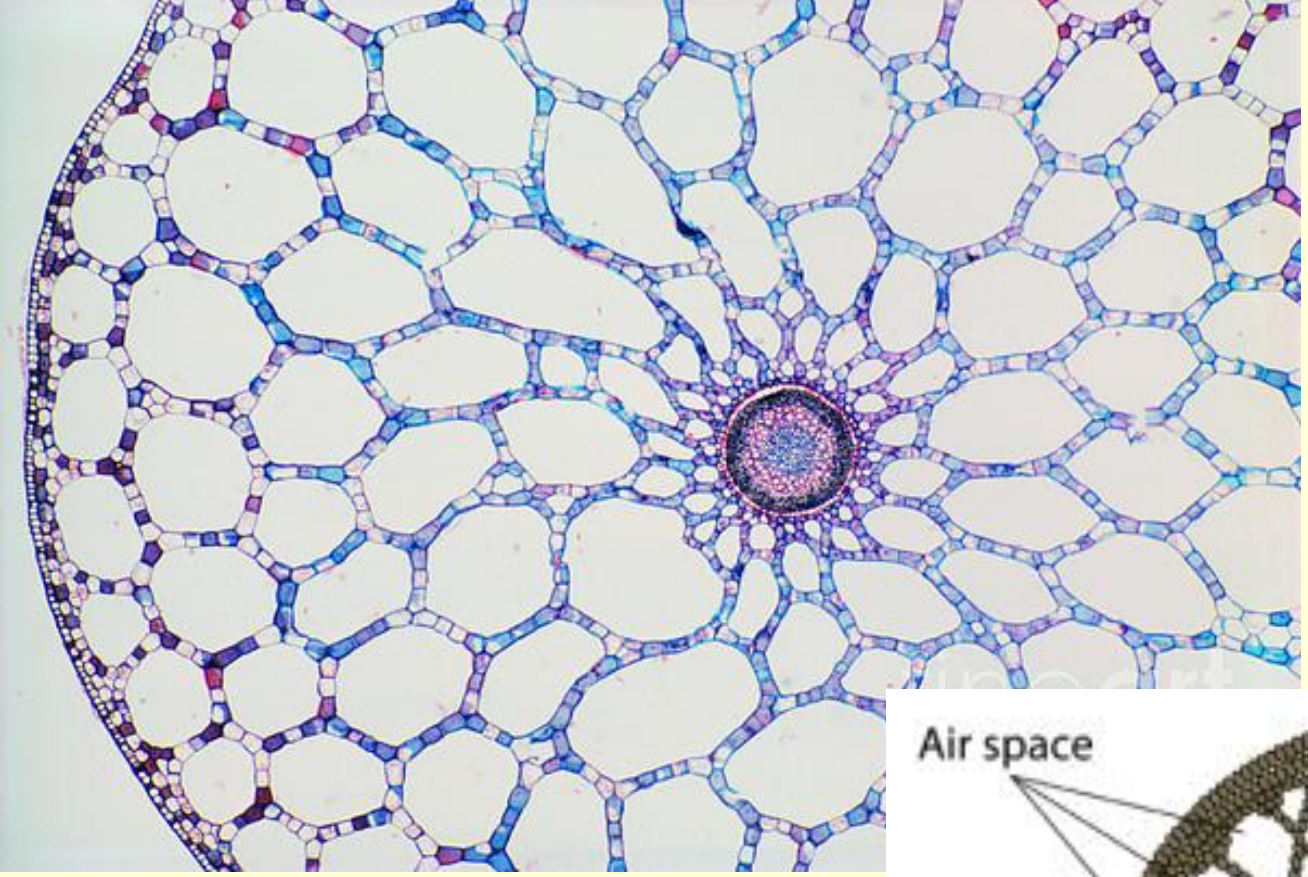
Storage parenchyma in a potato tuber through an electron microscope

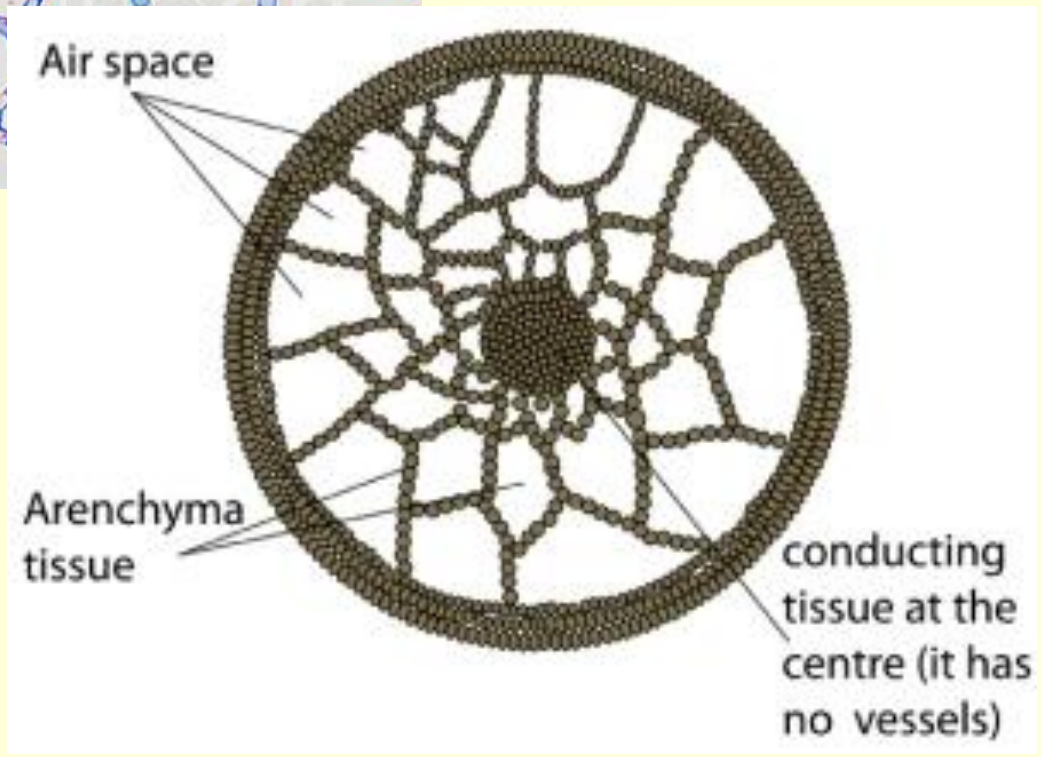
The water-bearing parenchyma is a tissue that stores water. It is thin - walled, large-celled, there are mucous substances in the vacuoles of cells that contribute to moisture retention. It is found in the stems and leaves of succulents (cacti, agaves, aloe), plants of saline places(soleros), leaves of cereals.

A slice of an aloe leaf with a water-saving parenchyma

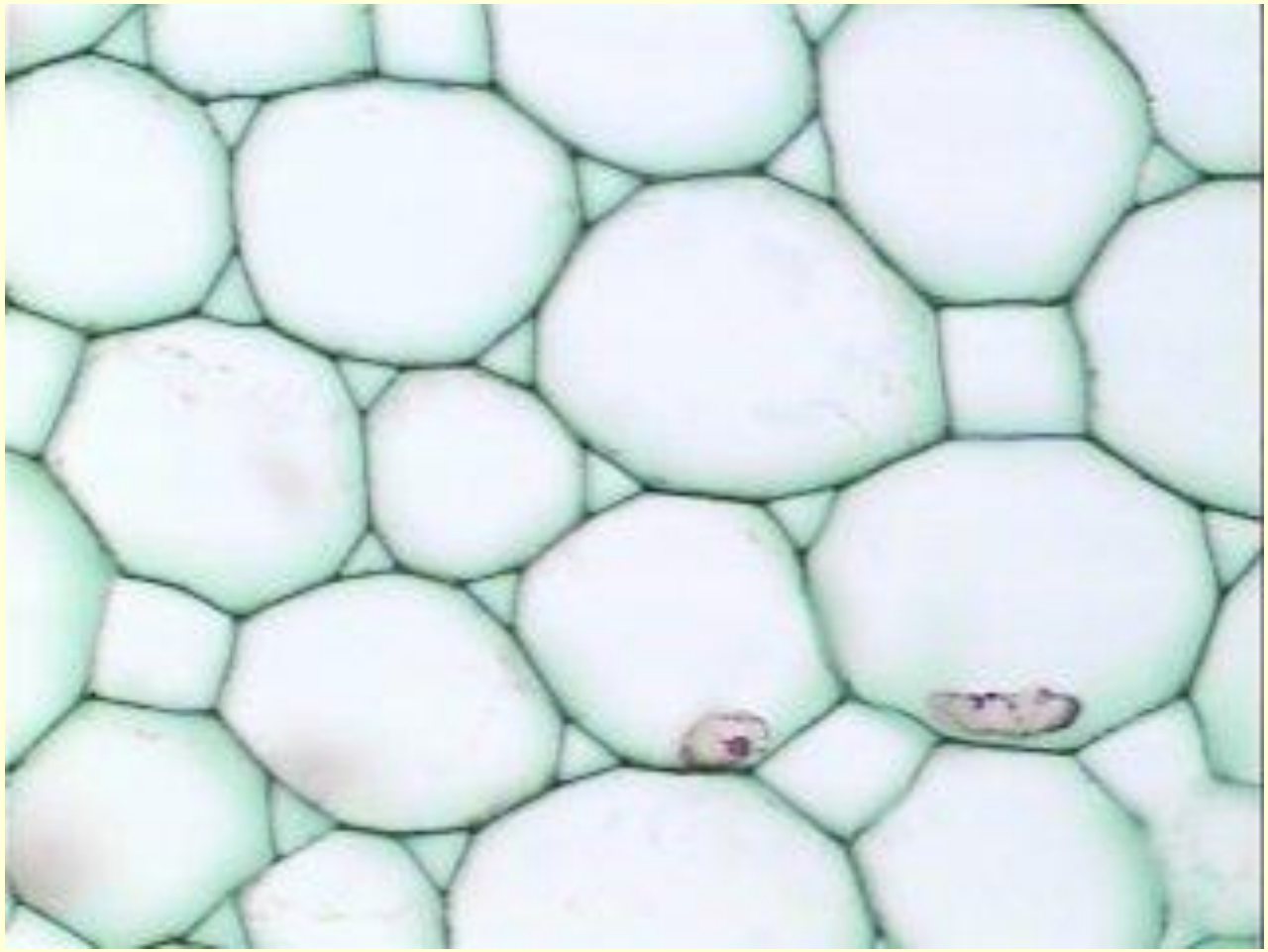


The air-bearing parenchyma — (aerenchyma) is a tissue with highly developed intercellular cells. The purpose of aerenchyma is to supply tissues with oxygen, in some cases-to supply leaves with carbon dioxide (CO2) and to ensure the buoyancy of plants. It is well developed in various organs of aquatic and marsh plants, but it is also found in land species.




Air space
Arenchyma tissue
conducting tissue at the centre (it has no vessels)

The core parenchyma (filling parenchyma, pith parenchyma) is also different sometimes. It consists of living poorly specialized cells, which has a large vacuole and often does not contain chloroplasts. Its function is to fill in the gaps between other permanent tissues and bind them into a single whole.

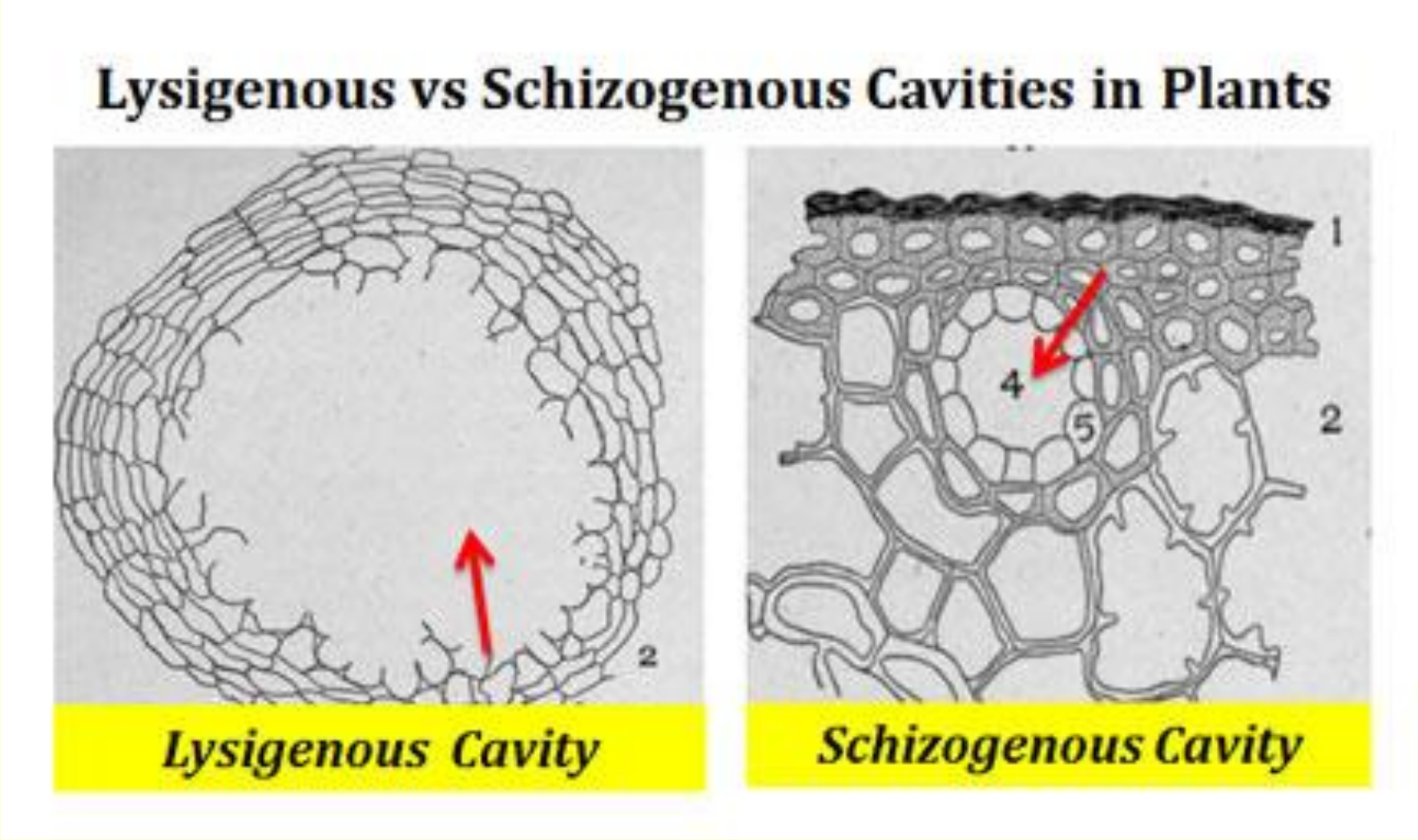


Excretory tissues or **structures**

Excretory tissues or structures are called tissues (structures) that are able to secrete and either bring out or actively isolate various secrets inside the plant body (essential oils, resins, mucus, tannides, latex, calcium and magnesium oxalates, etc.)

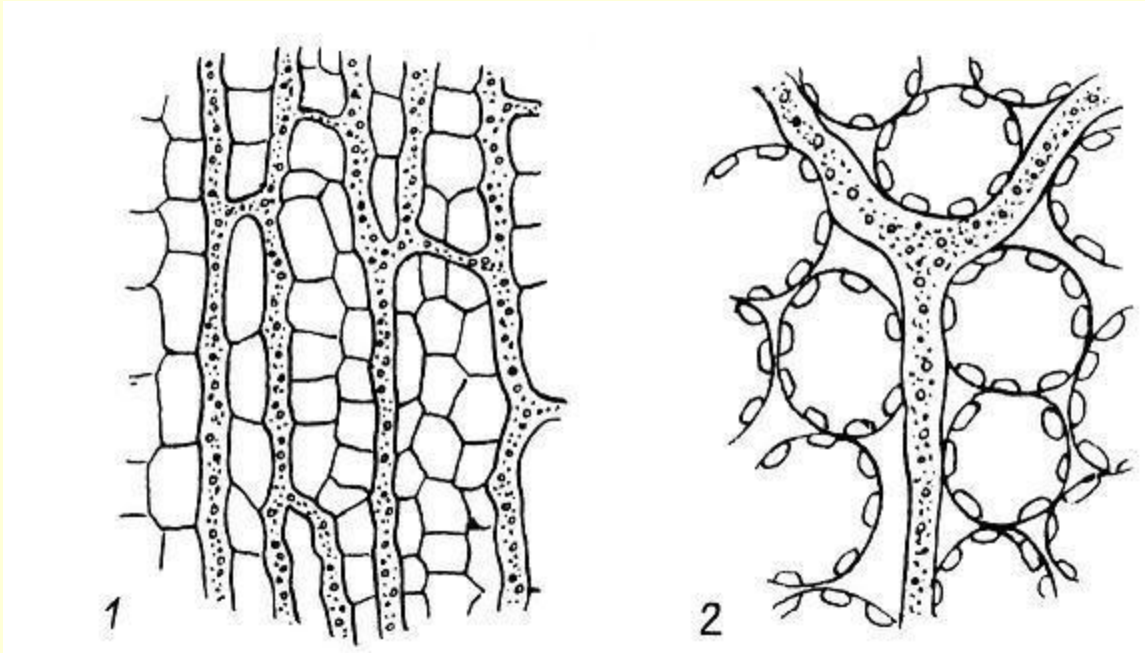
Excretory (secretory) tissues are divided into two groups: internal secretions structures and external secretions structures. The internal excretory structures, respectively, isolate the secrets inside the plant body, the external ones-bring the secrets and the final products of metabolism out.

Internal secretory structures include schizogenous and lysigenous cavities idioblasts, and latex tubes cells.



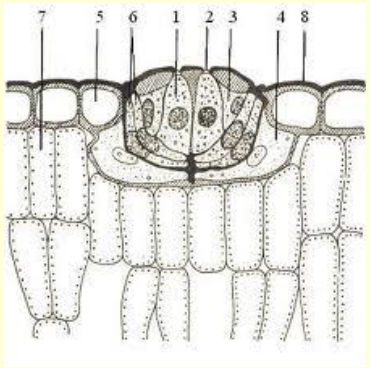
The idioblasts with tannin

The laticifers

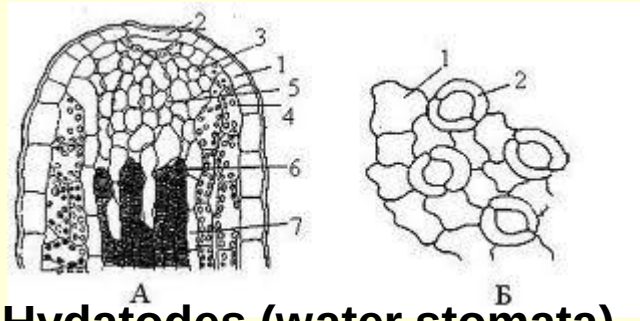


External excretory structures

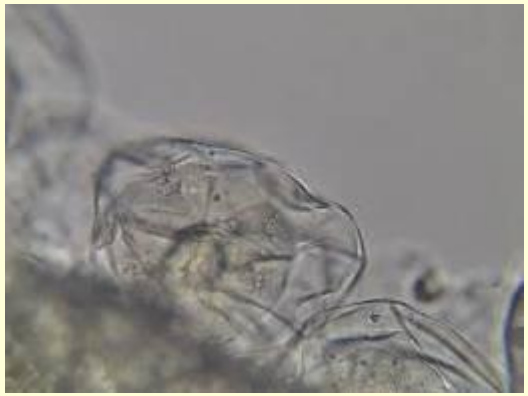
Stinging hairs



Salt-removing glandulars



Hydatodes (water stomata)



Essential oil glandulars.

The digesting glandulars

Nectaries