Plant tissues.

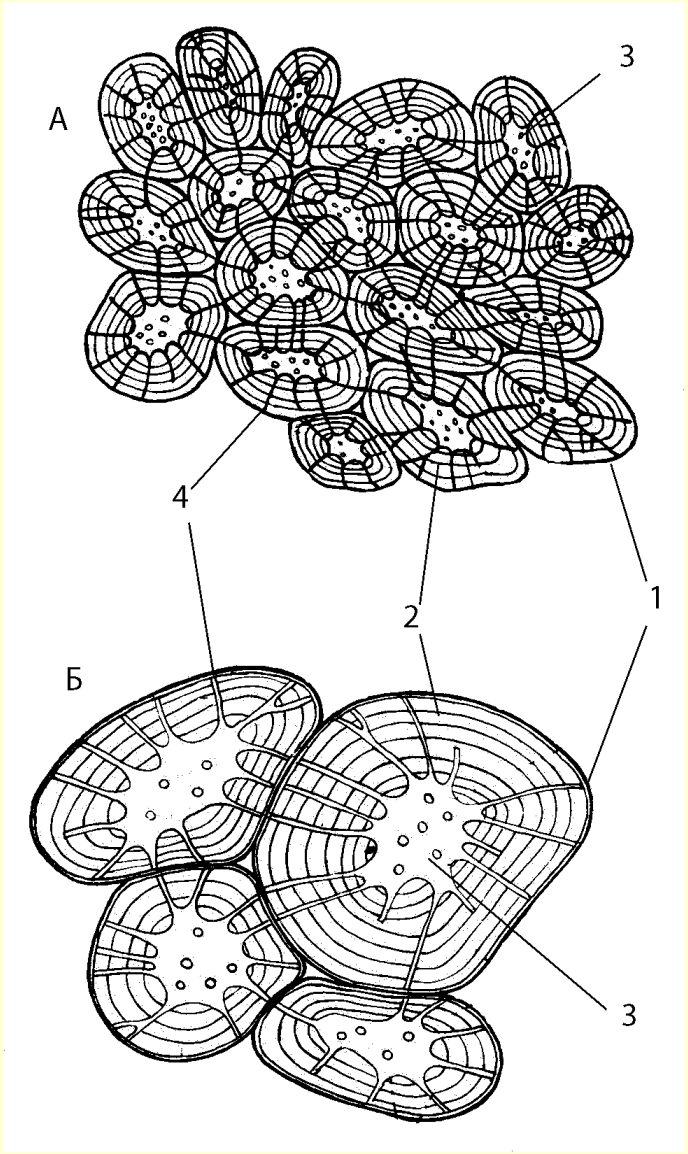
Meristems, the process of plant cell division.

Plant tissue is a group of cells that are structurally and functionally interconnected with each other and, usually, similar in origin.

Tissues consisting of cells, all of whose linear dimensions are approximately the same, are called parenchymal.

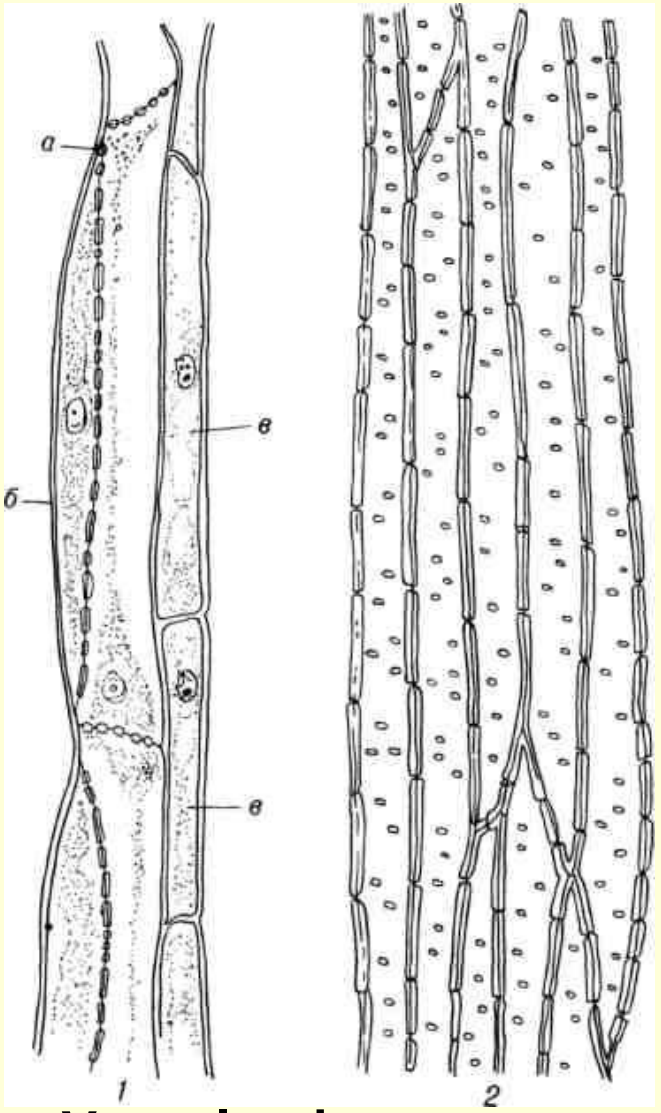
Tissues whose cells have a length several times greater than the width and thickness are called prozenchymal.

Parenchymal shaped tissue



Sclereids

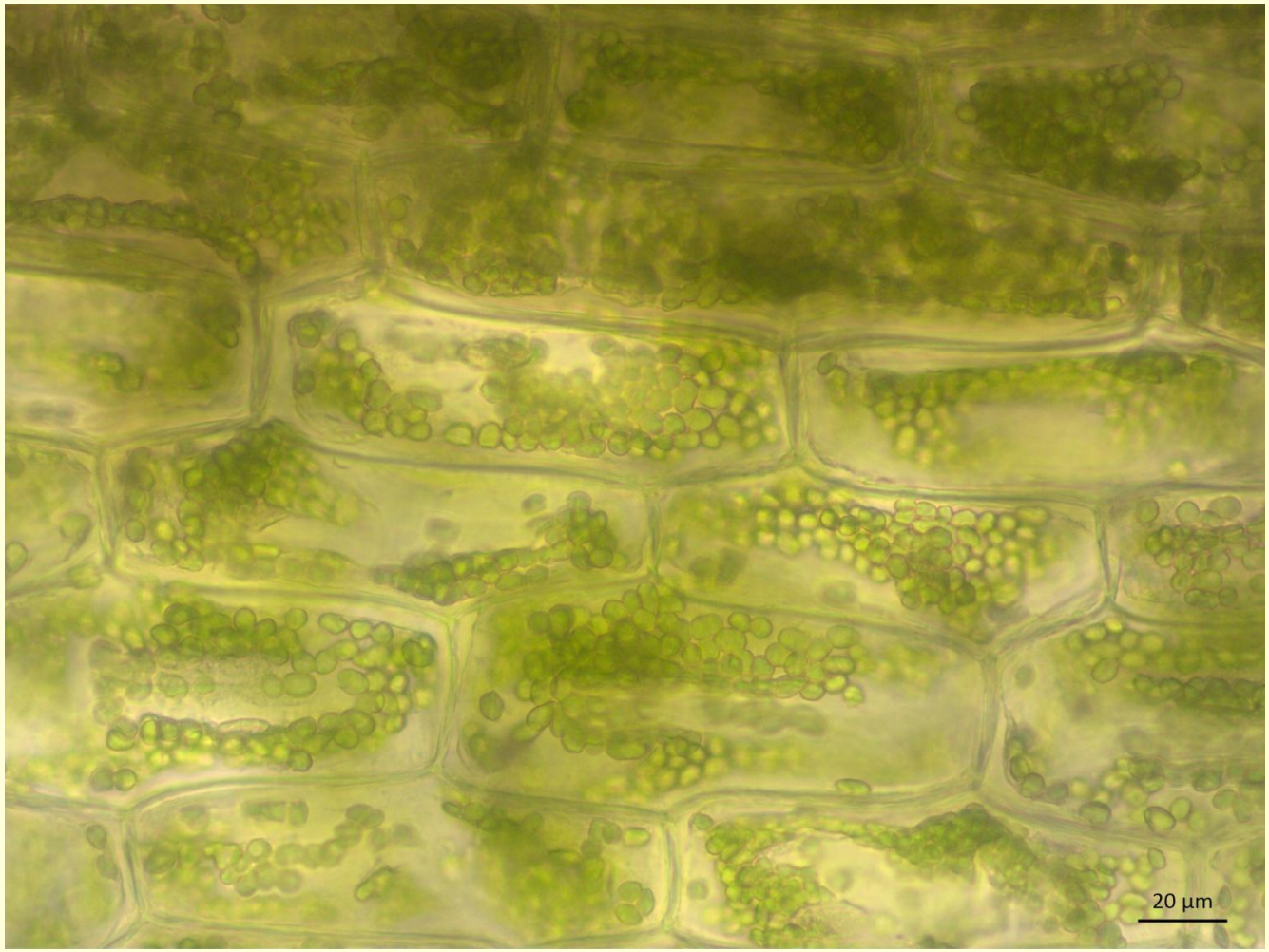
Prozenchymal shaped tissue



Vascular tissue

Tissues consisting of one type of cells are called simple, from several types of cells — complex.

As a rule, simple tissues perform one specific function, for example, assimilation parenchyma.

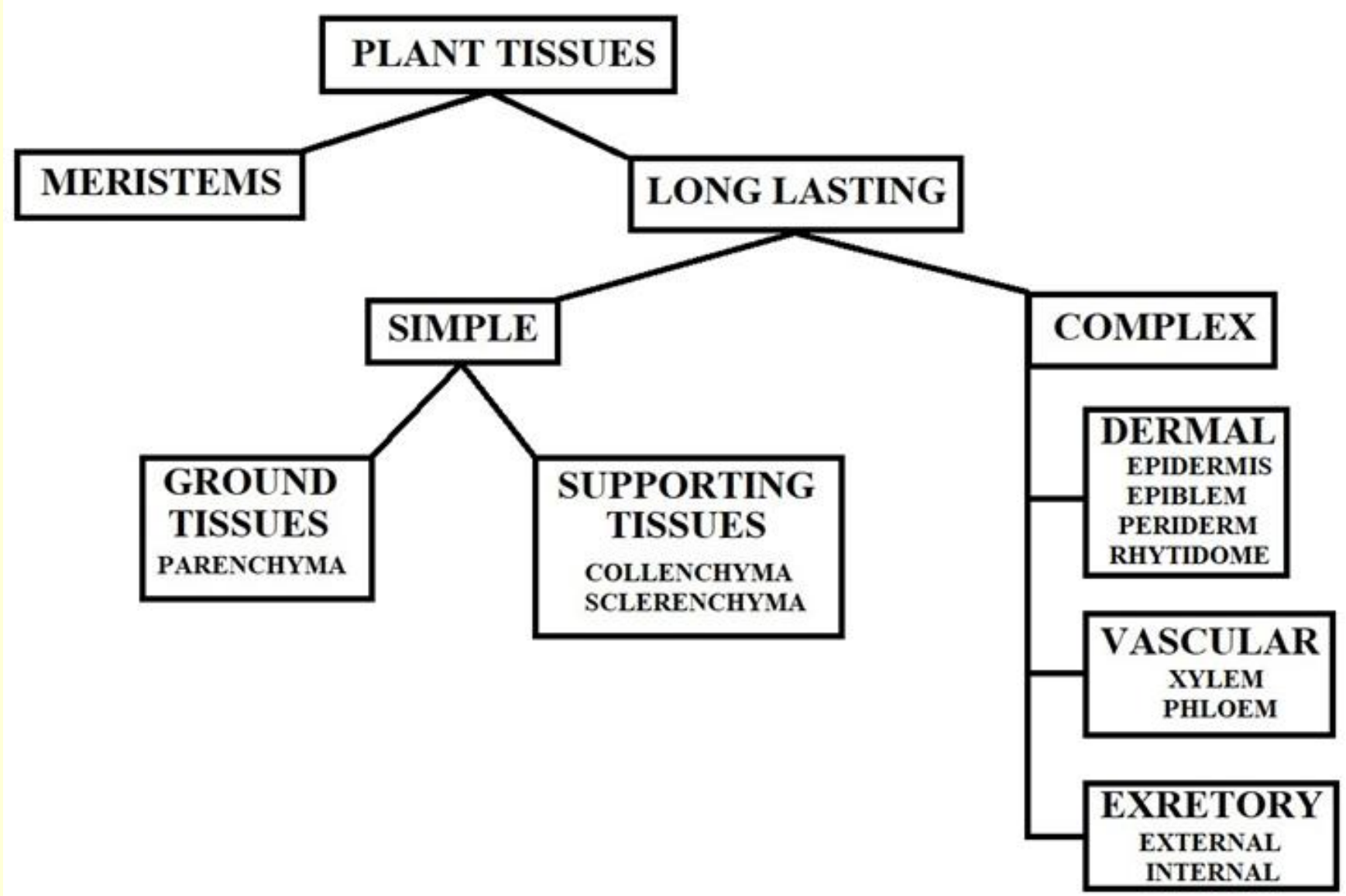


Complex tissues have several functions, and each type of cell is responsible for performing its function. For example, the covering tissue epidermis.

All plant tissues are divided according to their functions into **meristematic tissue** and **permanent tissue**.

The cells of the meristematic tissue are constantly dividing and differentiating into cells of other tissues.

Permanent (long lasting) tissue perform one of the functions necessary to maintain the vital activity of the plant. Therefore, they have a name match for the function they perform.

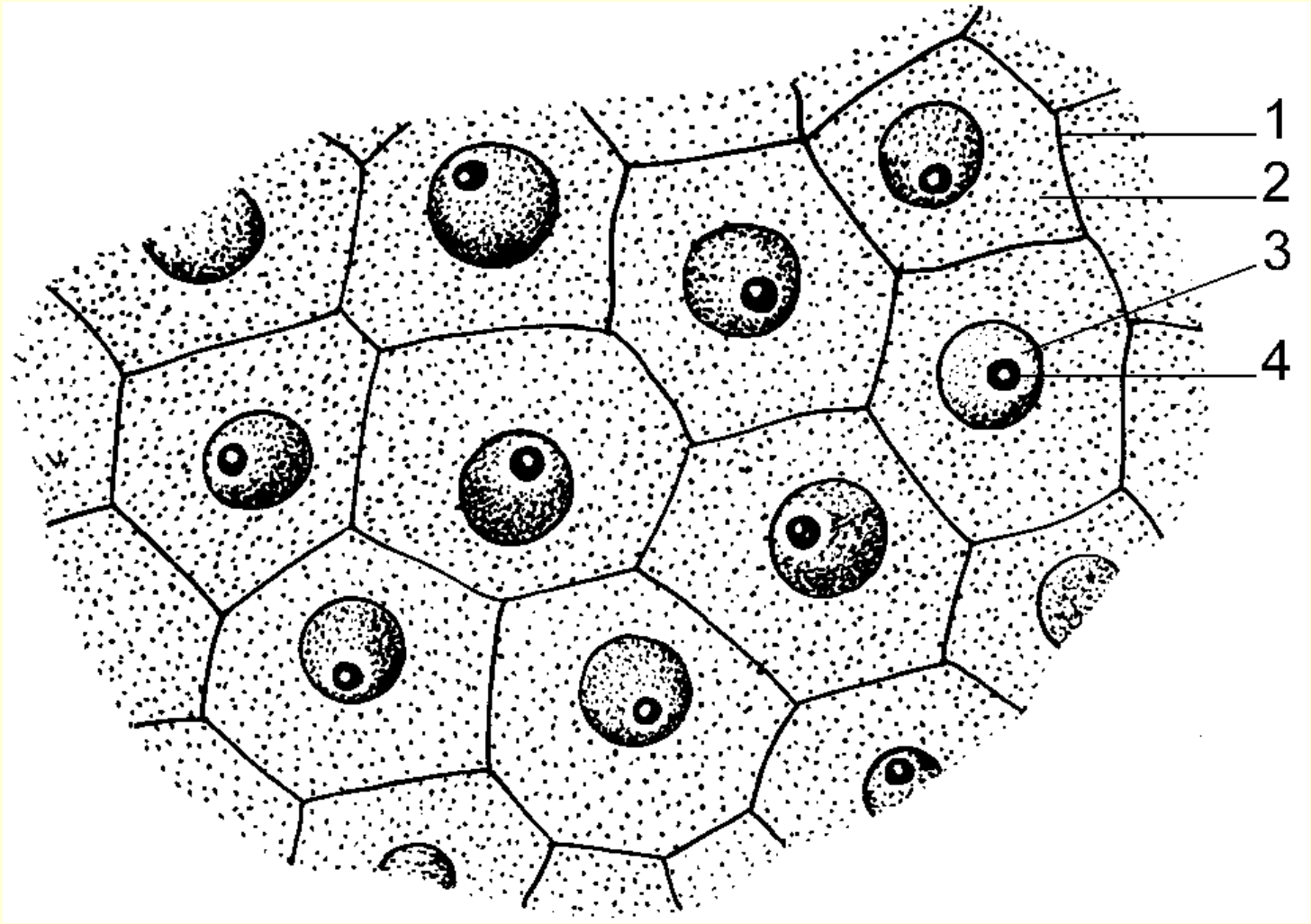

PLANT TISSUES
MERISTEMS
LONG LASTING
SIMPLE
COMPLEX
GROUND TISSUES
PARENCHYMA
SUPPORTING TISSUES
COLLENCHYMA
SCLERENCHYMA
DERMAL
EPIDERMIS
EPIBLEM
PERIDERM
RHYTIDOME
VASCULAR
XYLEM
PHLOEM
EXRETORY
EXTERNAL
INTERNAL

Primary and secondary tissues are distinguished by origin.

Primary long lasting tissues are formed by primary meristems, **secondary long lasting tissues** are formed by secondary meristems.

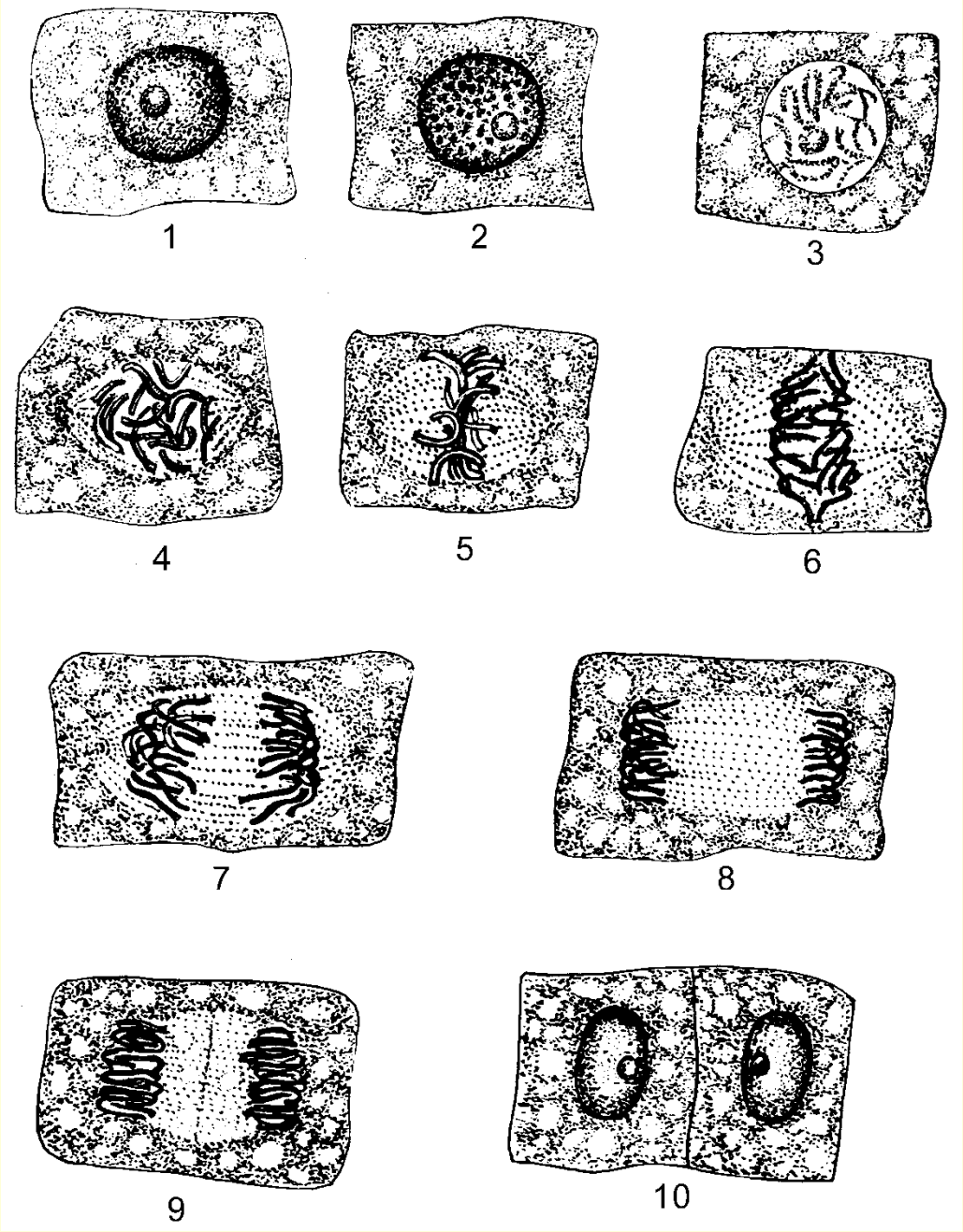
Meristematic tissue (Meristems)

A **meristem** is a specialized tissue whose cells divide and give rise to new cells that form permanent tissues. Meristems ensure the growth of the plant in length and thickness, form new organs and tissues, provide the orientation of the plant in space, as well as wound healing.



A section of the apical meristem of the elodea stem.

1 – cell wall, 2 - cytoplasm, 3 - nucleus, 4 - nucleolus.



Mitosis (karyokinesis)in the cells of the onion root.

1 - interphase,

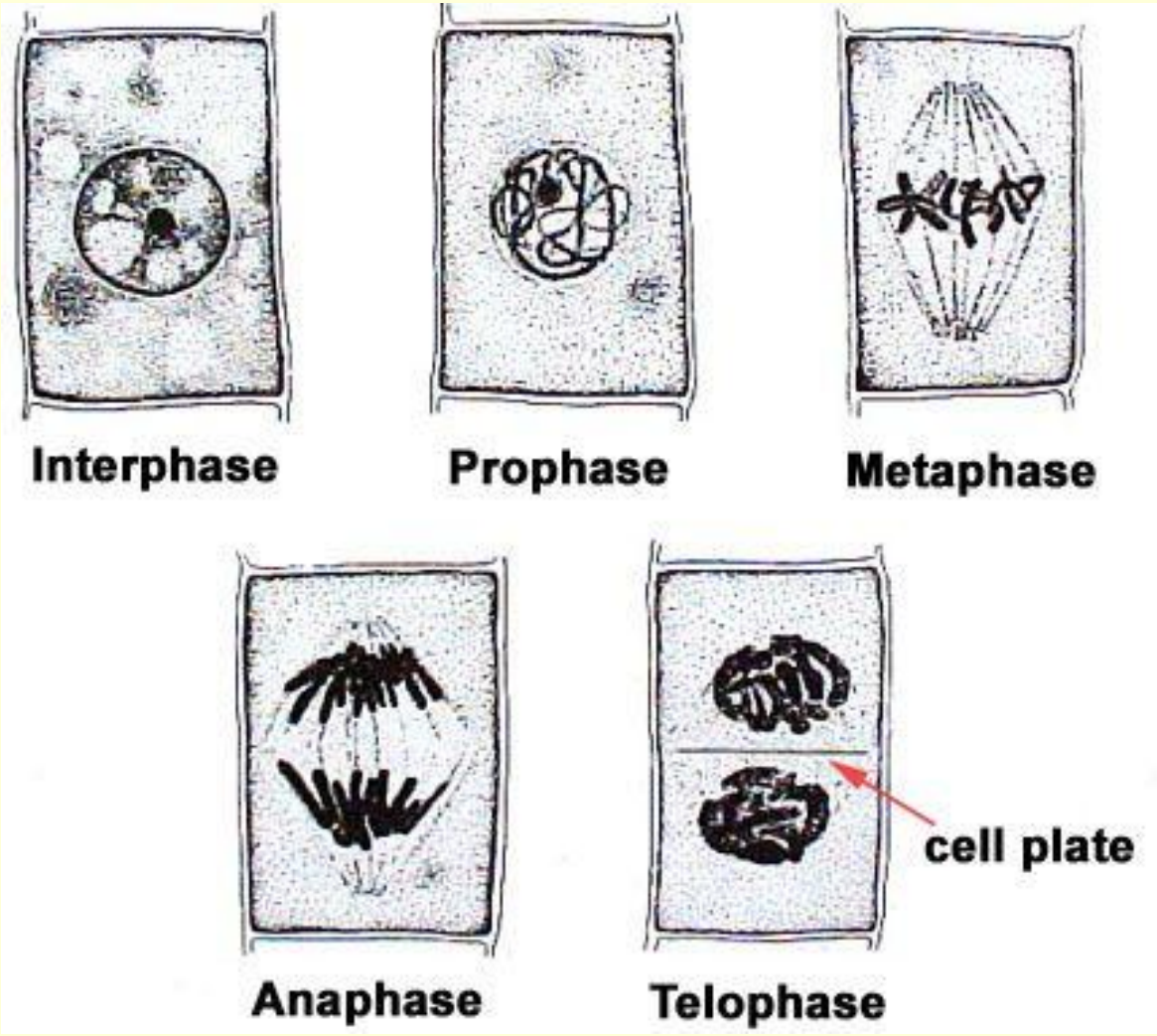
2-4 - prophase,

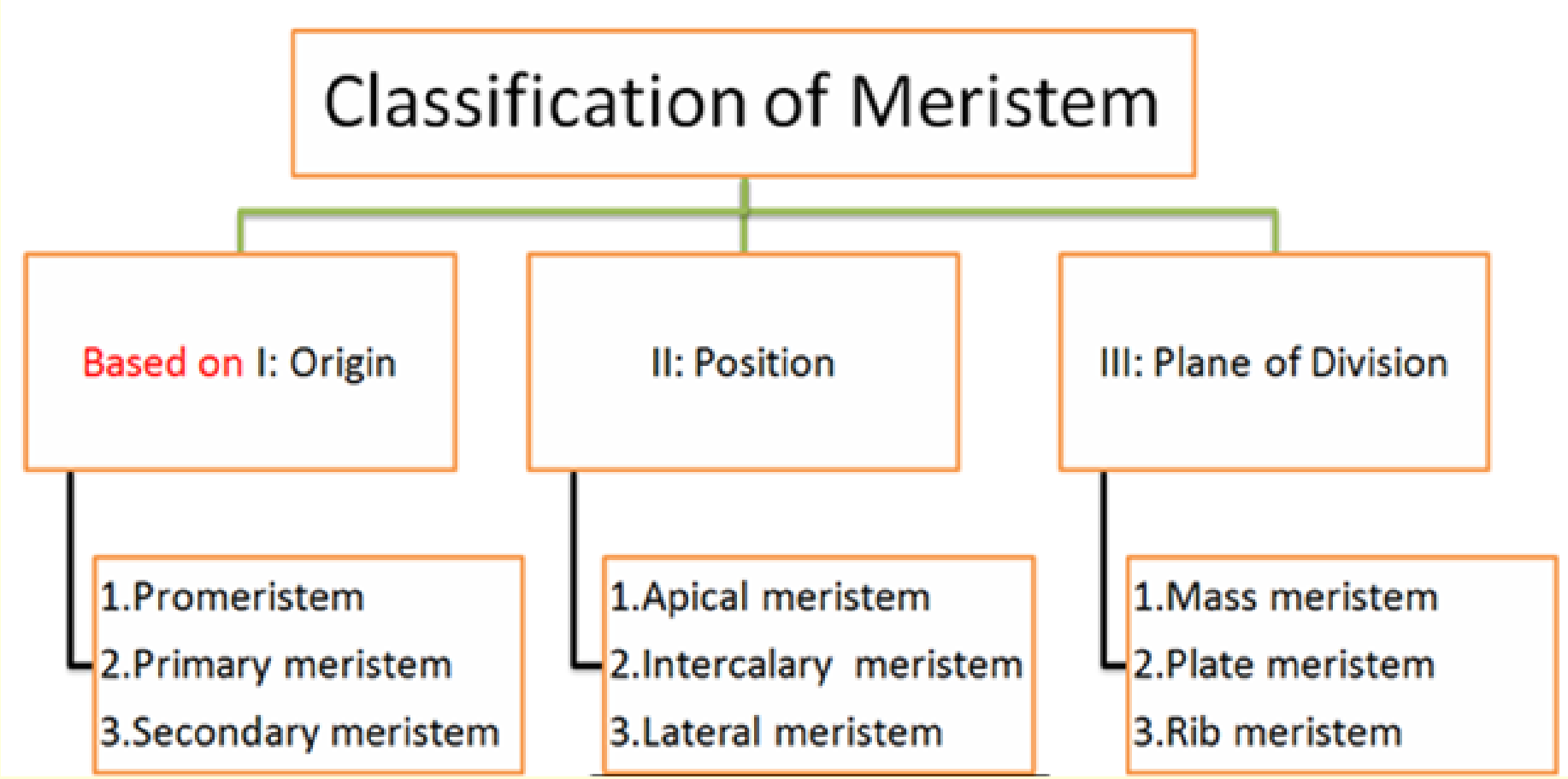
5 - metaphase,

6-8 - anaphase,

9 - telophase,

10 - cytokinesis.

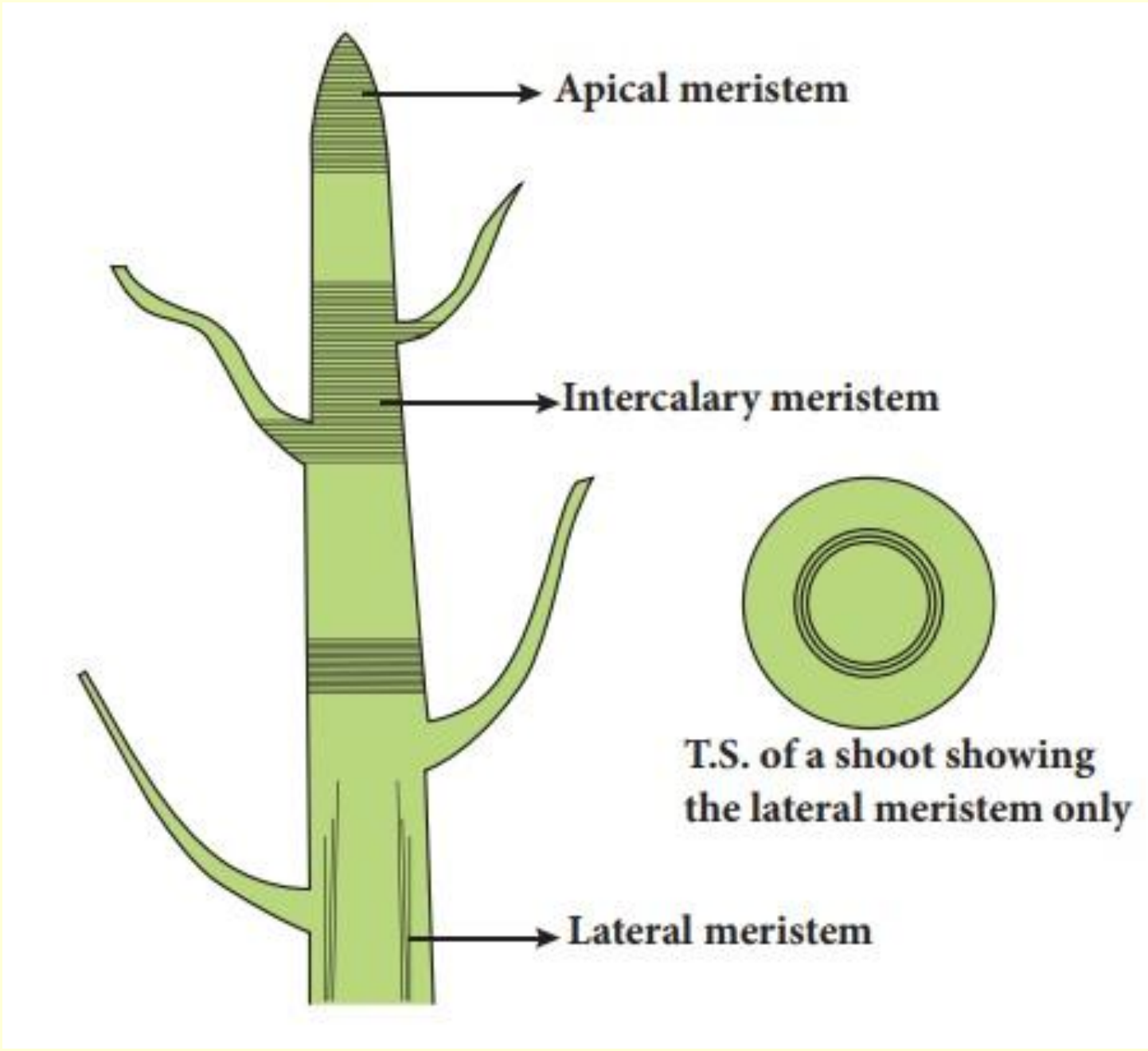

Interphase
Prophase
Metaphase
Anaphase
Telophase
cell plate


Classification of Meristem
Based on I: Origin
II: Position
III: Plane of Division
1.Promeristem
2.Primary meristem
3.Secondary meristem
1.Apical meristem
2.Intercalary meristem
3.Lateral meristem
1.Mass meristem
2.Plate meristem
3.Rib meristem

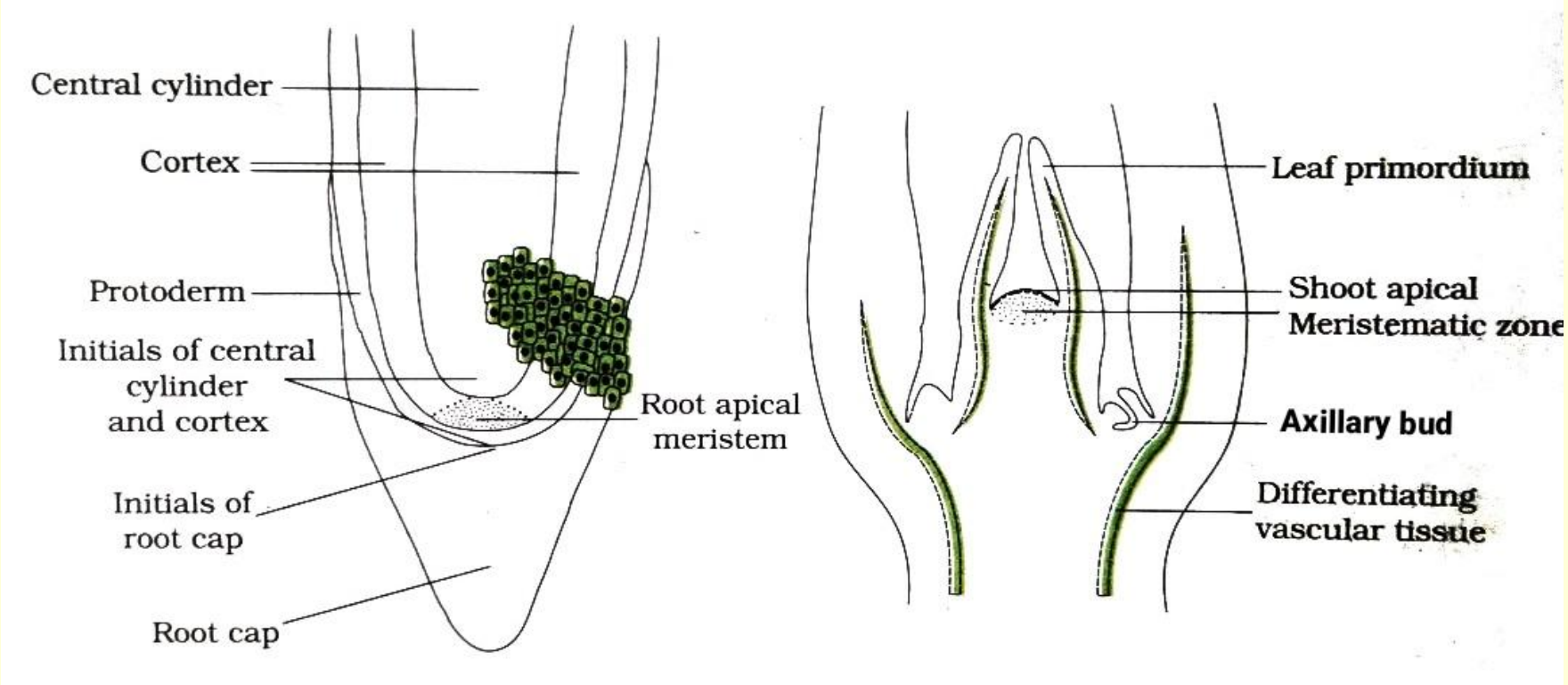
By origin, primary and secondary meristems are distinguished.

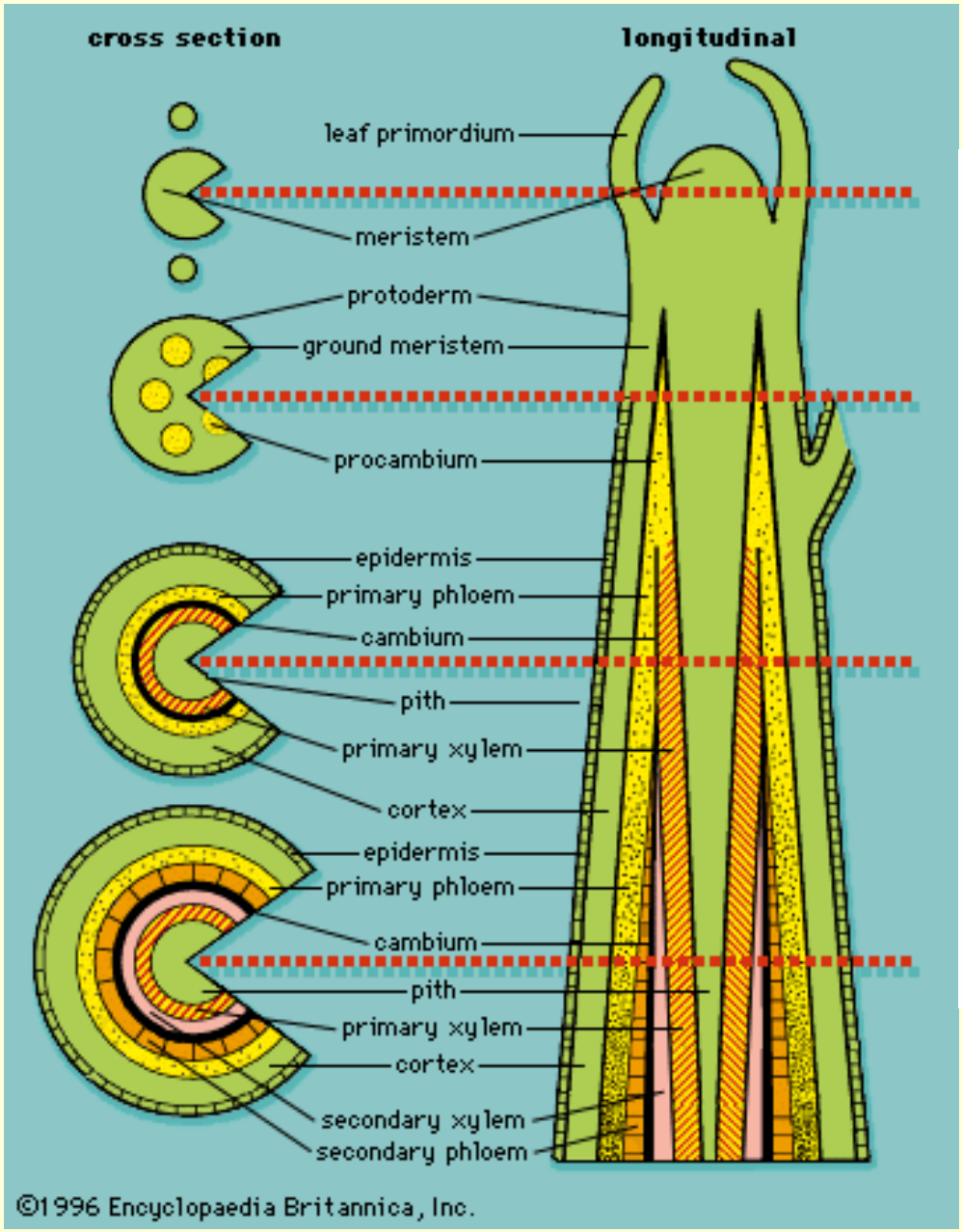
The beginning of the **primary meristems** is given by the initial cells formed during the formation of the plant embryo from a fertilized egg.

Secondary meristems are formed from cells that have lost the ability to divide (in other words, any permanent tissue, and less often - from primary meristems)


Apical meristem
Intercalary meristem
T.S. of a shoot showing
the lateral meristem only
Lateral meristem

Apical meristems of the stem and root.




cross section
longitudinal
leaf primordium
meristem
protoderm
ground meristem
procambium
epidermis
primary phloem
cambium
pith
primary xylem
cortex
epidermis
primary phloem
cambium
pith
primary xylem
cortex
secondary xylem
secondary phloem
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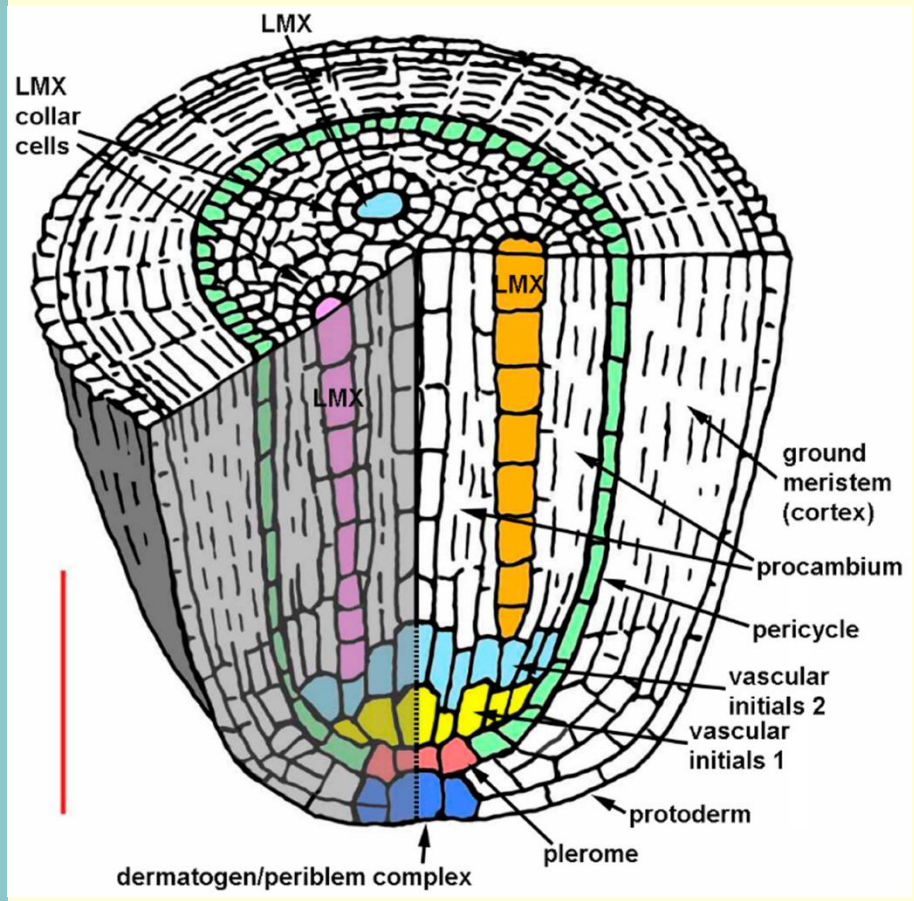
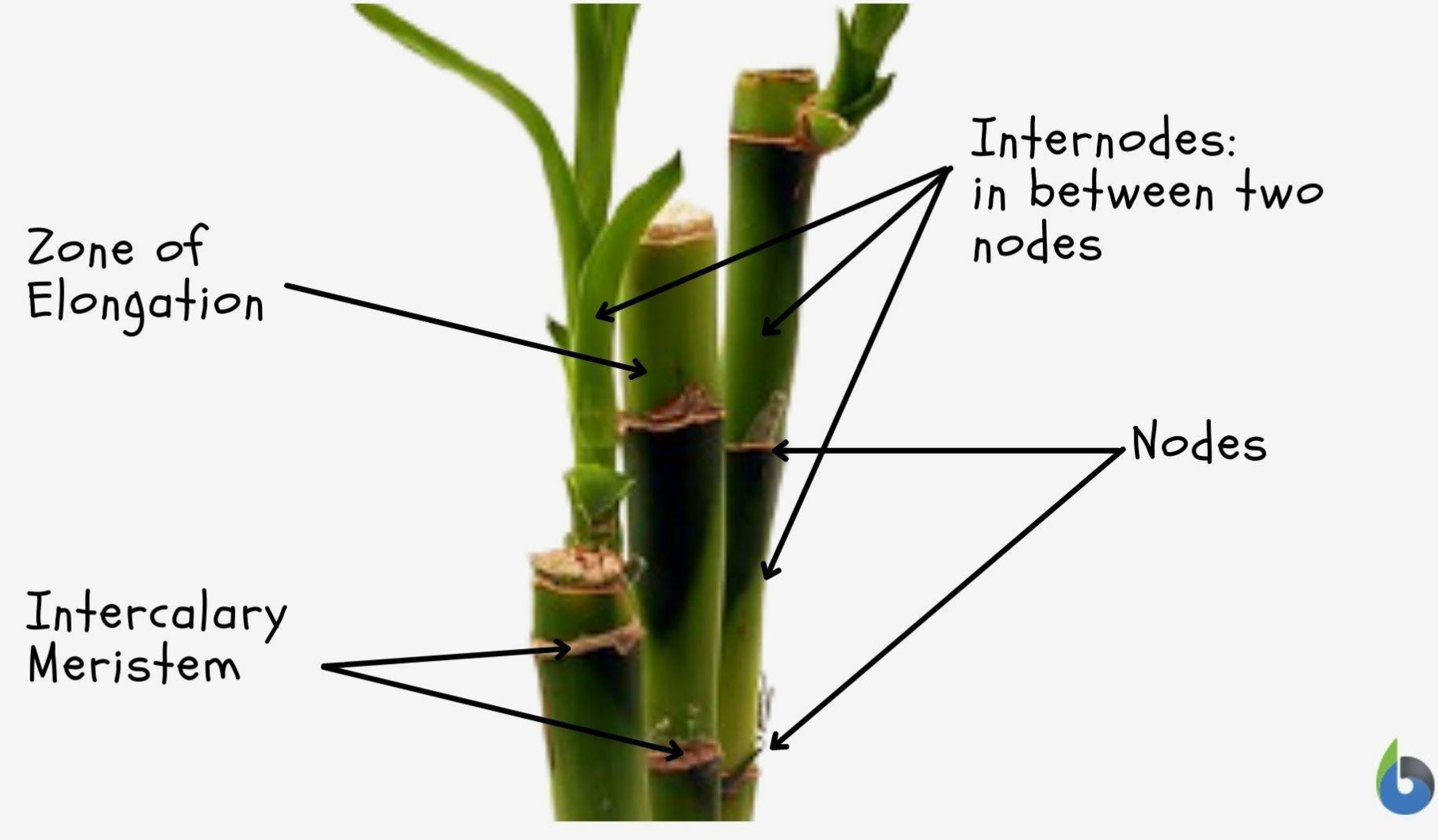
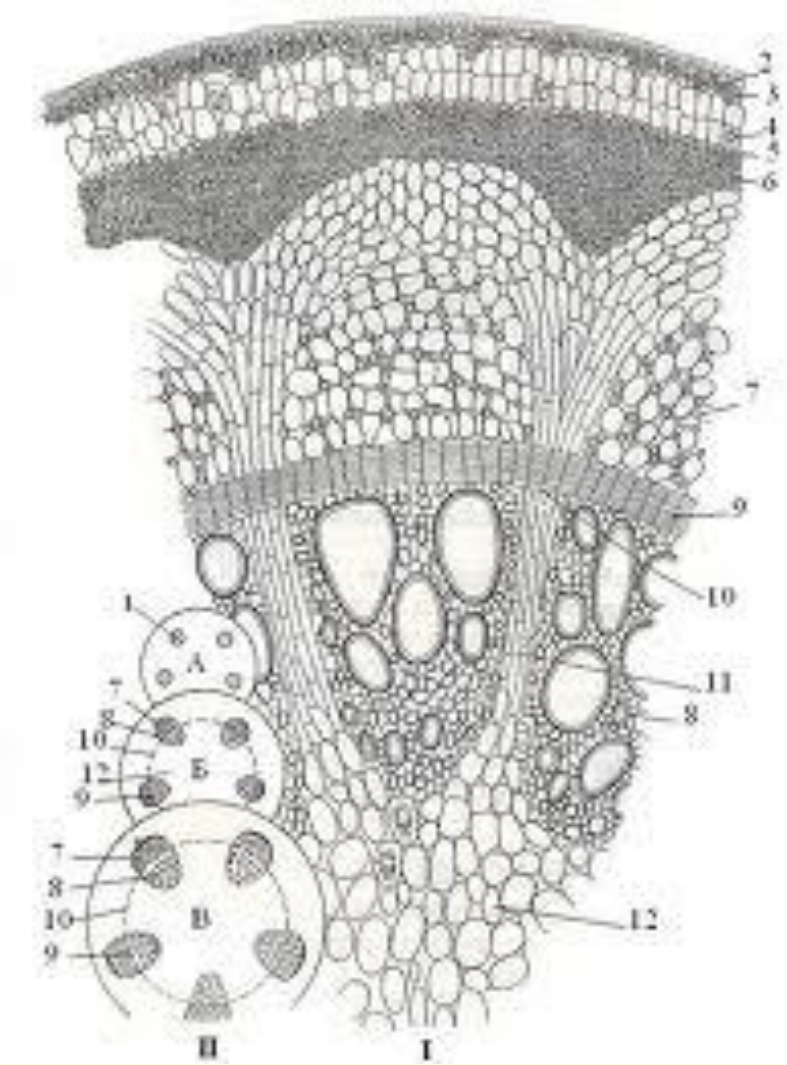
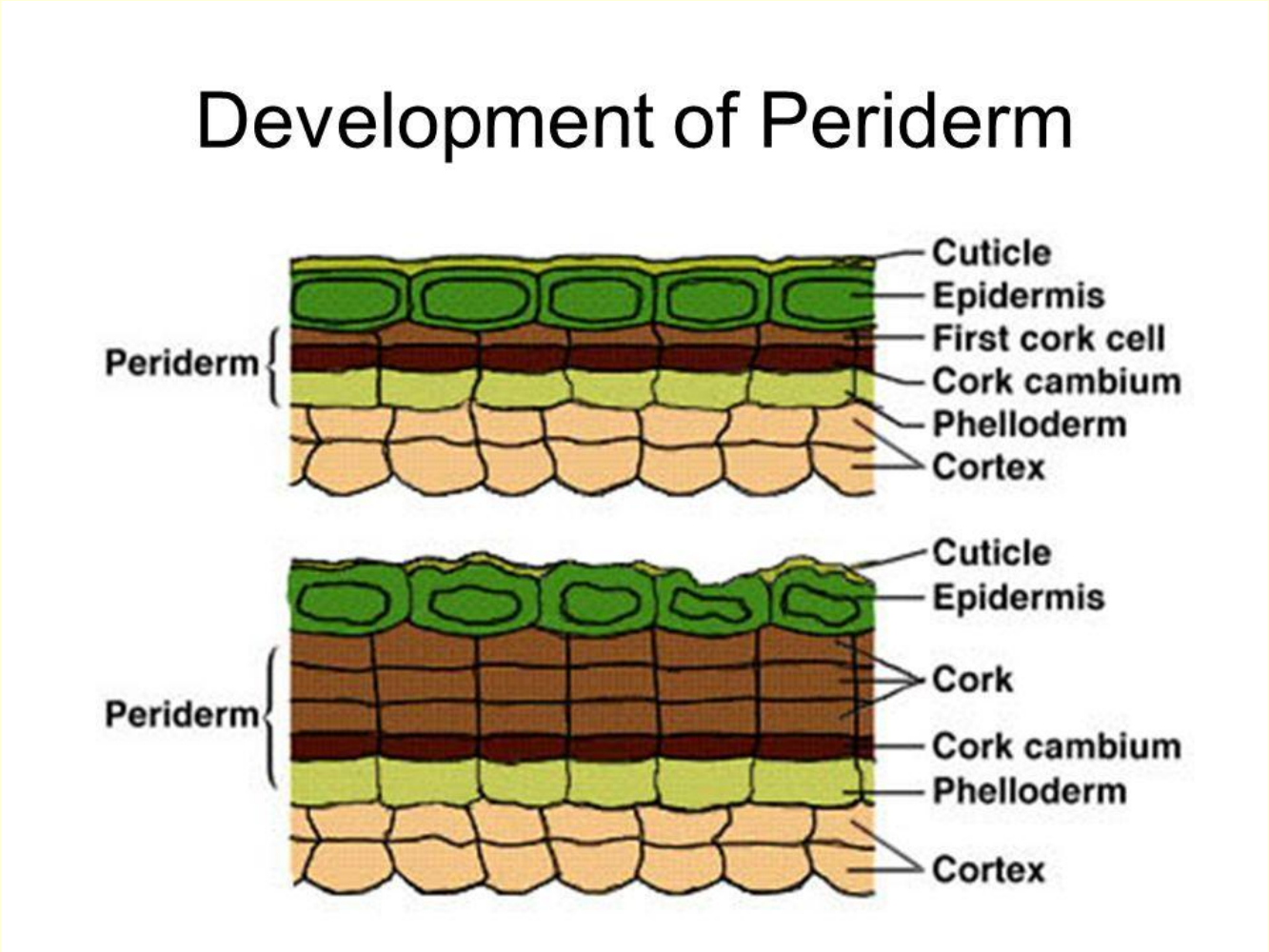

LMX
LMX
collar
cells
LMX
LMX
ground
meristem
(cortex)
procambium
pericycle
vascular
initials 2
vascular
initials 1
protoderm
plerome
dermatogen/periblem complex


Internodes: in between two nodes
Zone of Elongation
Nodes
Intercalary Meristem

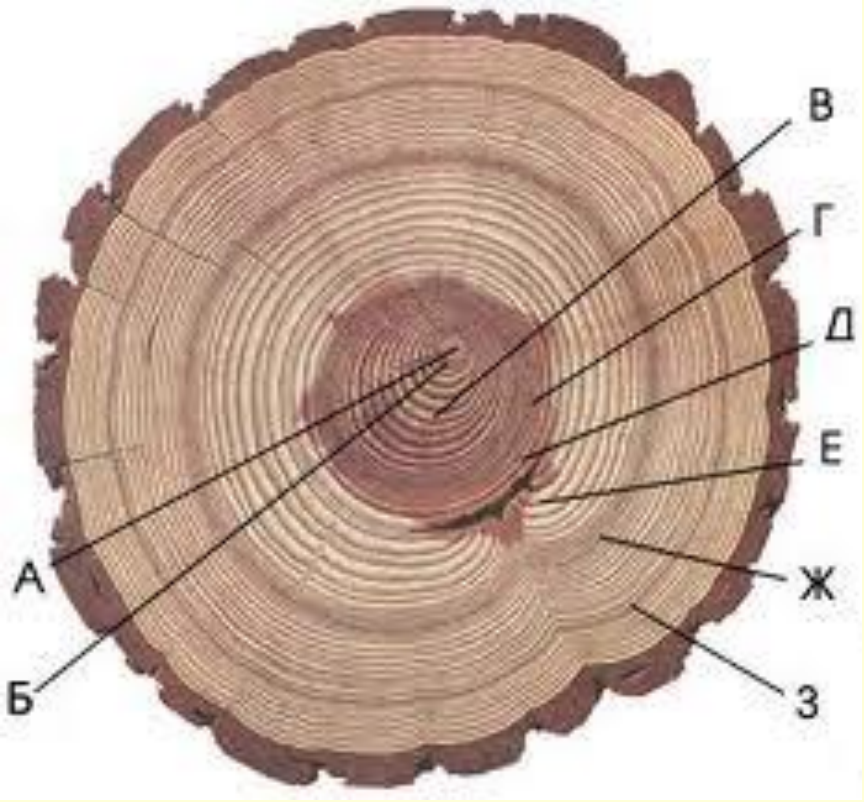


The vascular cambium is formed in the central axial cylinder and provides a long-term growth of the axial organs of the plant in thickness, forming vascular tissues and tissues of the vascular (pith) rays.

Synonyms for cork cambium are **bark cambium** and **phellogen**.



The rings of xylem on the cross-section of the beet are formed due to the repeated formed of cambium.



The formation of annual layers in tree trunks is also associated with the repeated formed of cambium

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