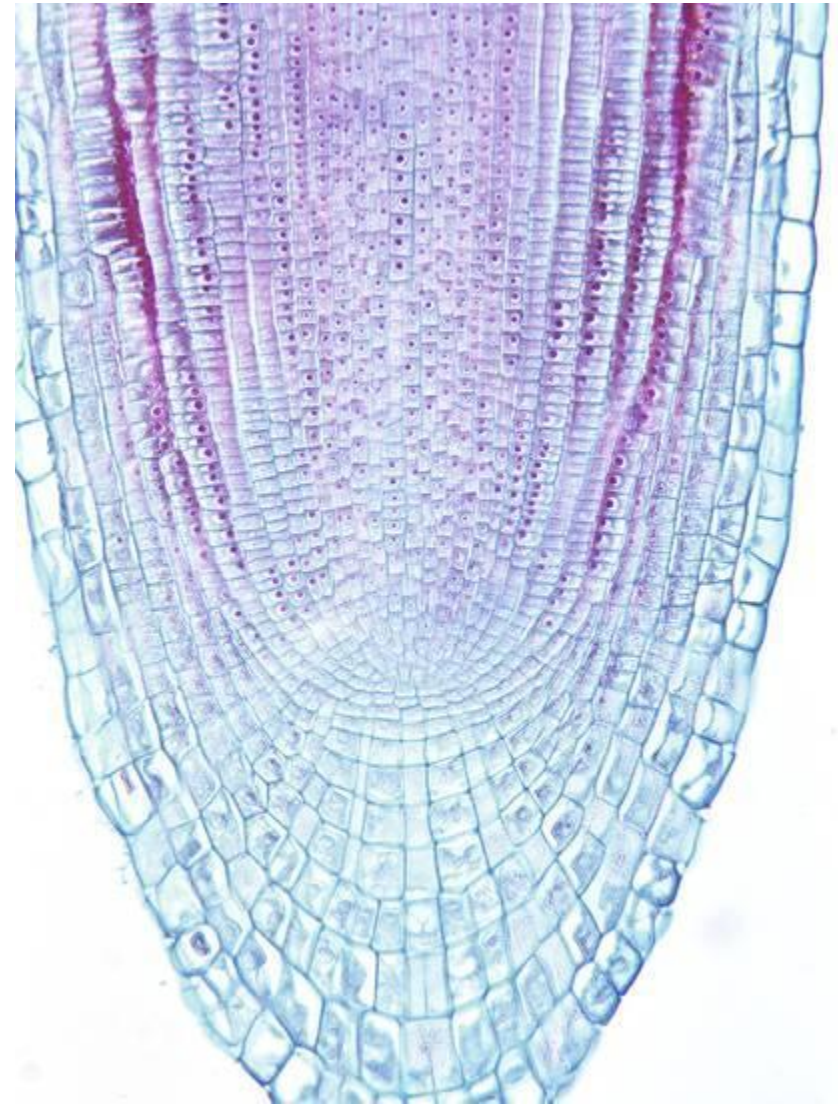
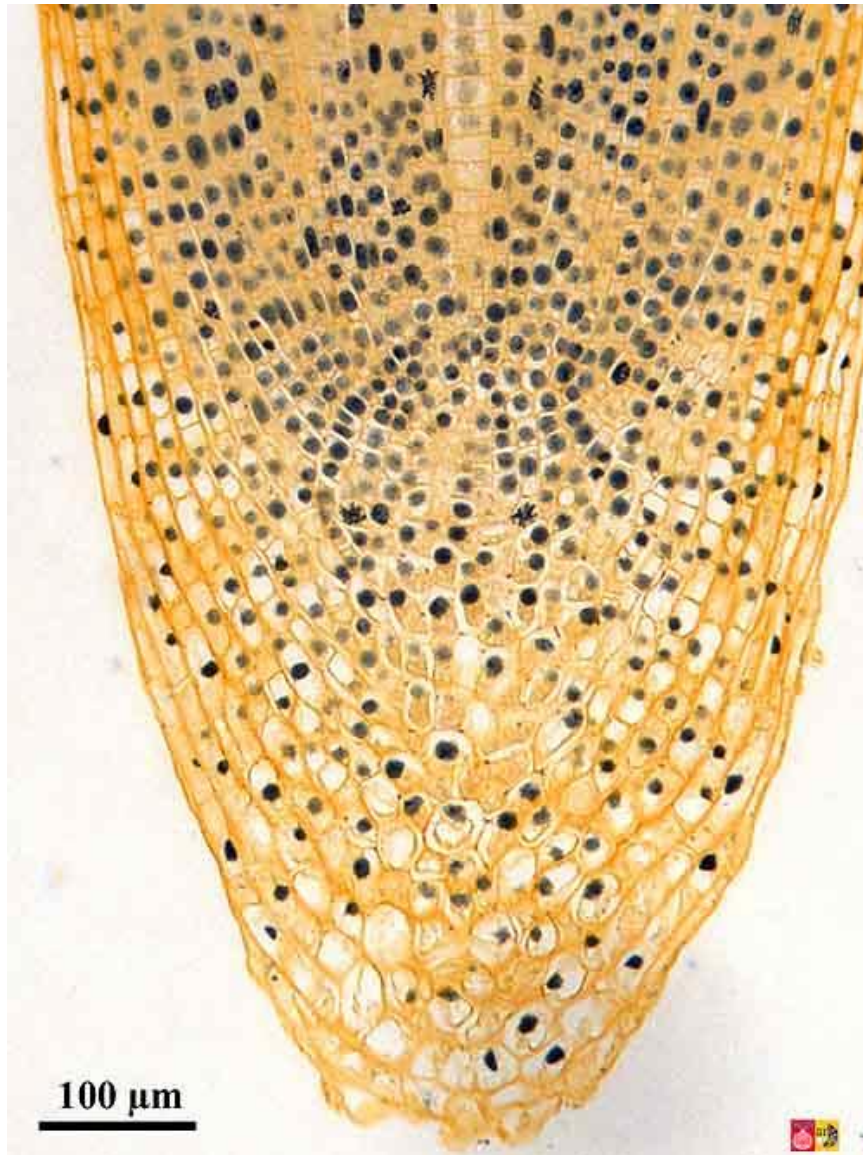
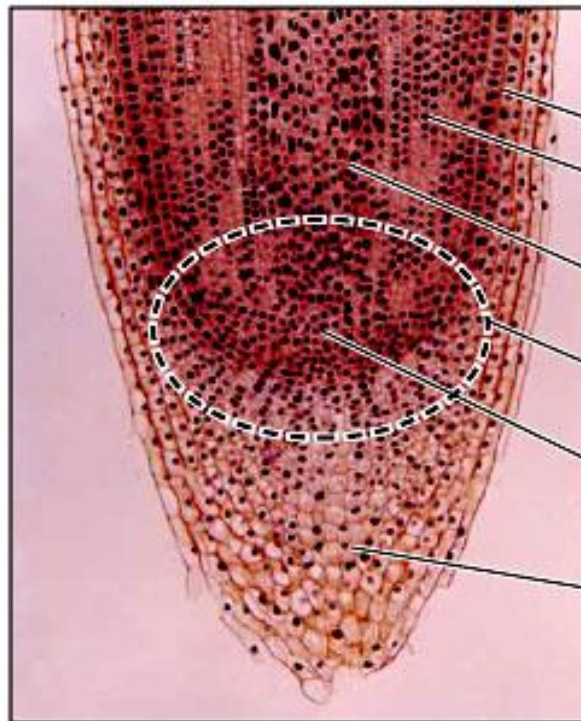
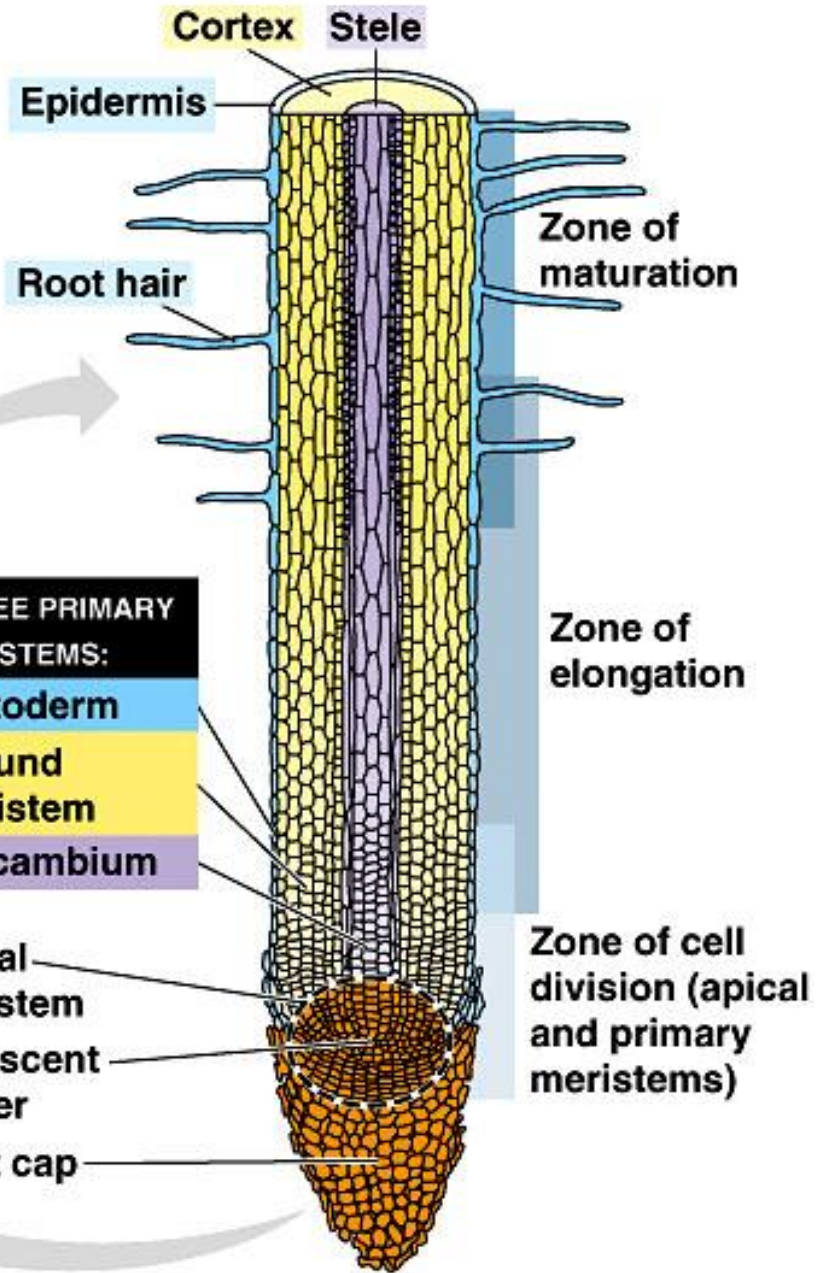


โครงสร้างปลายรากตัดตามยาว



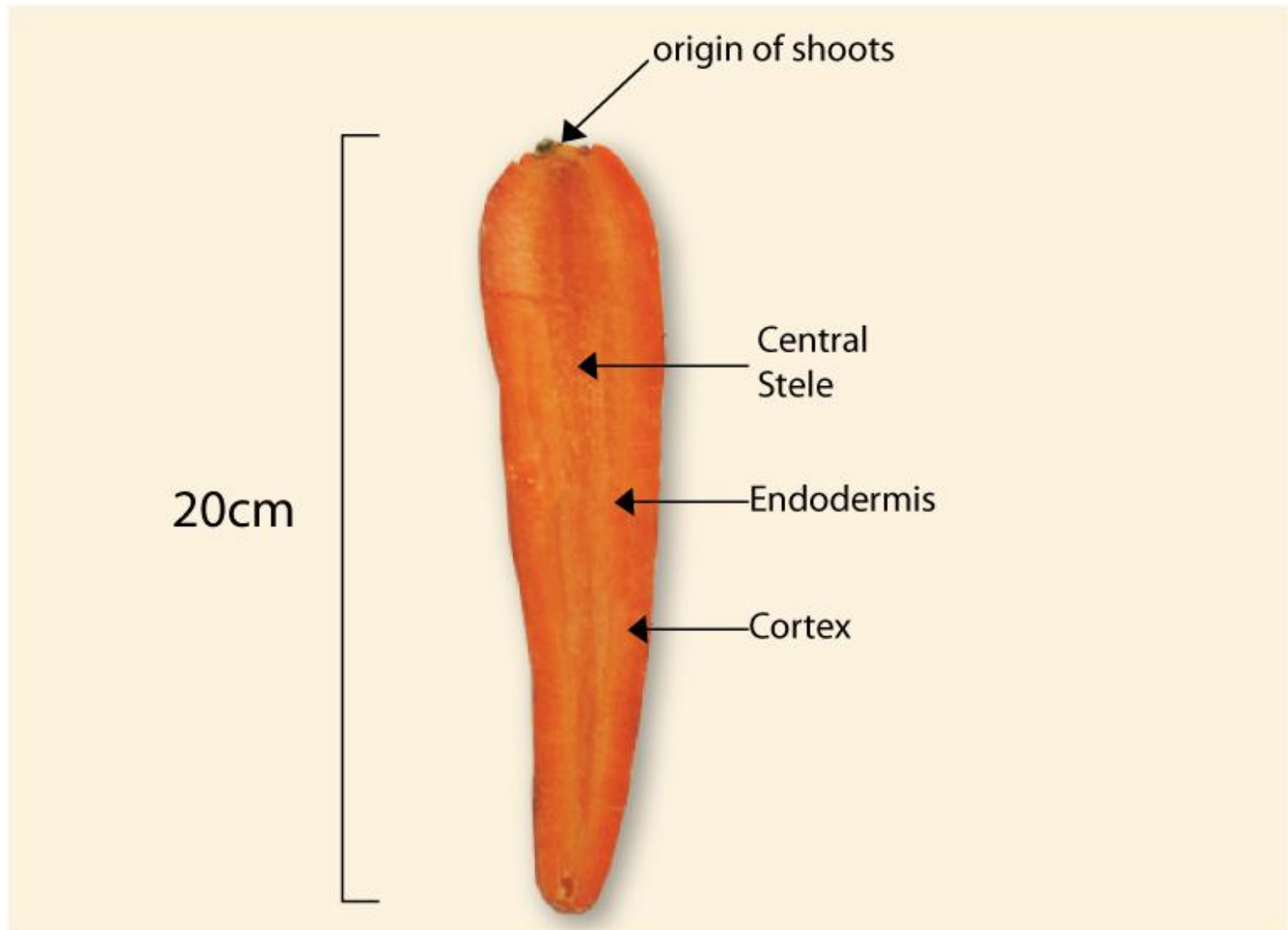
KEY

- Epidermal
- Ground
- Vascular

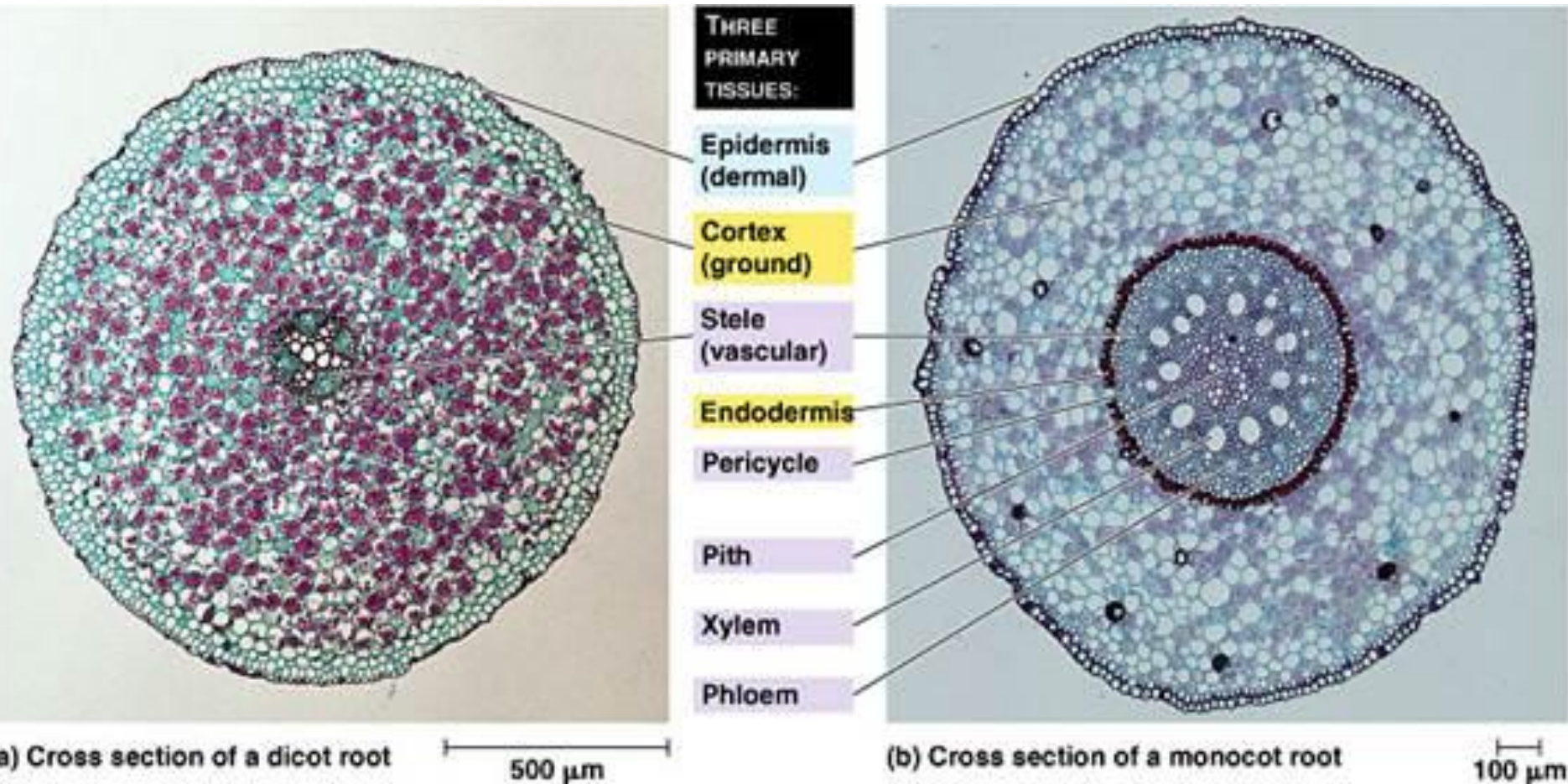


100 μm

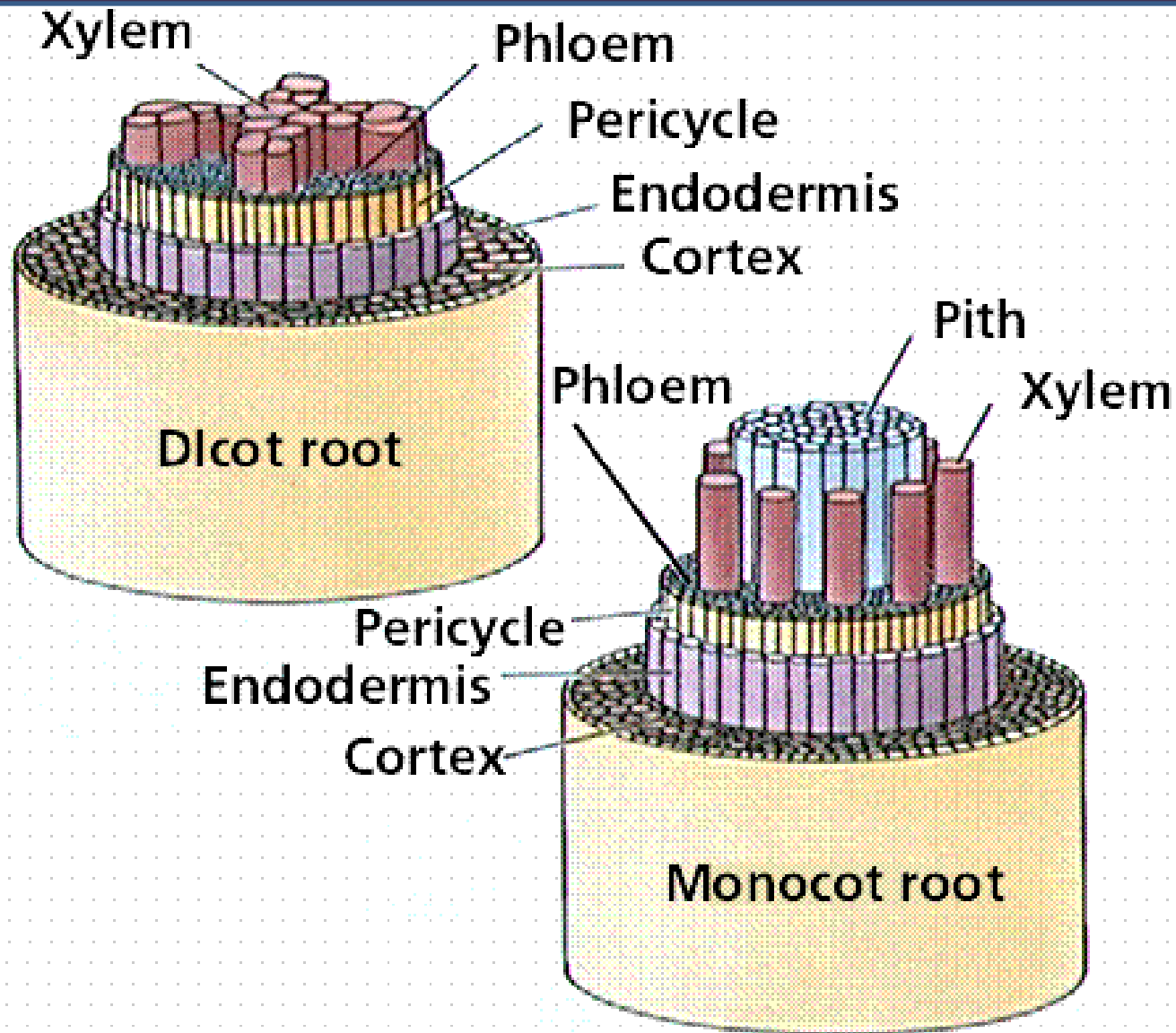
carrot ที่เห็นนี้ก็เป็นรากเช่นกัน



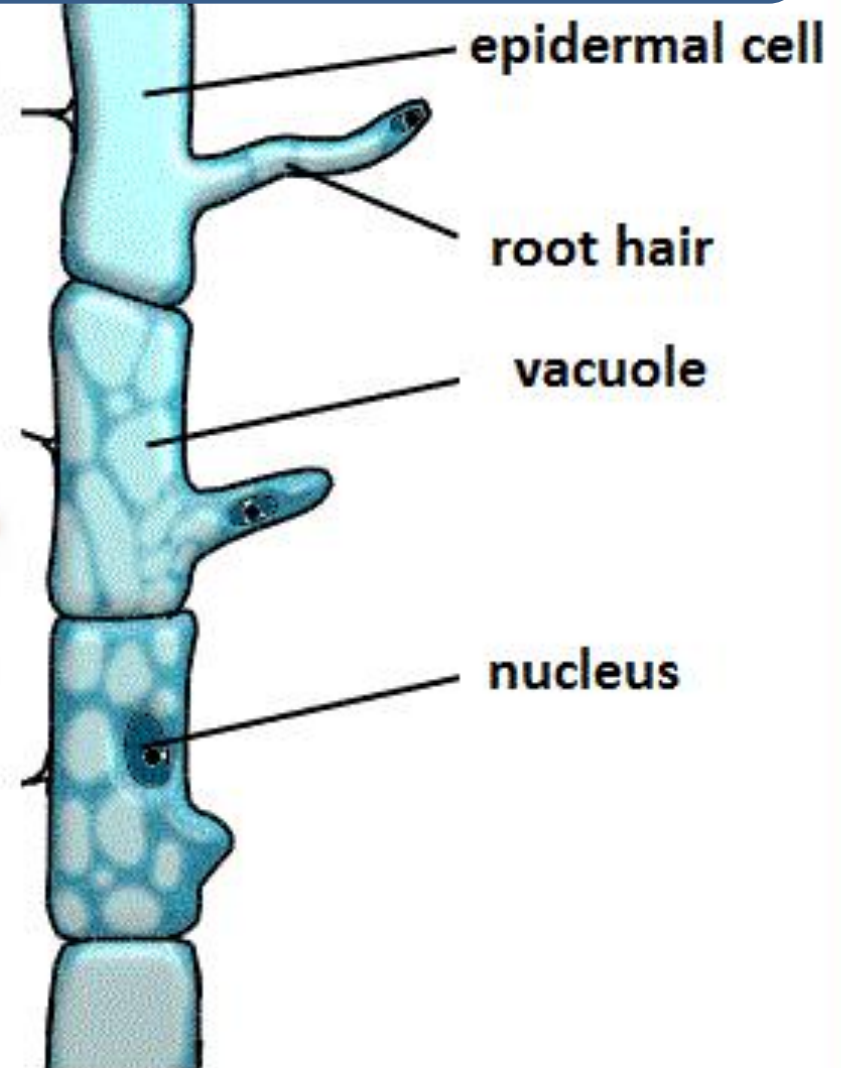
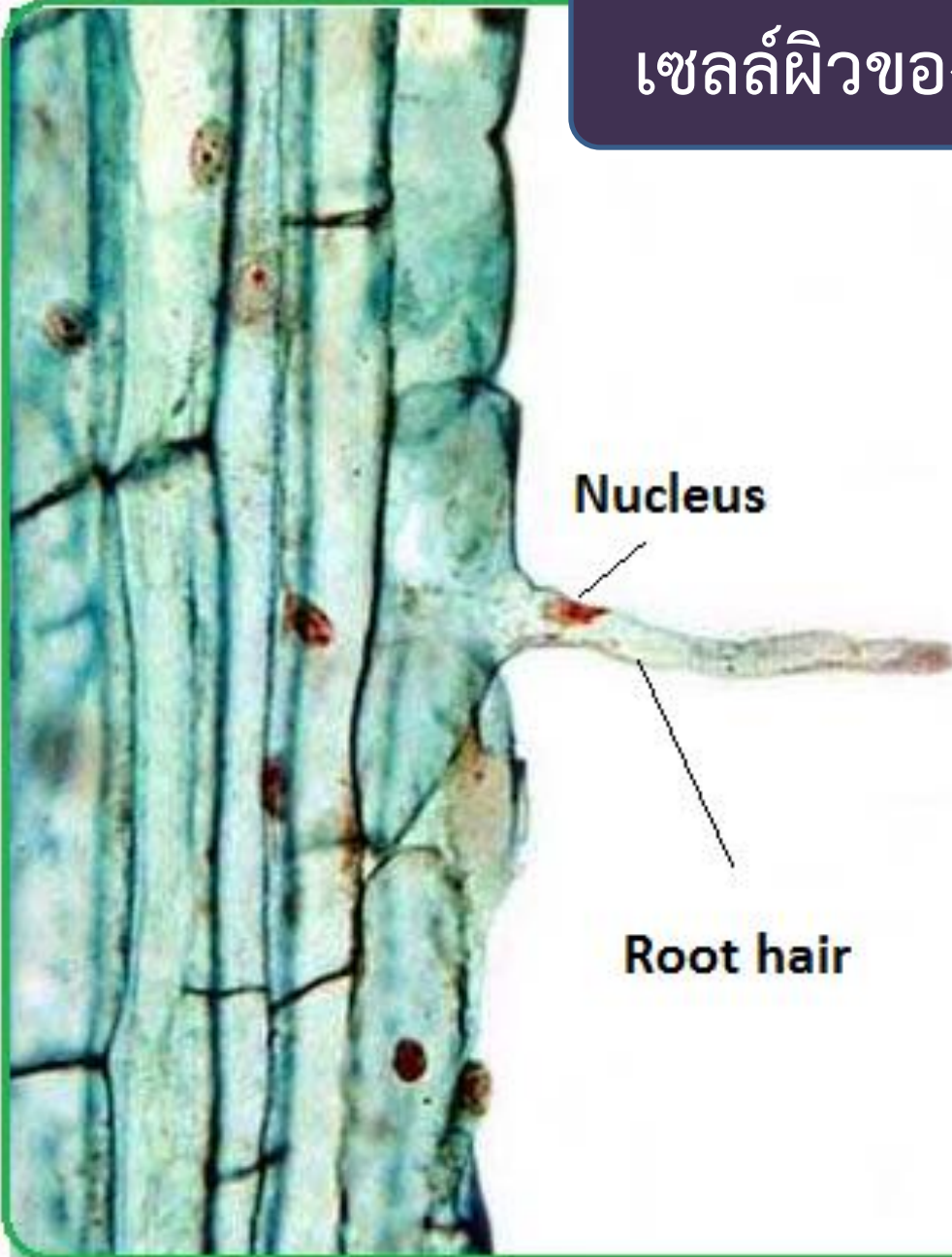
โครงสร้างปลายรากตัดตามขวางของพืช dicot , monocot



โครงสร้างปลายรากตัดตามขวางของพืช dicot , monocot



เซลล์ผิวของราก ส่วนหนึ่งเป็นขนราก



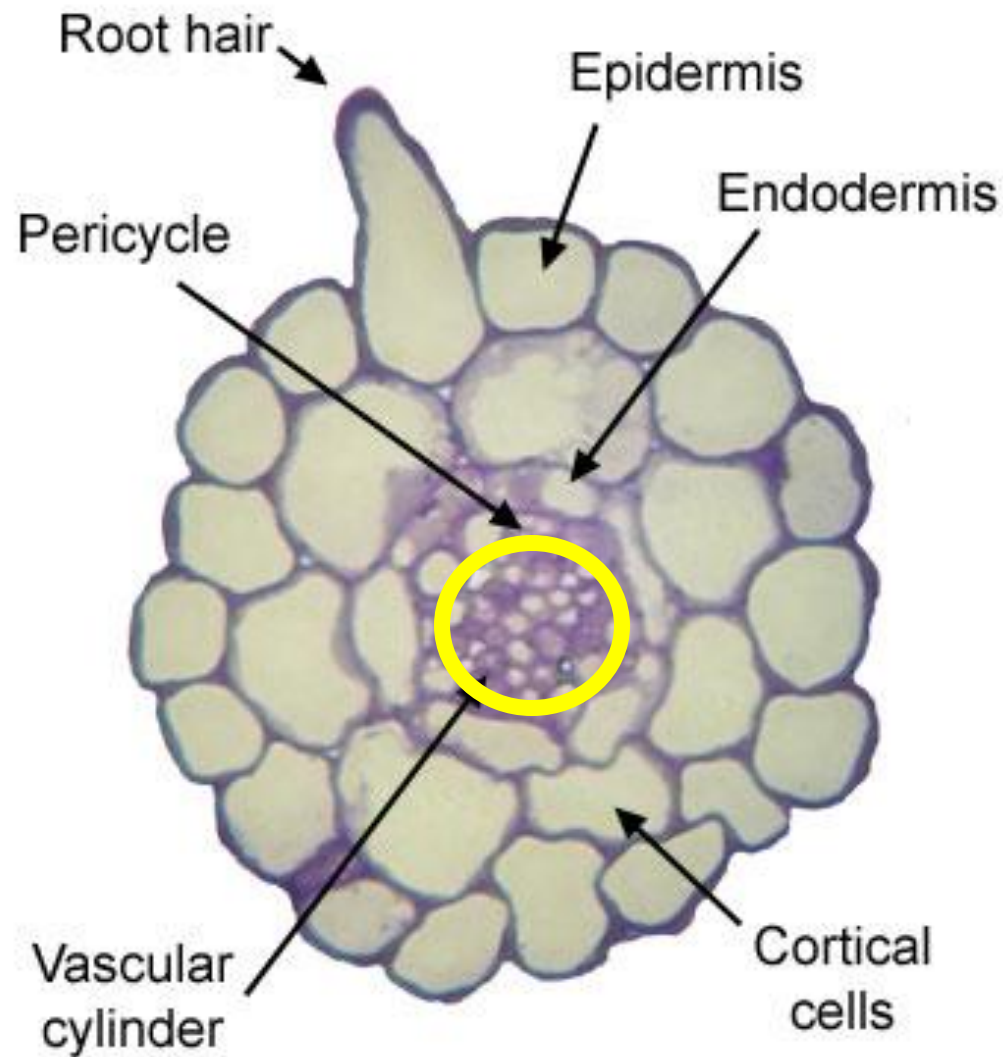
การลำเลียงน้ำจากดินสู่ยอดพืชมีขั้นตอนอะไรบ้าง



ขั้นตอนที่ 1 นำจากดินออสโมซิสเข้าสู่ขบวนการของพืช



เมื่อน้ำเข้ามาในขรรากแล้ว น้ำจะไปไหนต่อ?



น้ำจะเข้าสู่มัดท่อลำเลียงด้วยวิธีไหนบ้าง

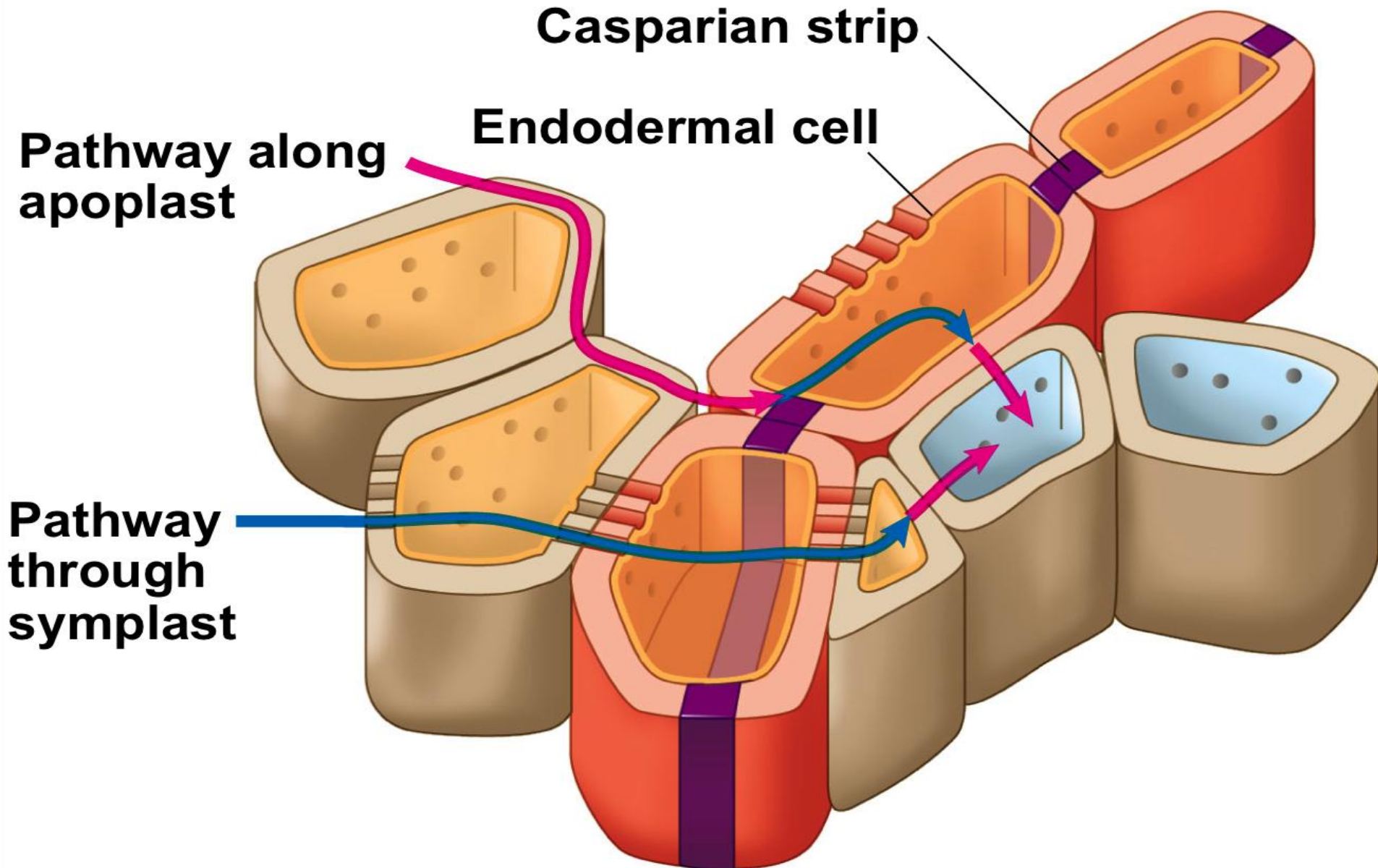
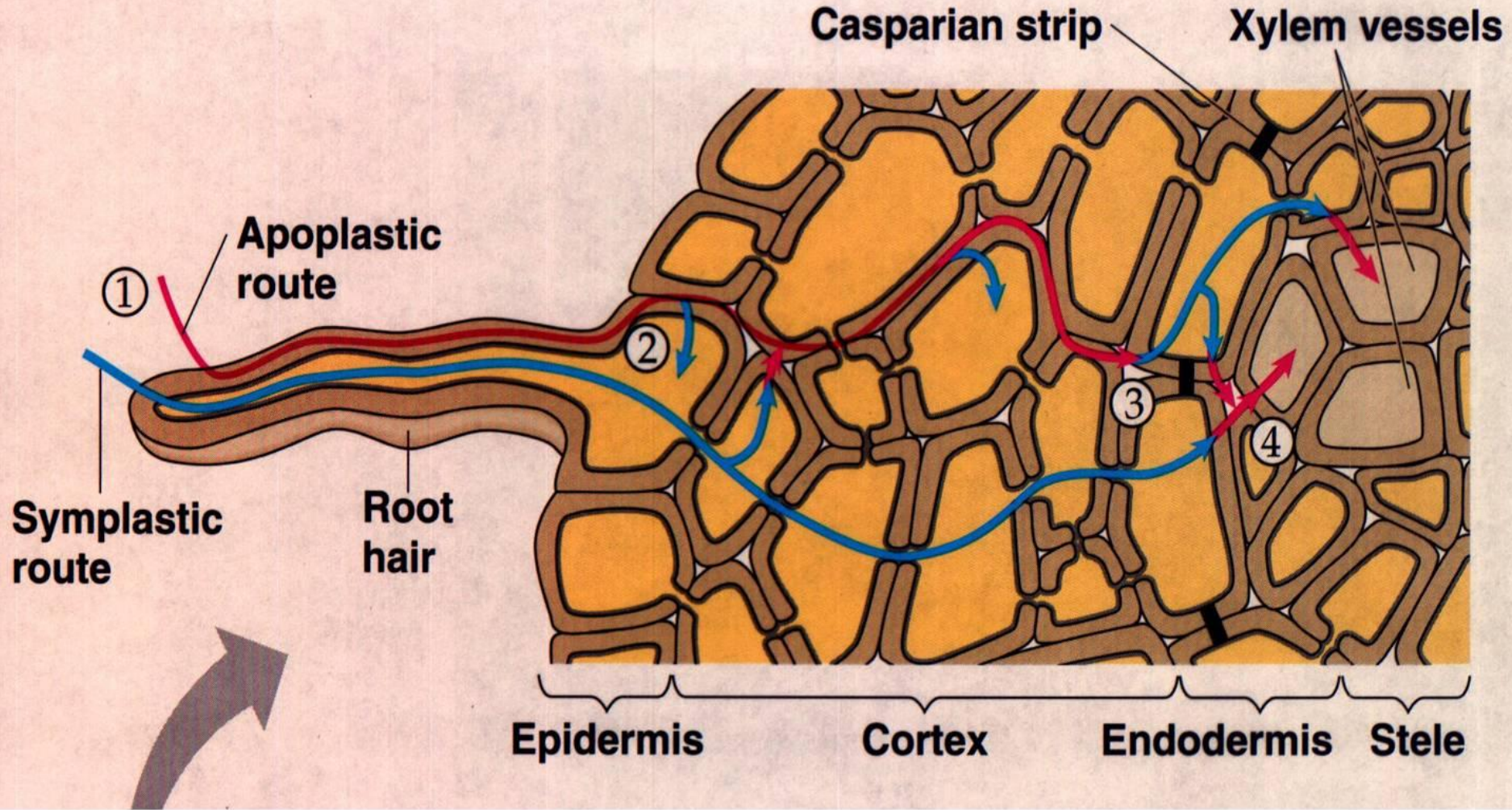
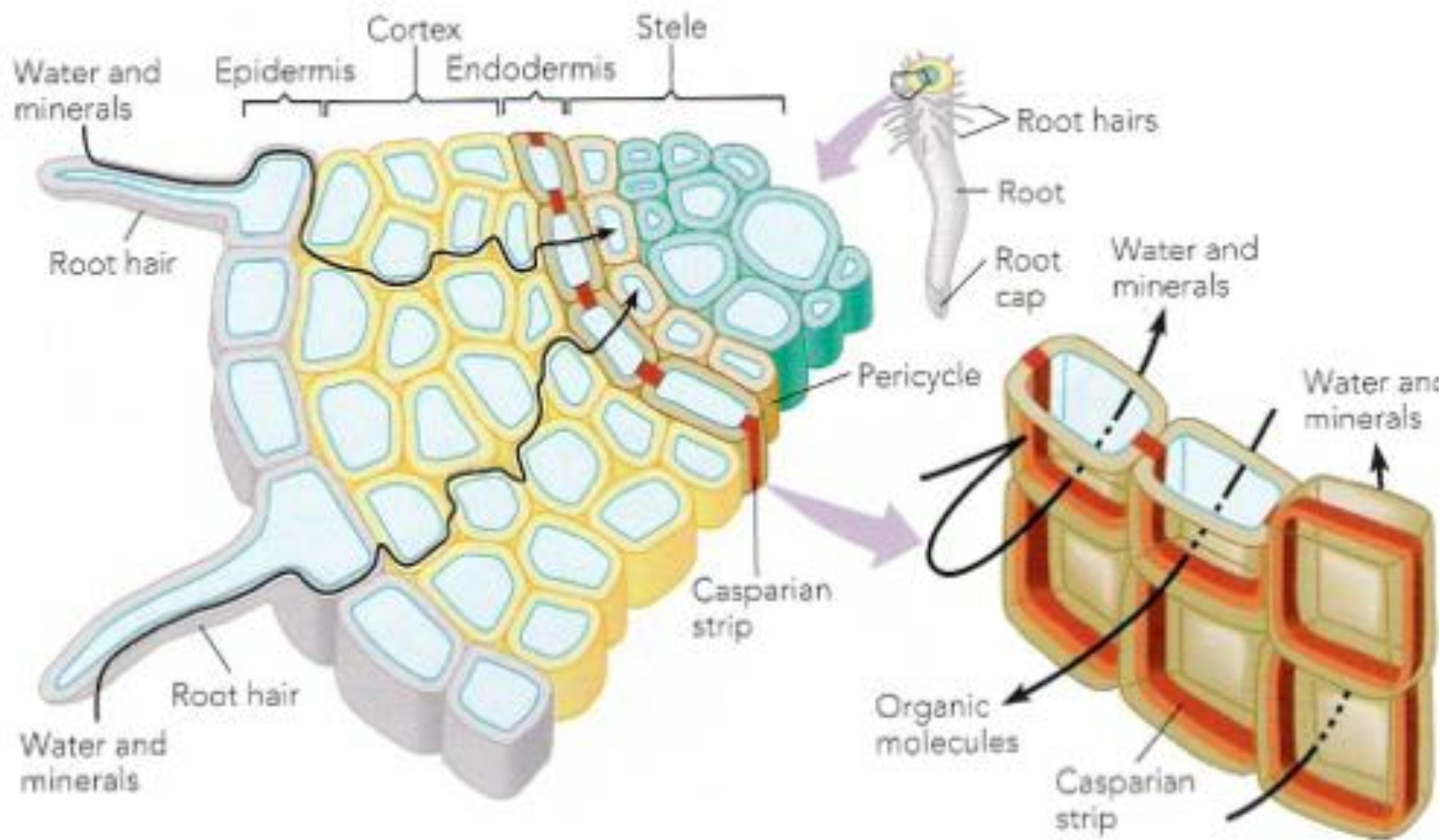
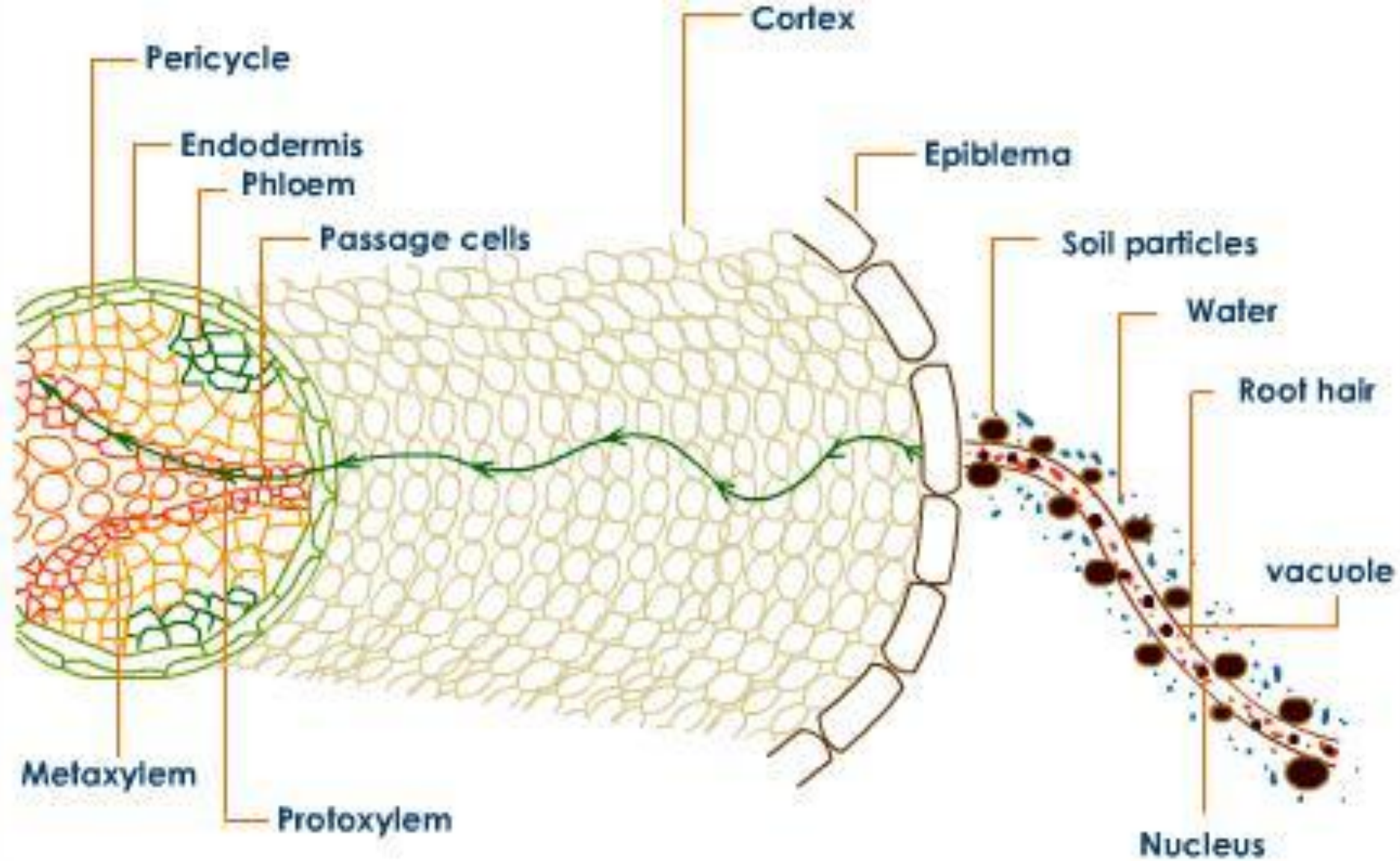
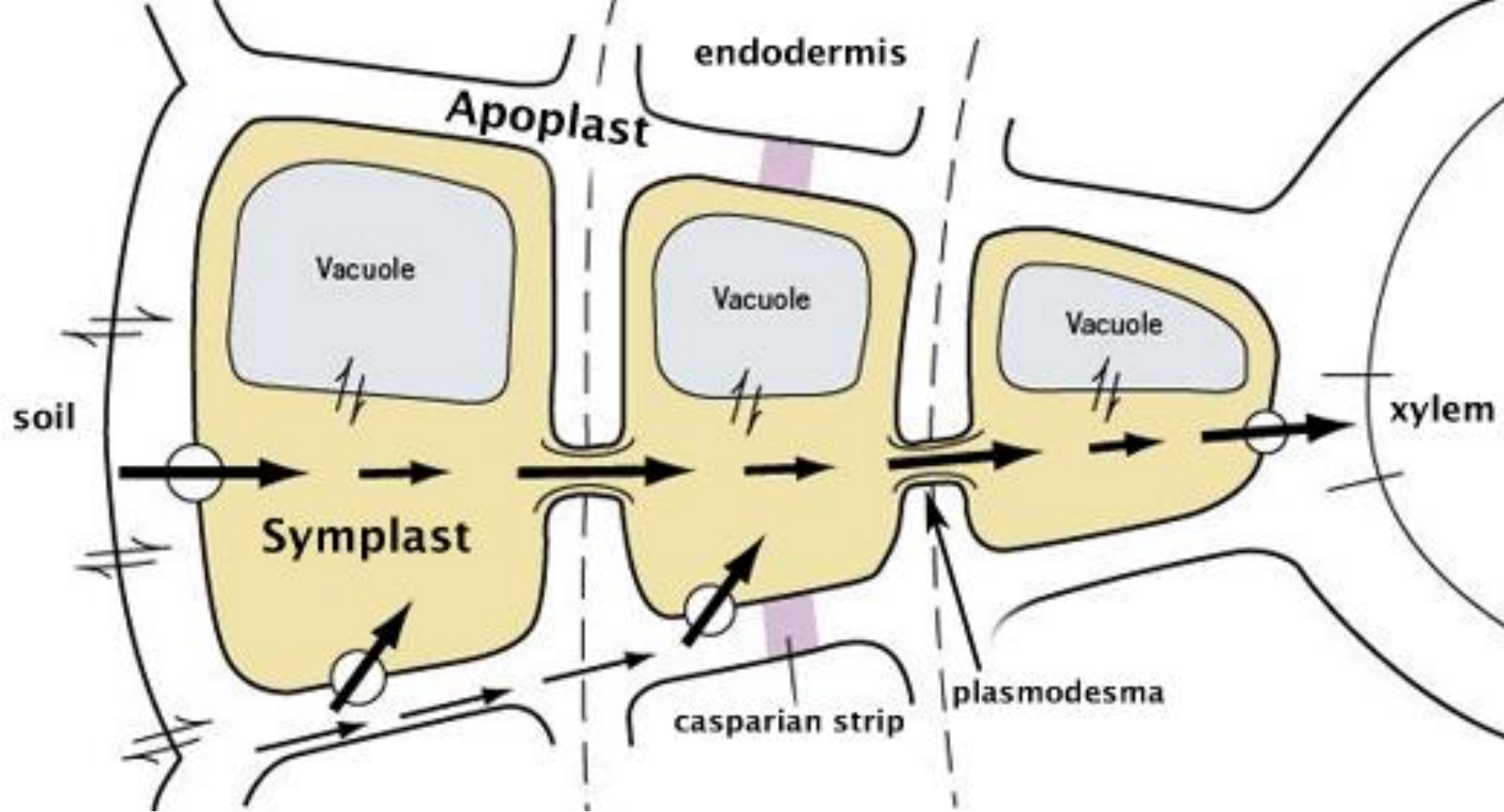


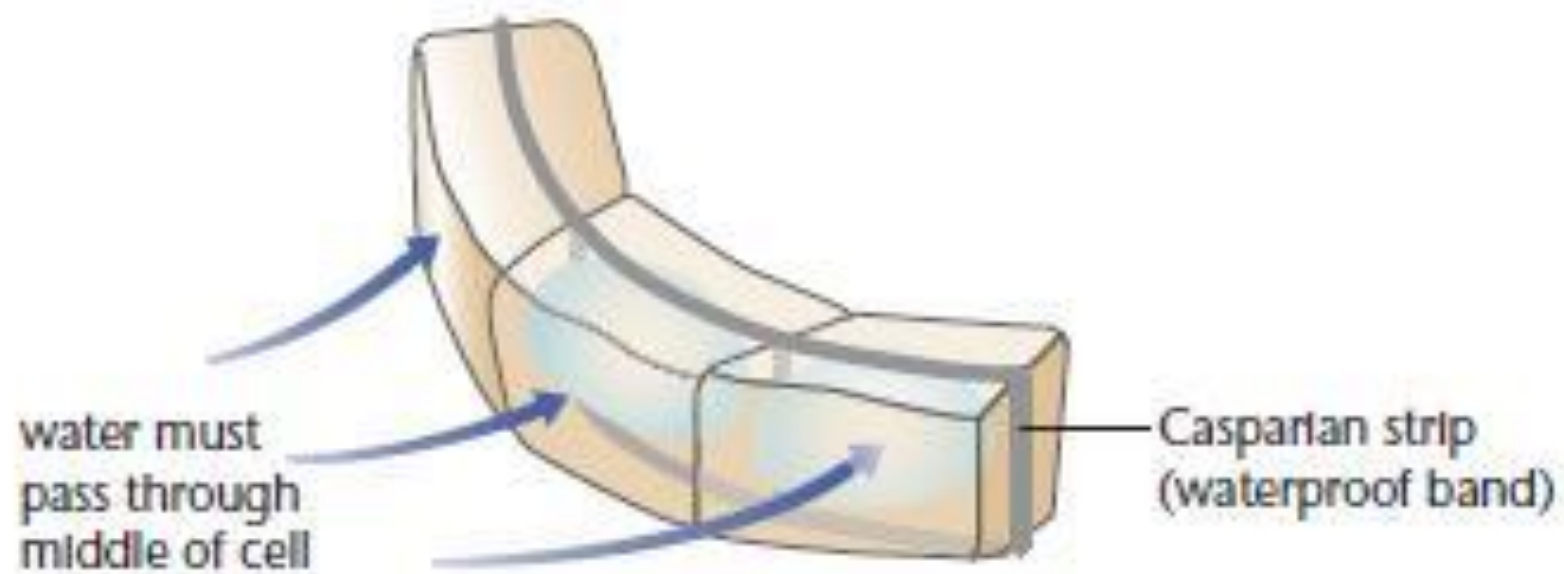
Figure 32.6 Lateral transport of minerals and water in roots





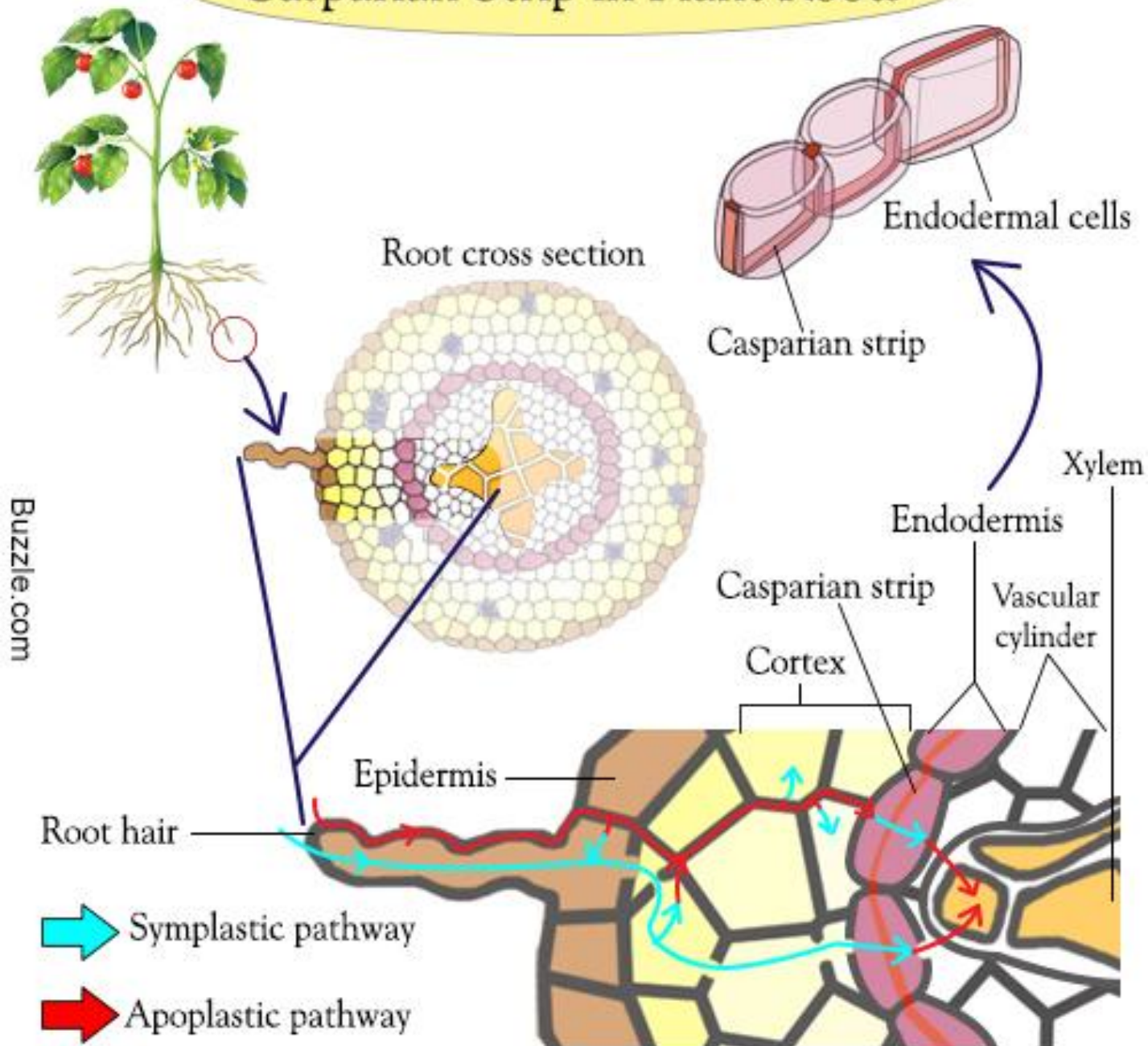






Casparian strip of the endodermal cells

Casparian Strip in Plant Roots



Vacuoles

Plasmodesmata

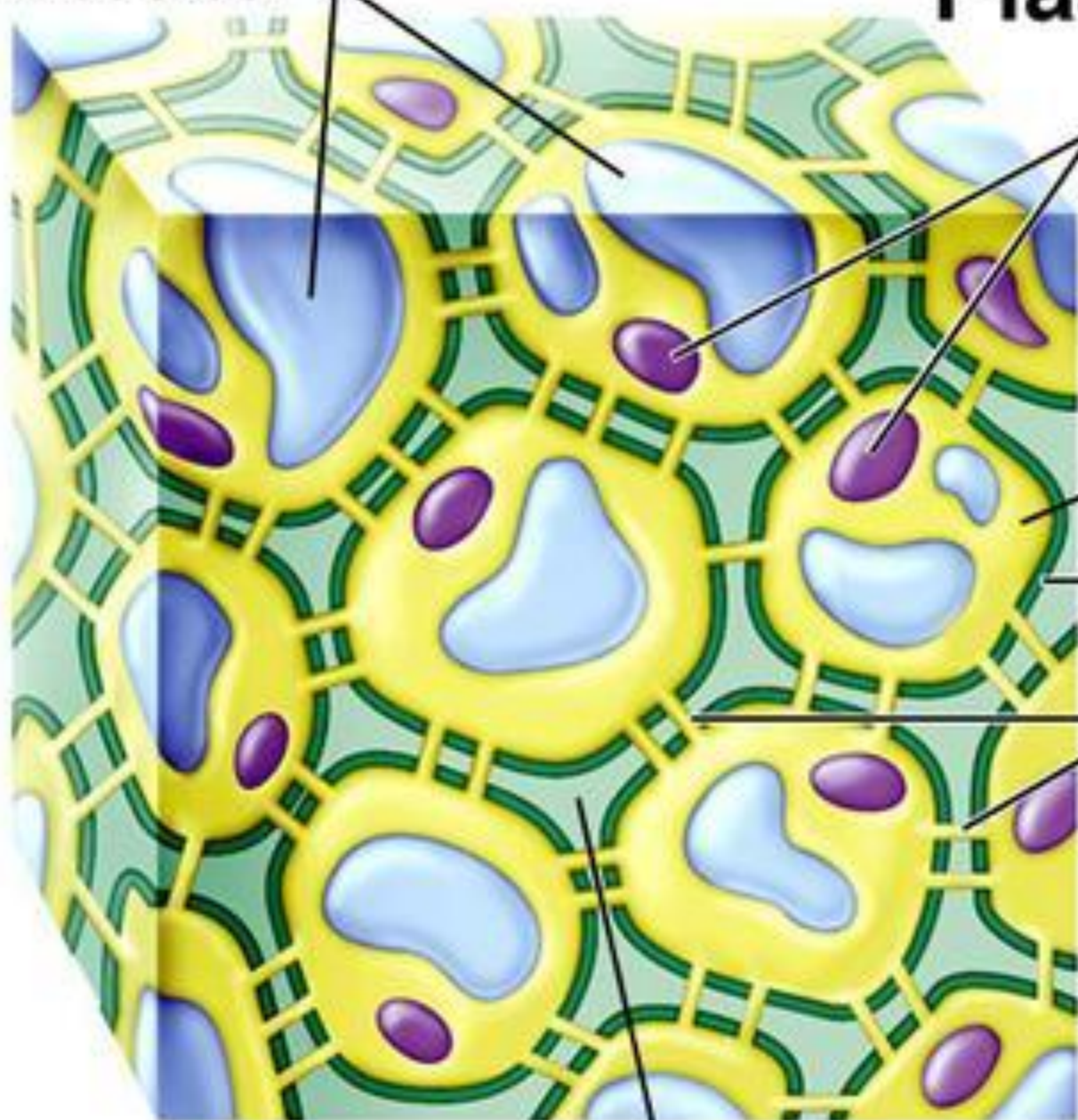
Nuclei

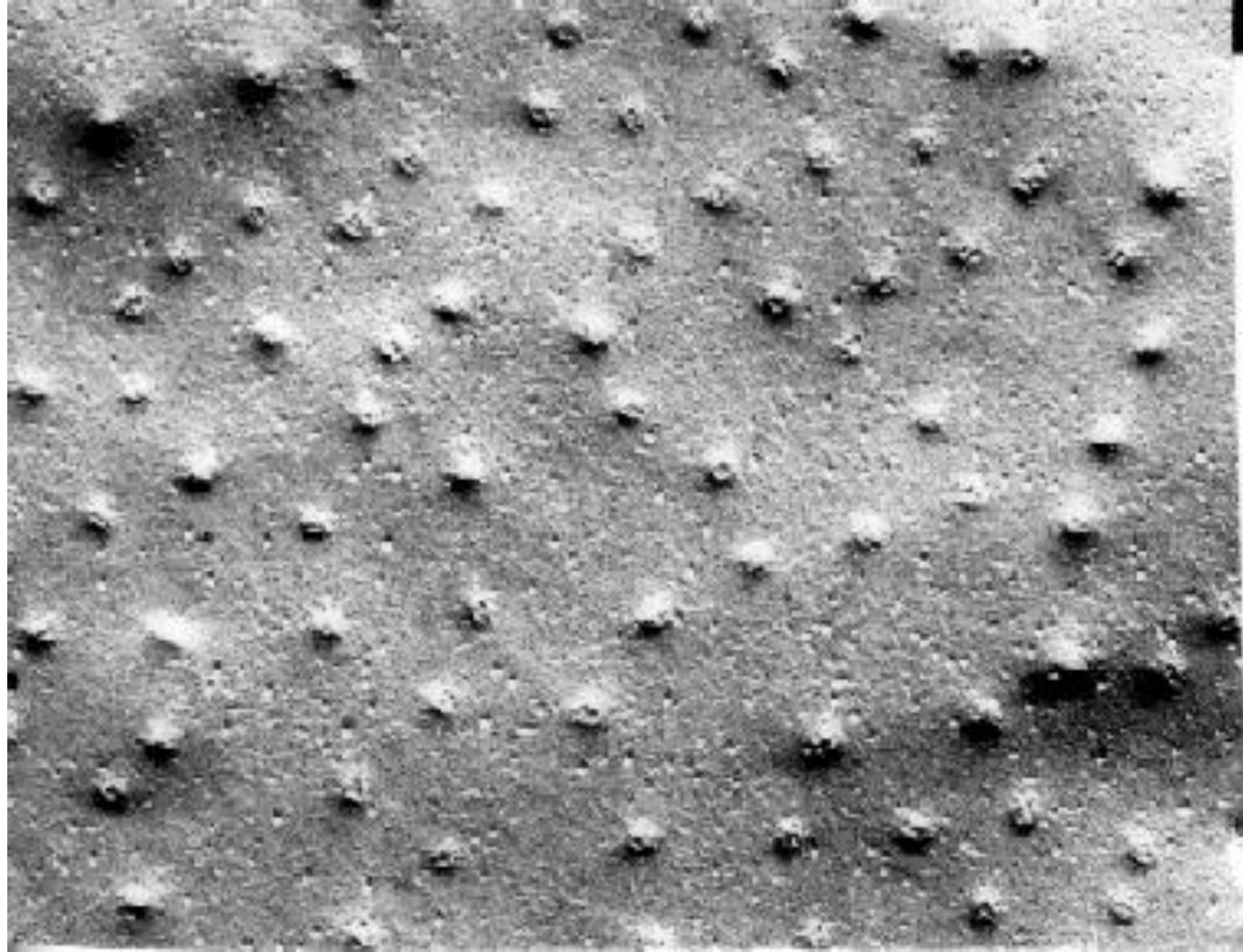
Cytoplasm

Primary cell wall

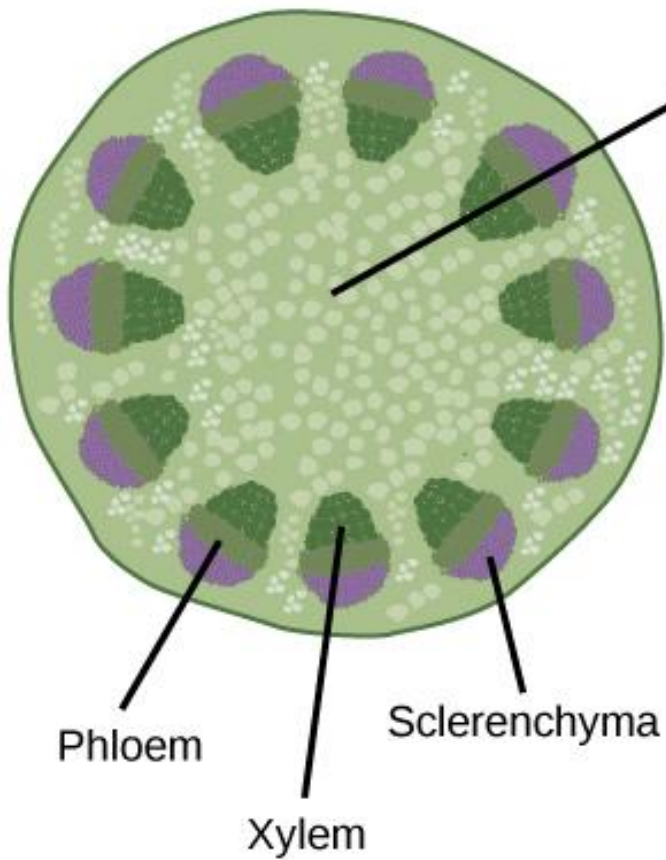
Plasmodesmata

Middle lamella

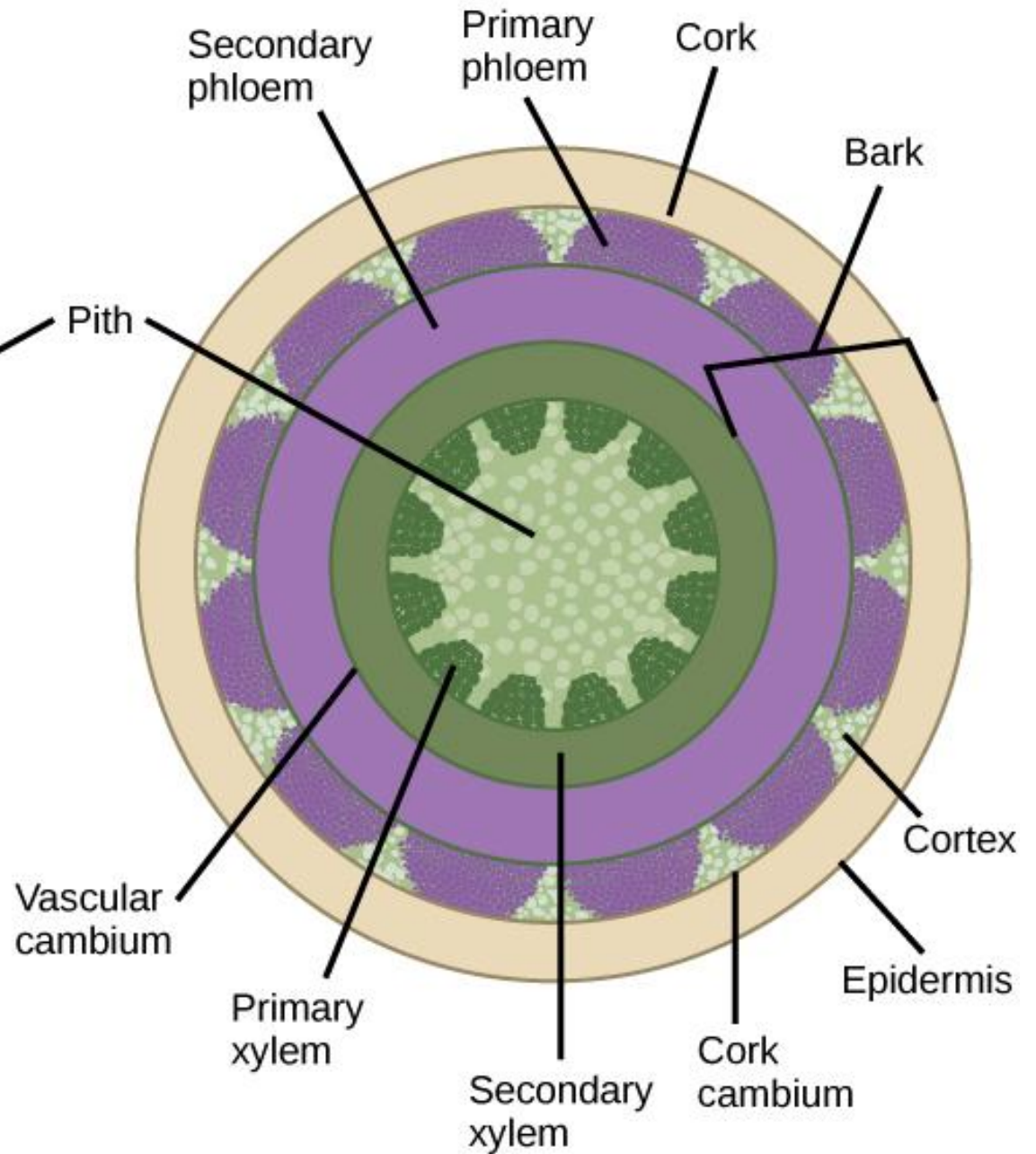


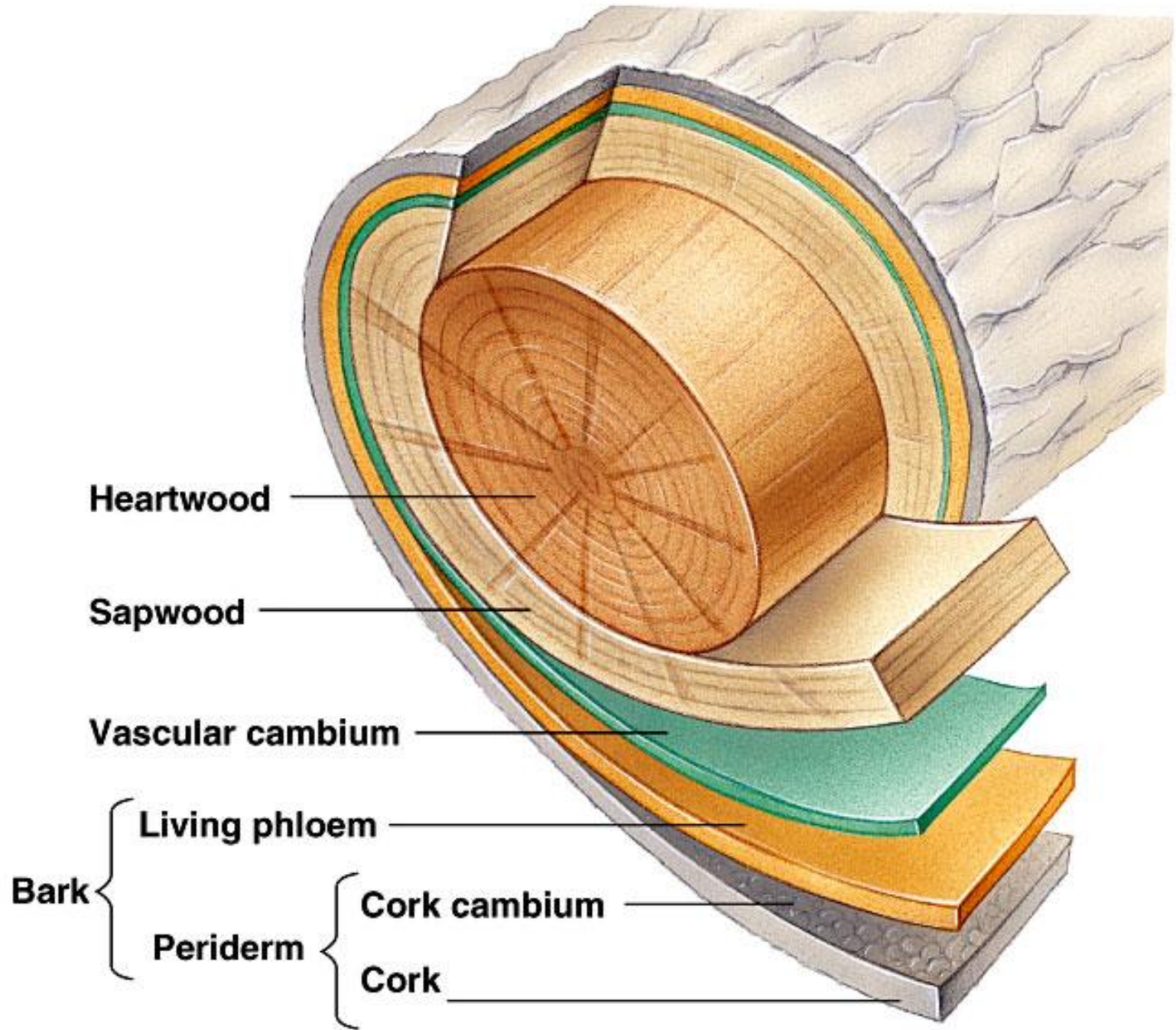


Primary growth

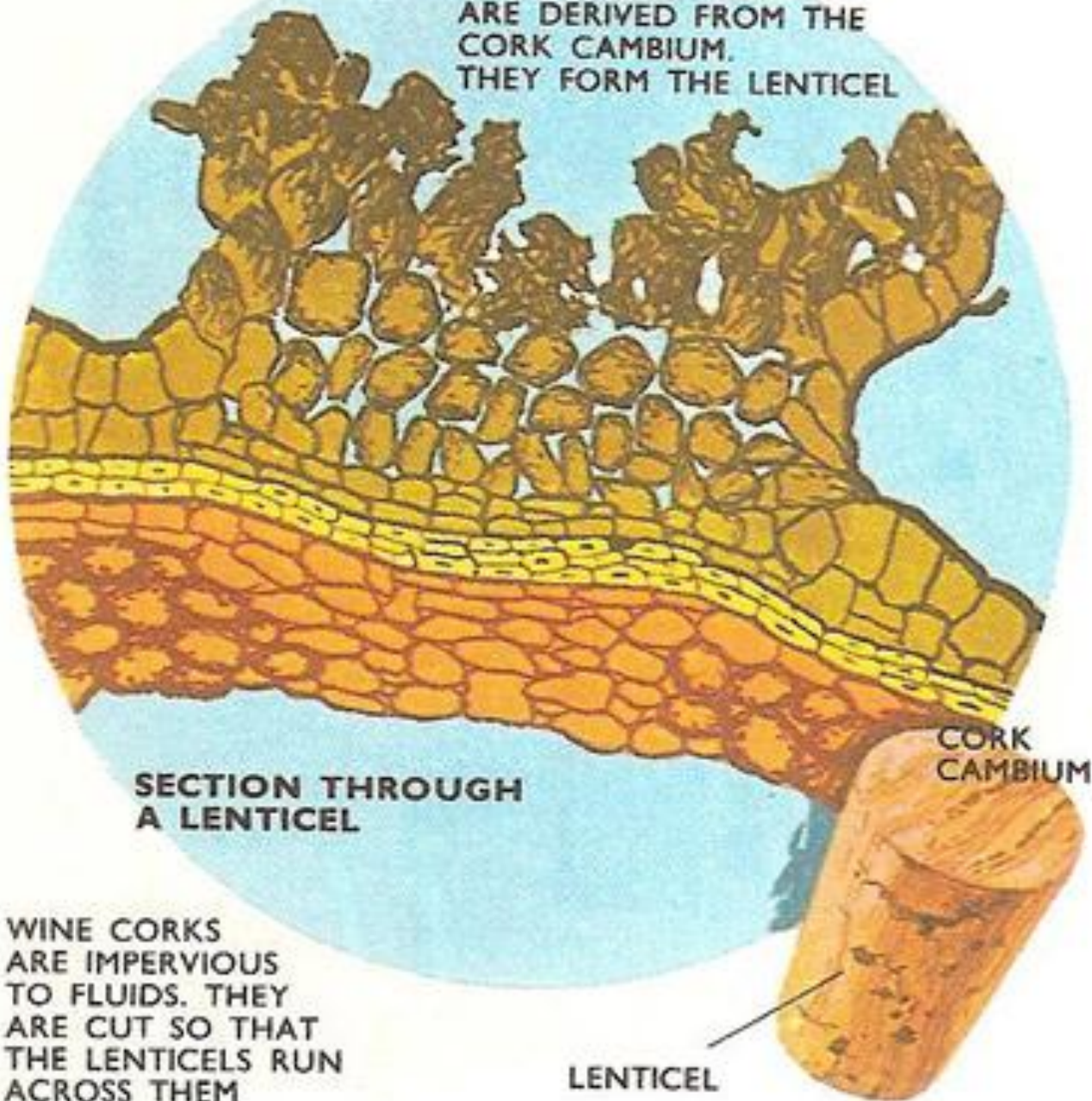


Secondary growth





LOOSELY PACKED
UNSUBERIZED CELLS
ARE DERIVED FROM THE
CORK CAMBIUM.
THEY FORM THE LENTICEL

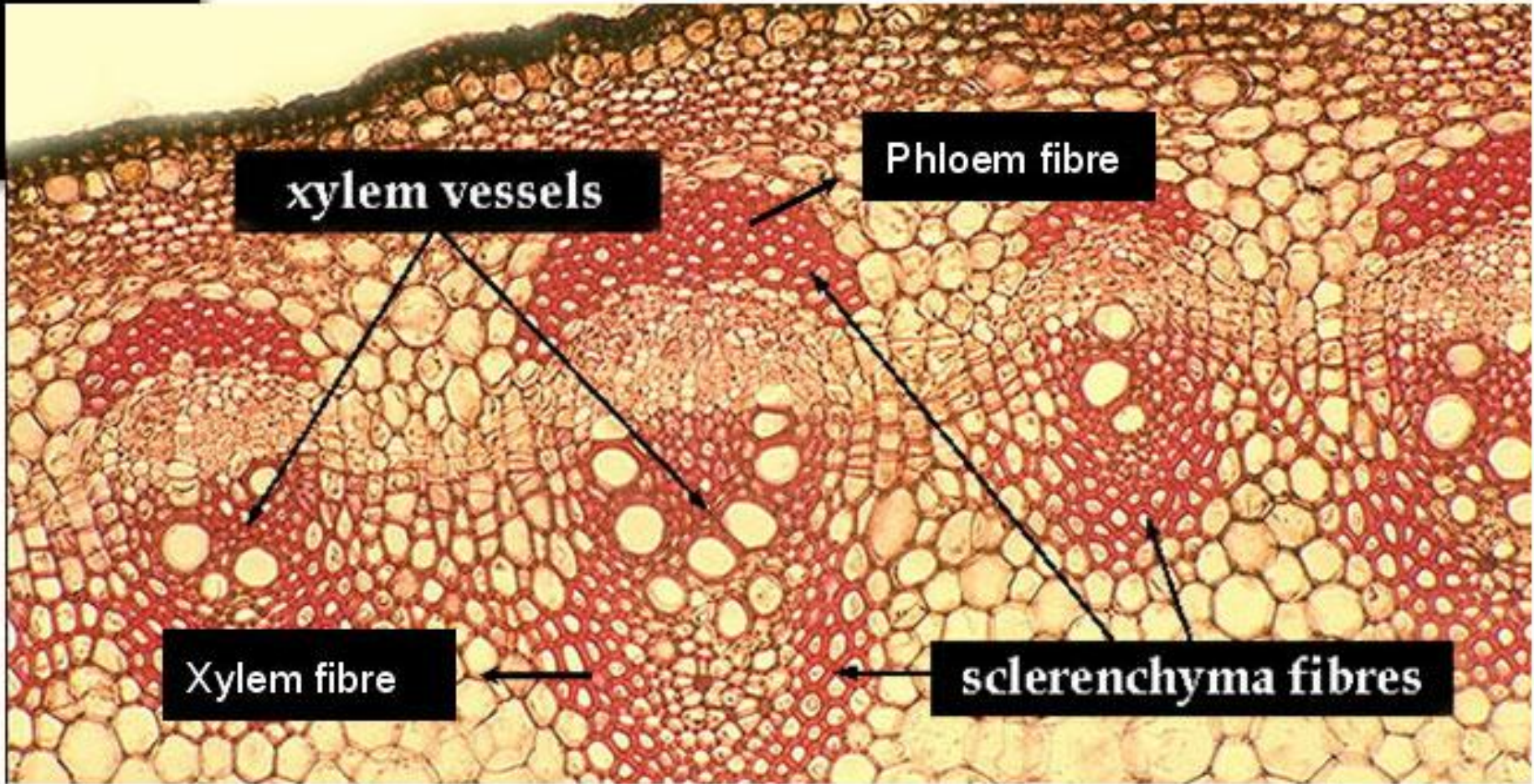


SECTION THROUGH
A LENTICEL

CORK
CAMBIUM

WINE CORKS
ARE IMPERVIOUS
TO FLUIDS. THEY
ARE CUT SO THAT
THE LENTICELS RUN
ACROSS THEM

LENTICEL



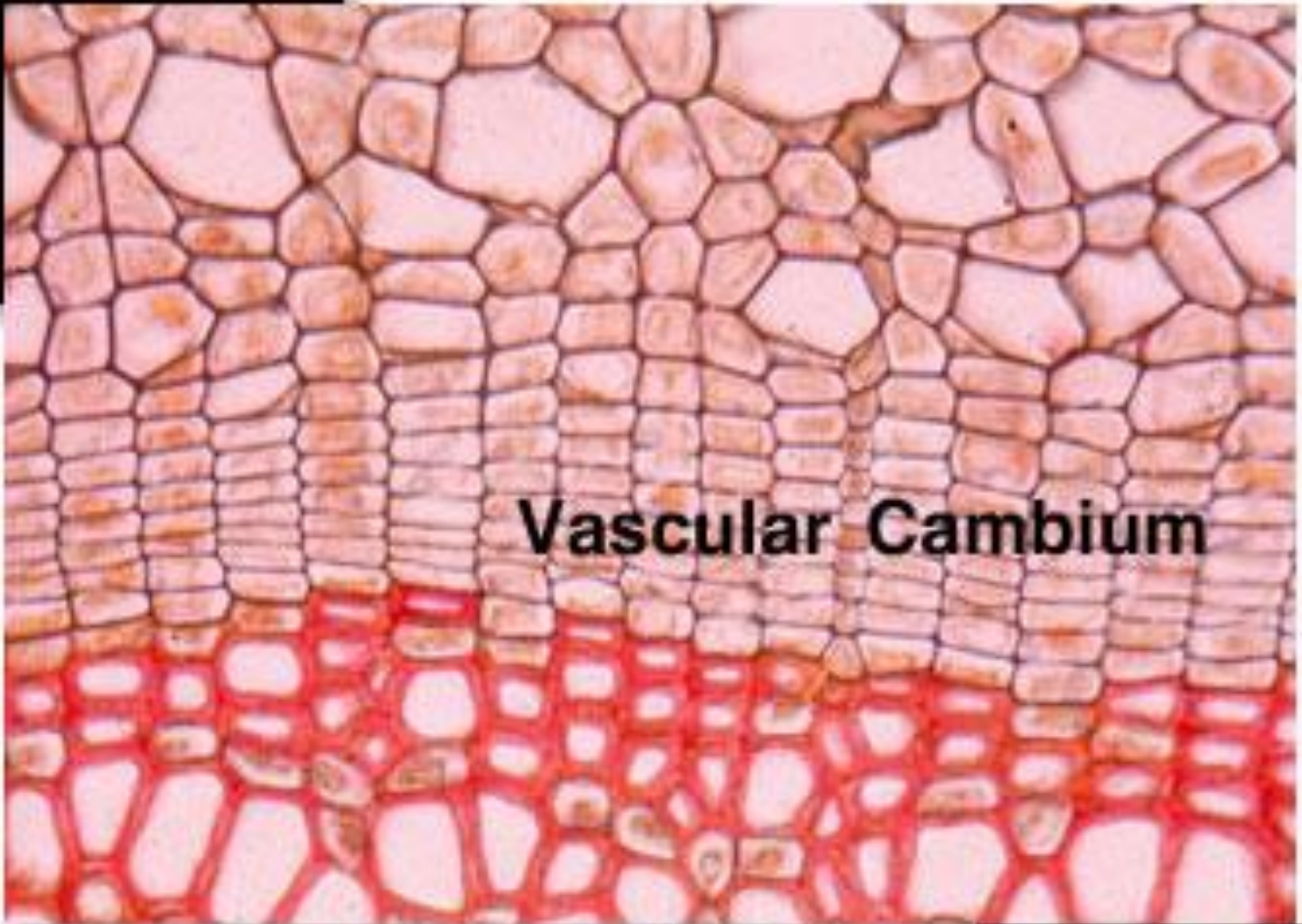
xylem vessels

This micrograph shows a cross-section of plant tissue. The top layer is dark, likely the epidermis. Below it is a layer of small, rounded cells. The main body of the image is filled with various types of plant cells. Large, circular structures are labeled as xylem vessels. Smaller, elongated cells are labeled as phloem fibres, xylem fibres, and sclerenchyma fibres. The tissue is stained, with some areas appearing reddish and others yellowish.

Phloem fibre

Xylem fibre

sclerenchyma fibres



A light micrograph of a plant stem cross-section. The image shows several vascular bundles arranged in a ring. Each bundle consists of a central vascular cambium, surrounded by xylem on the left and phloem on the right. The xylem vessels are large and circular, while the phloem is composed of smaller, more rectangular cells. The vascular cambium is a thin layer of cells that separates the xylem and phloem. The text "Vascular Cambium" is overlaid on the image, pointing to the central layer of each bundle.

Vascular Cambium

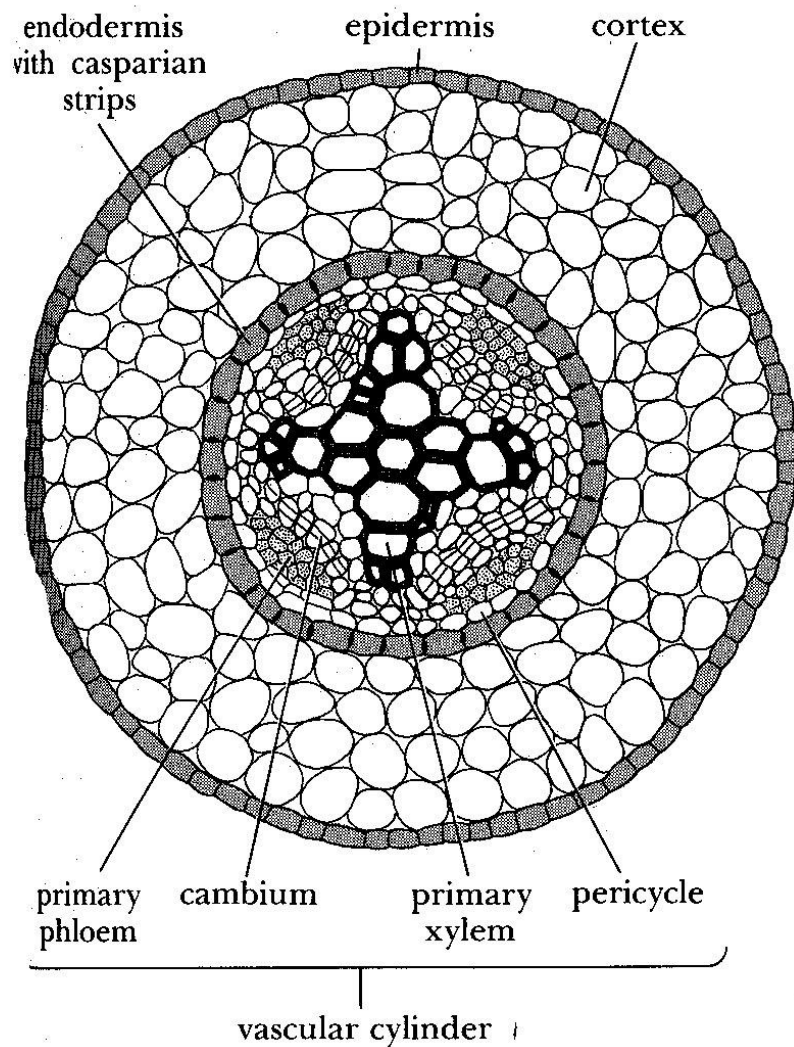


Fig. 9-4 Primary tissues in a cross section of a young dicotyledonous root. Note the alternate arrangement of the primary xylem and phloem.

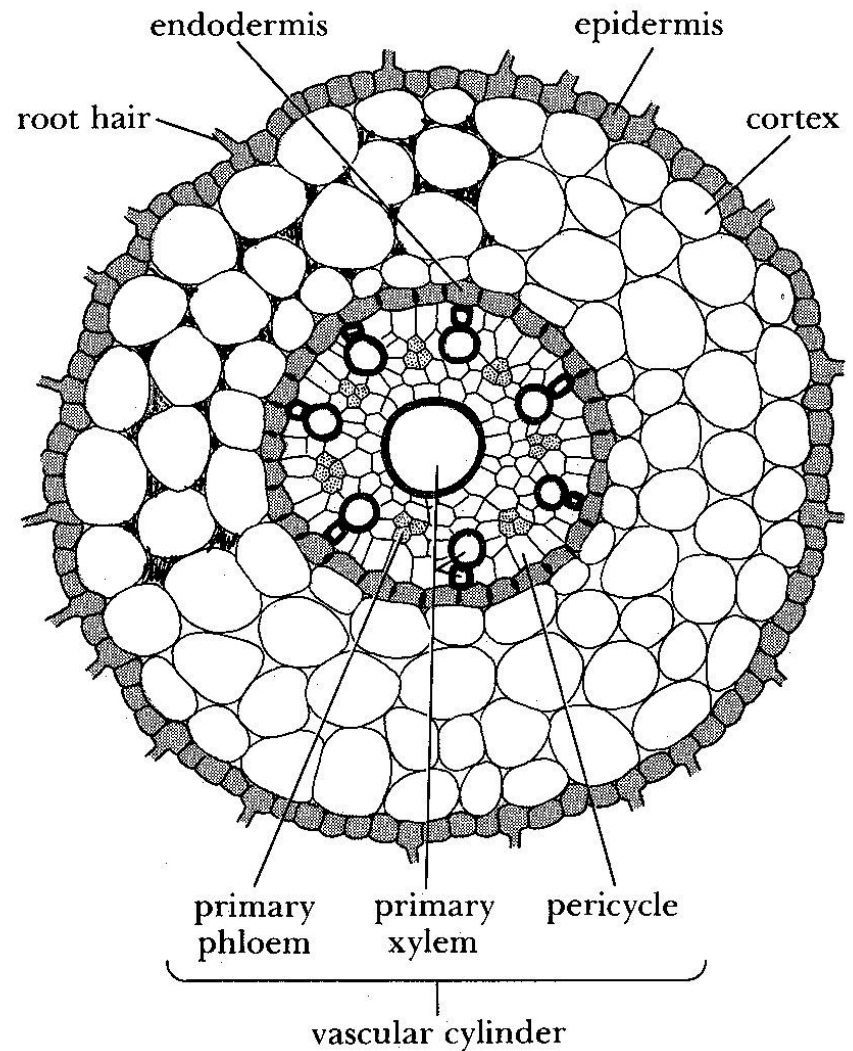
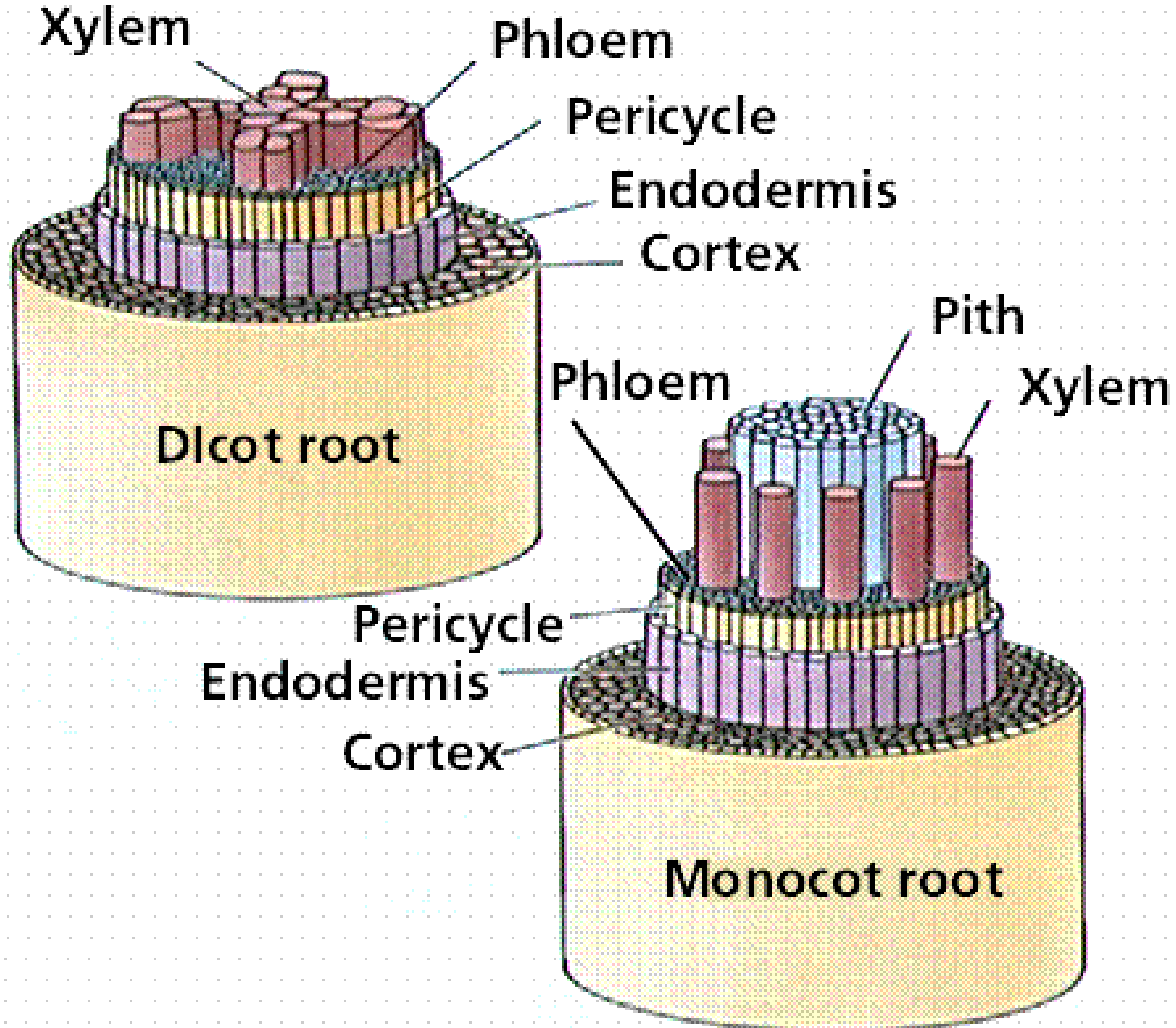
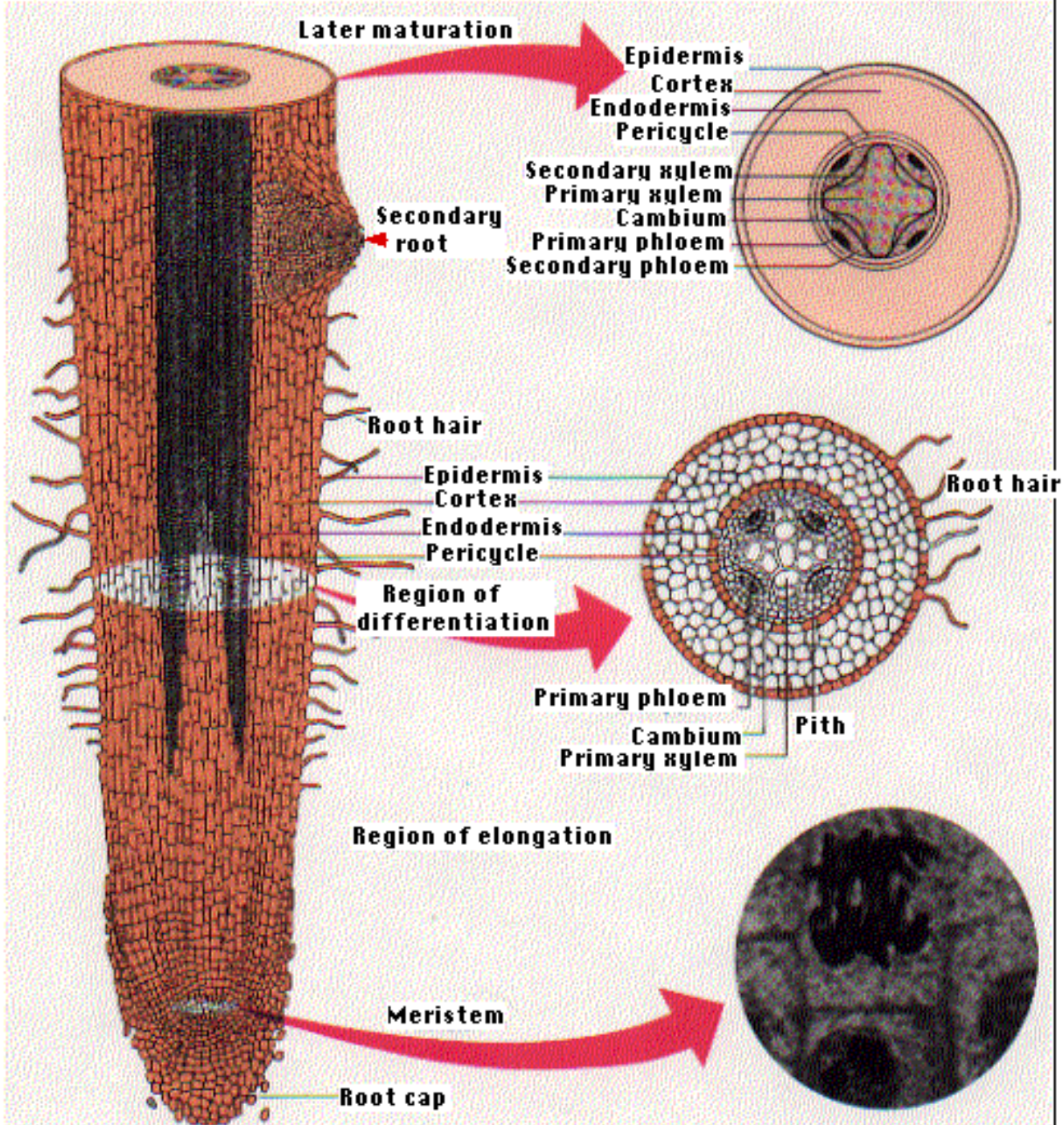


Fig. 9-5 Cross section of a young root of barley (*Hordeum vulgare*), a monocotyledon.





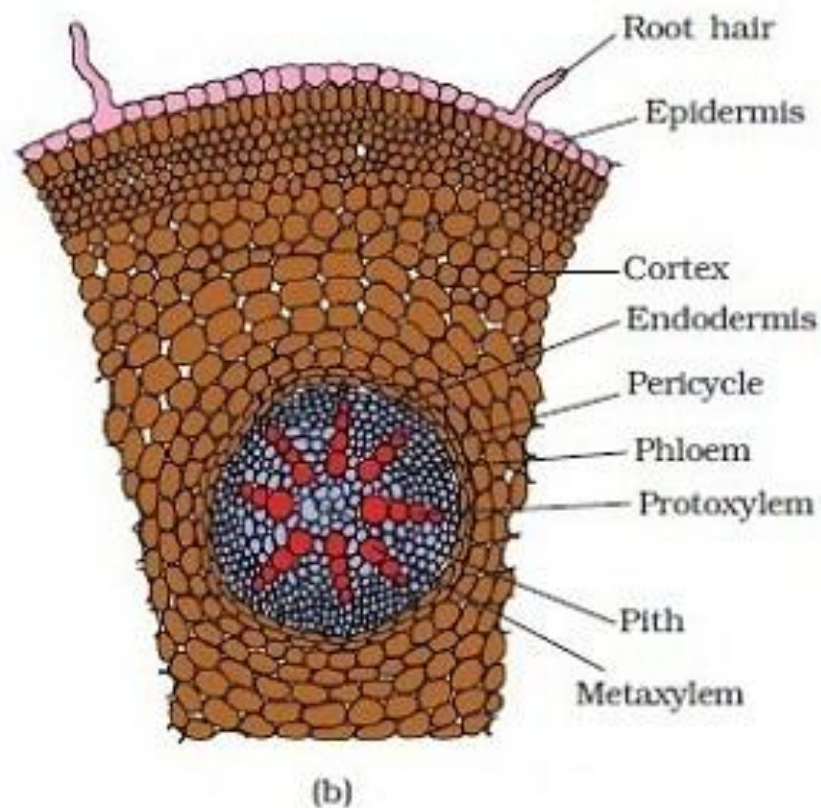
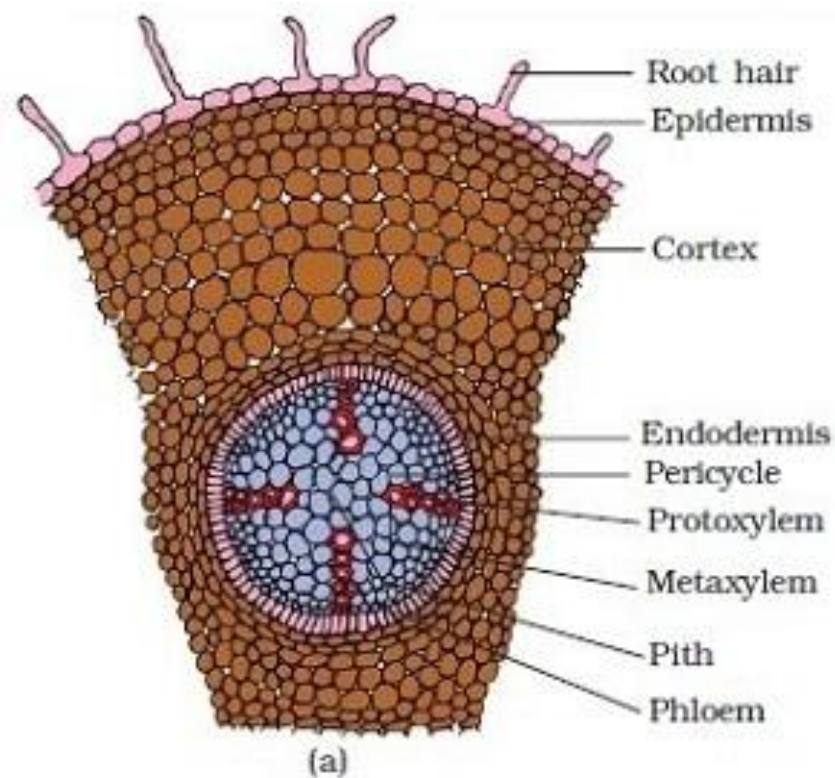
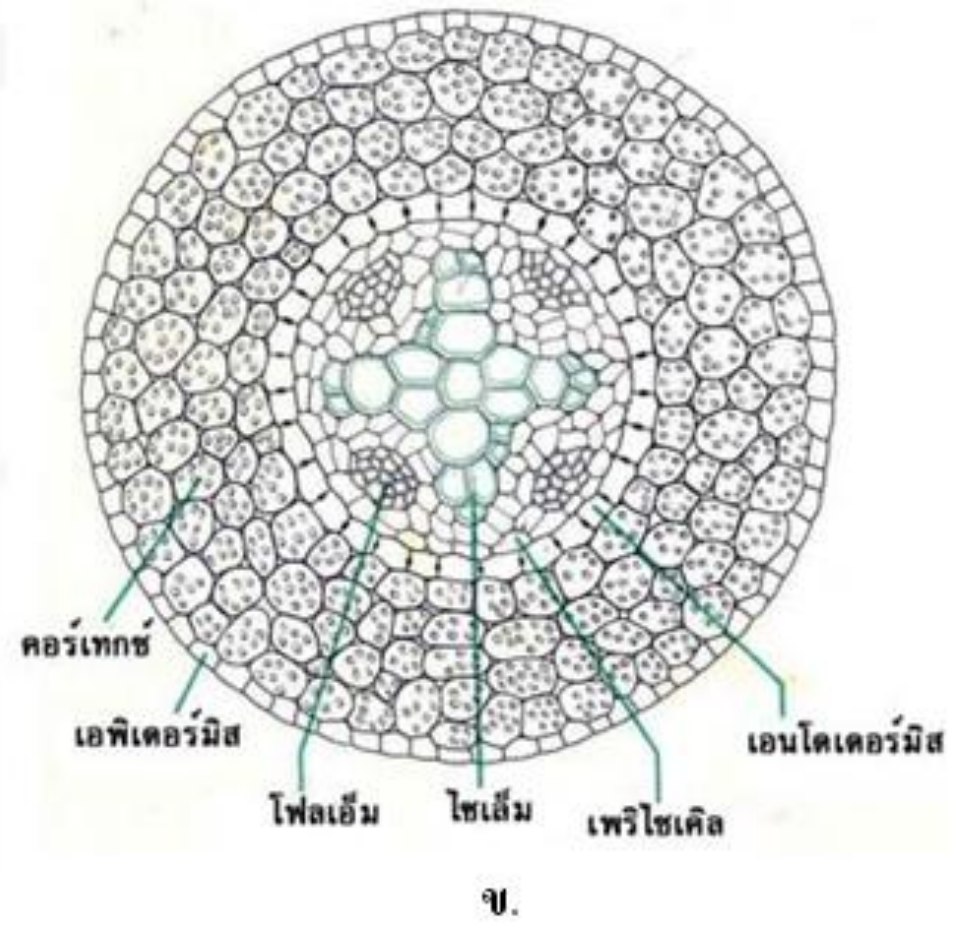
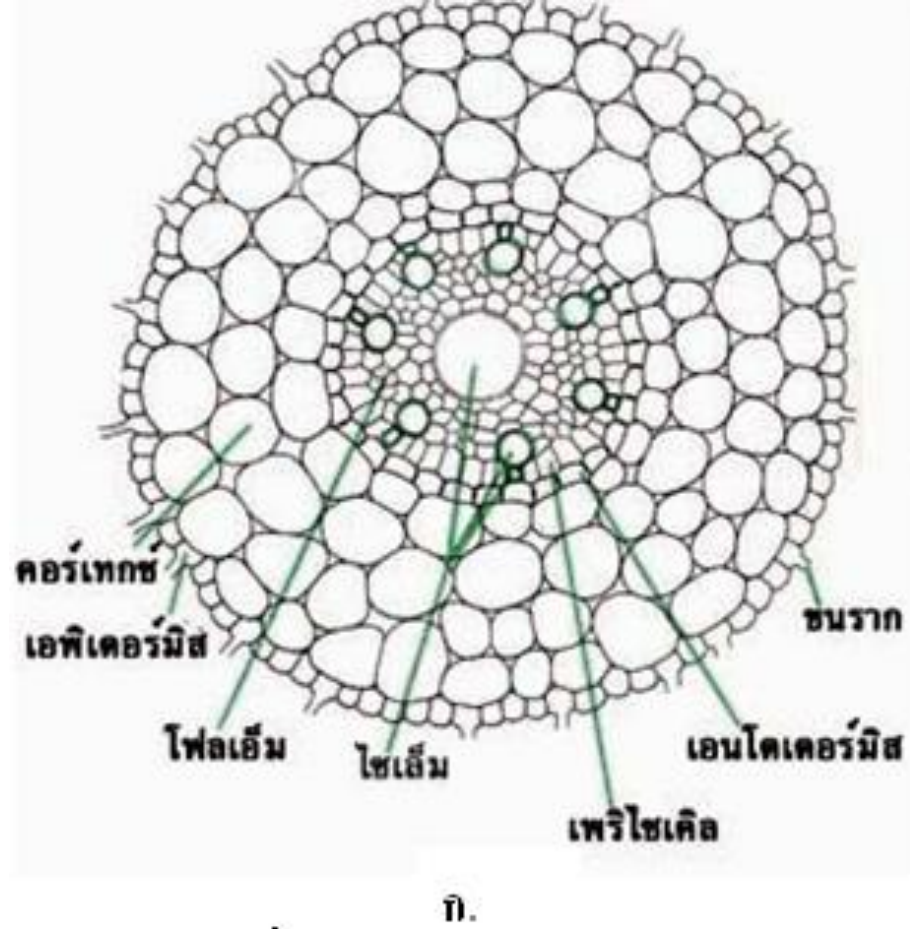
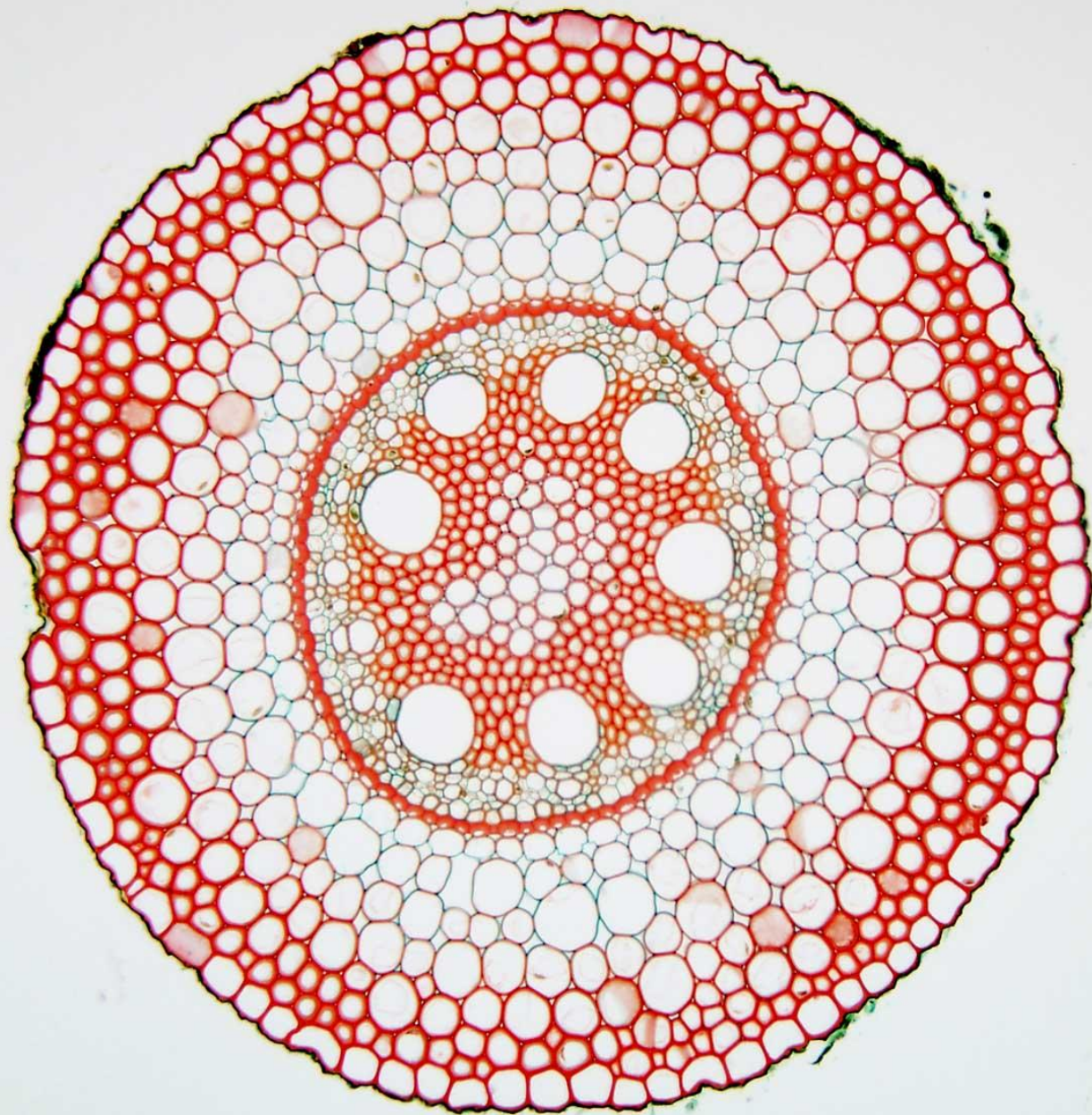
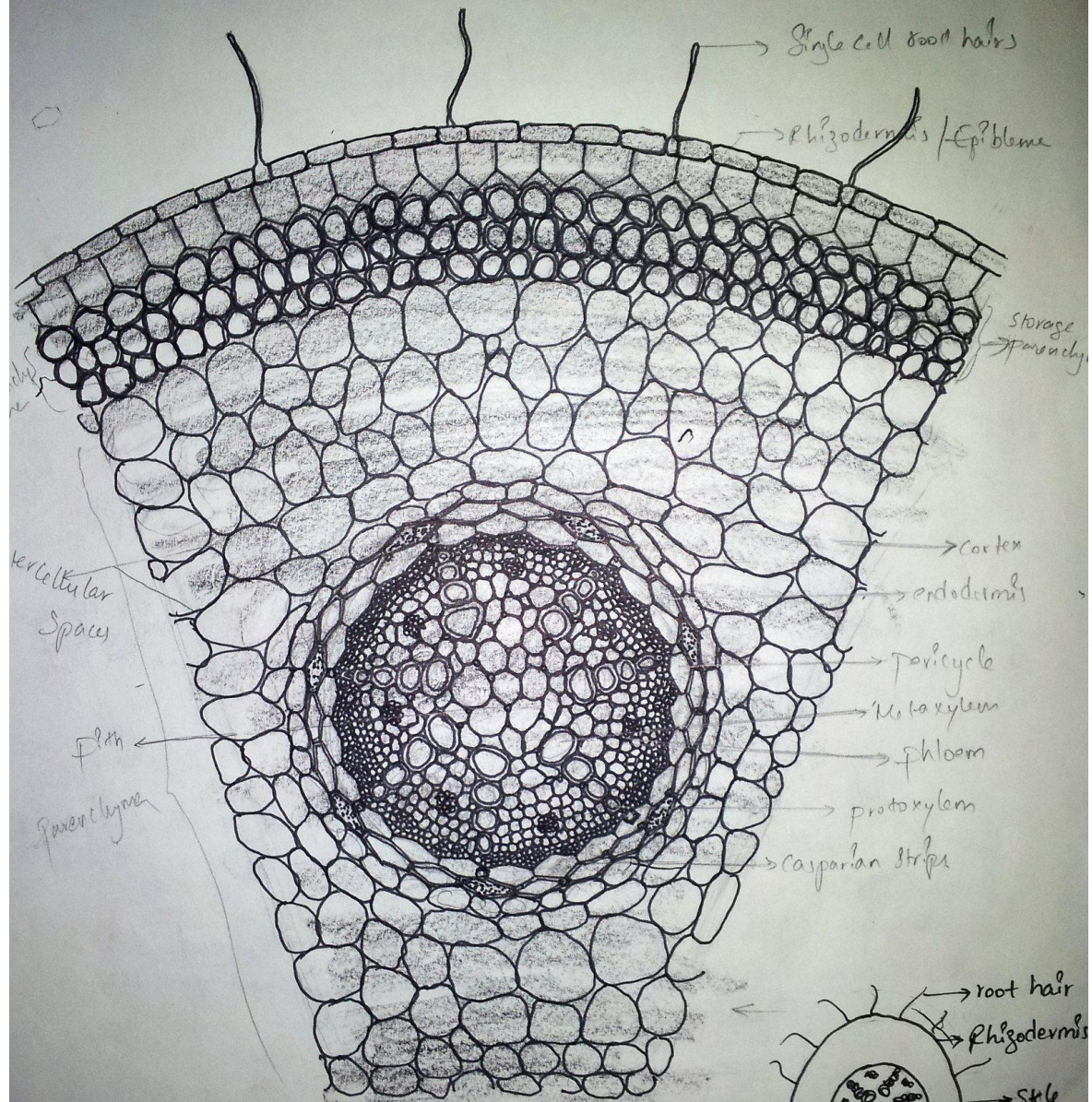


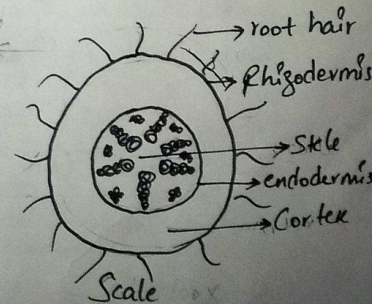
Figure 6. T.S (a) Dicot root (Primary) : (b) Monocot root







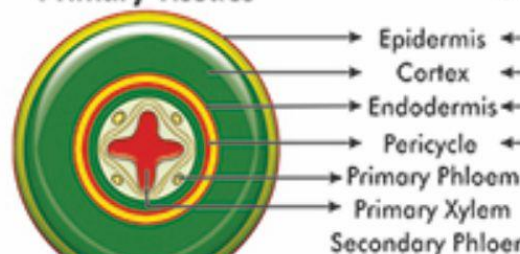
Scale 1000 X



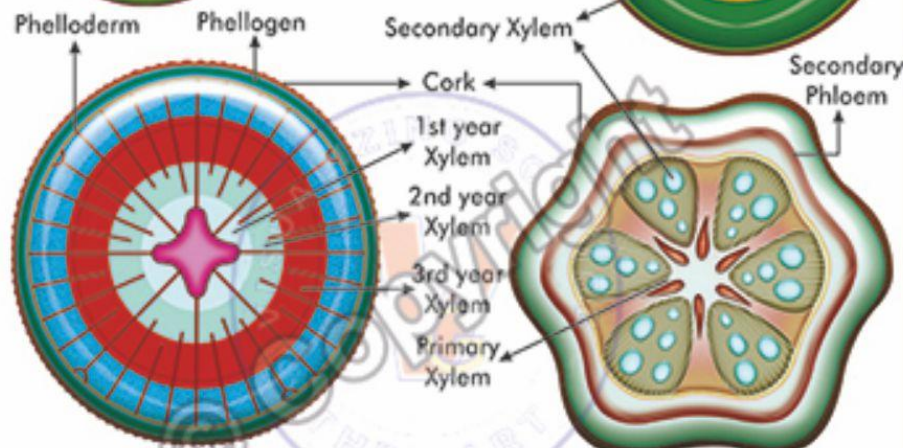
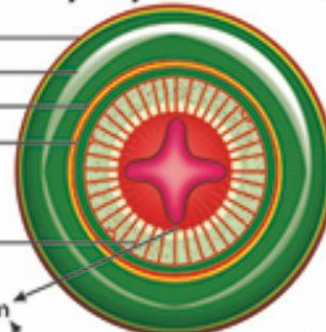
T.S of Monocot root (Zea Maise) / Corn

SECONDARY GROWTH IN DICOT ROOT

Primary Tissues

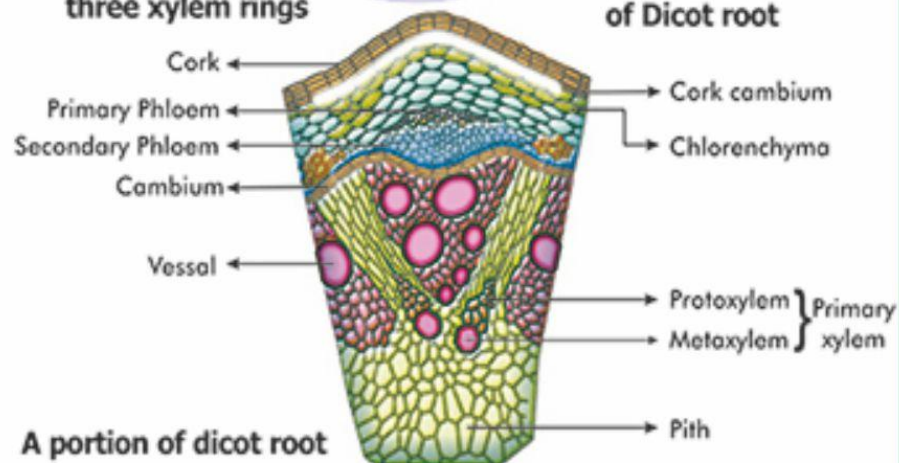


Secondary - Xylem & Phloem



Three year old root with three xylem rings

Transverse section of Dicot root



A portion of dicot root

Plant Growth

Stem – Secondary Growth:

Cork Cambium:

- Located under outer surface; produces periderm



Dead at maturity
Protection

Secondary
xylem

Growth
ring

Vascular
ray

Heartwood

Sapwood

Vascular cambium

Bark

Secondary phloem

Layers of periderm

