

PLANT ANATOMY

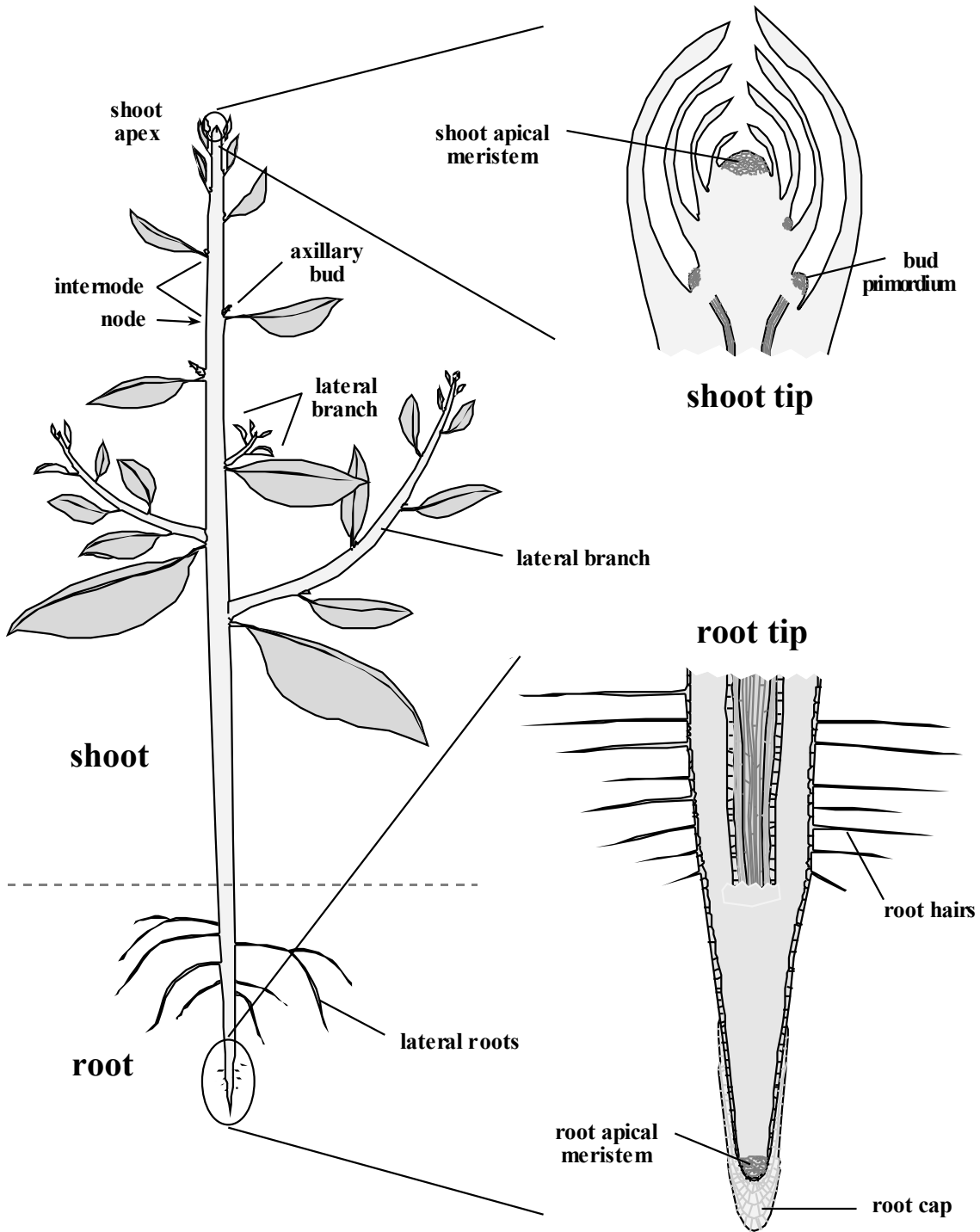
BOTANY DEPARTMENT
B.N.D. COLLEGE, KANPUR



Plant Anatomy

Study of tissue and cell structure of plants.



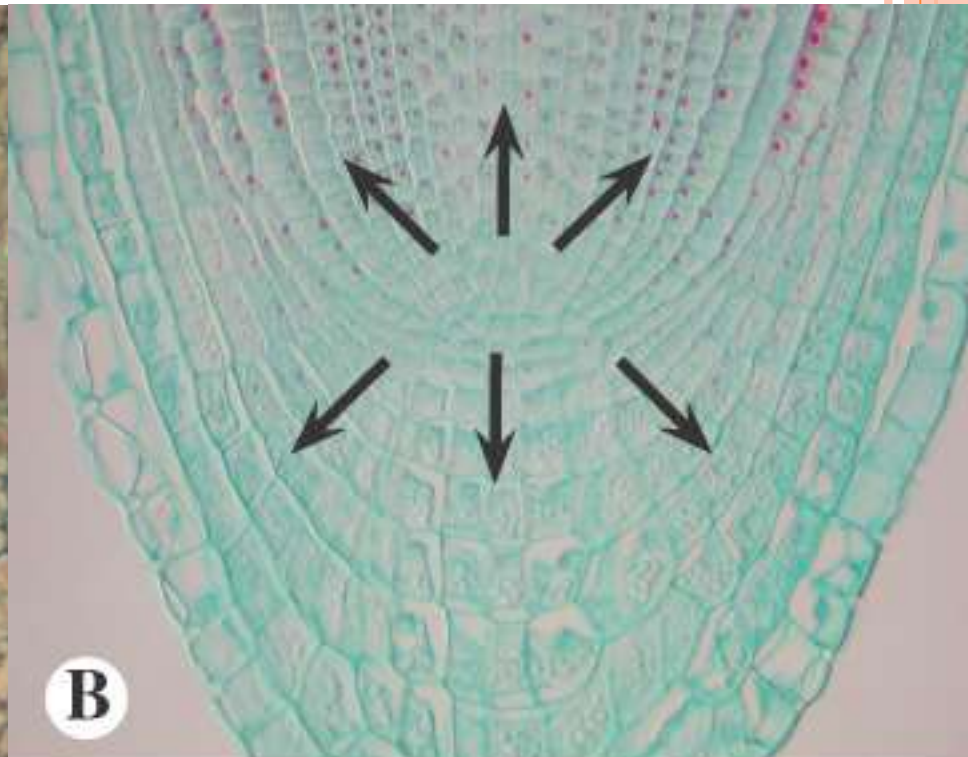
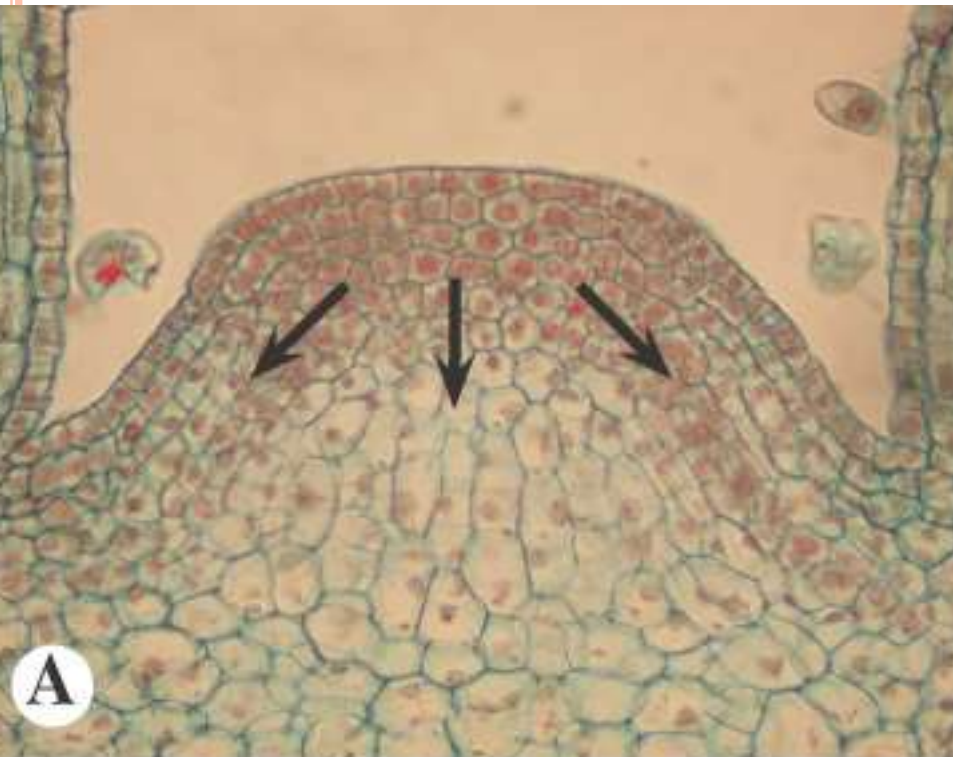


MERISTEM - REGION OF ACTIVELY DIVIDING CELLS

- 1) APICAL (SHOOT & ROOT);
- 2) LATERAL (VASCULAR & CORK CAMBIA)

Cell differentiation:

- 1) Cell expansion (elongation)
- 2) Cell maturation / specialization



PLANT TISSUES & CELL TYPES

Tissue:

= group of cells with common function or structure.

Three broad tissue types:

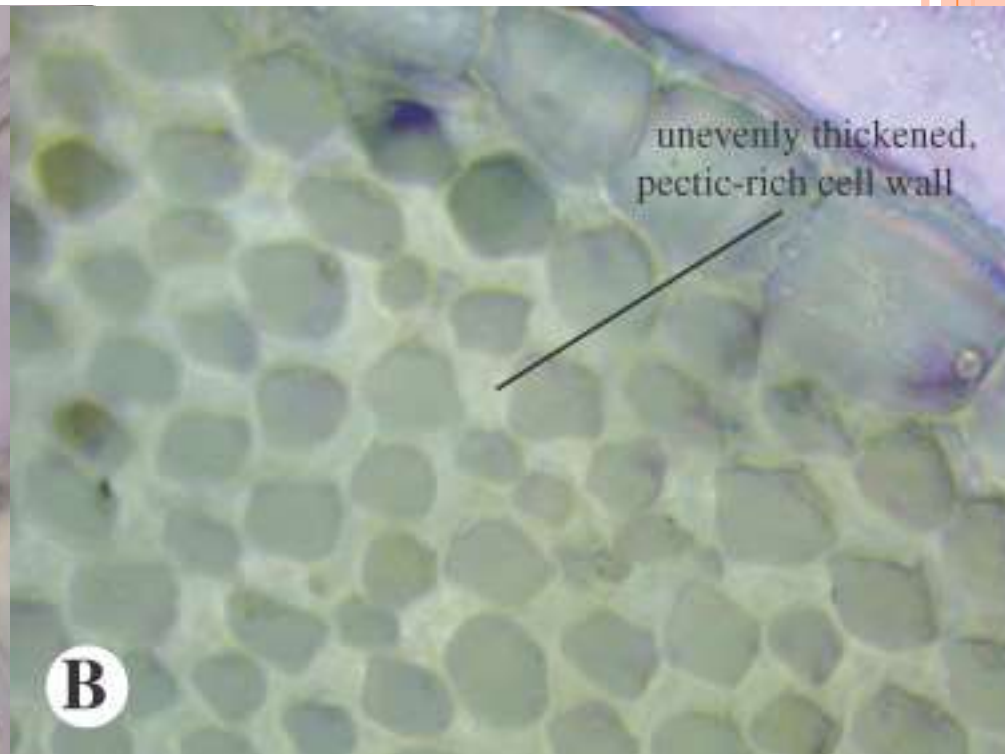
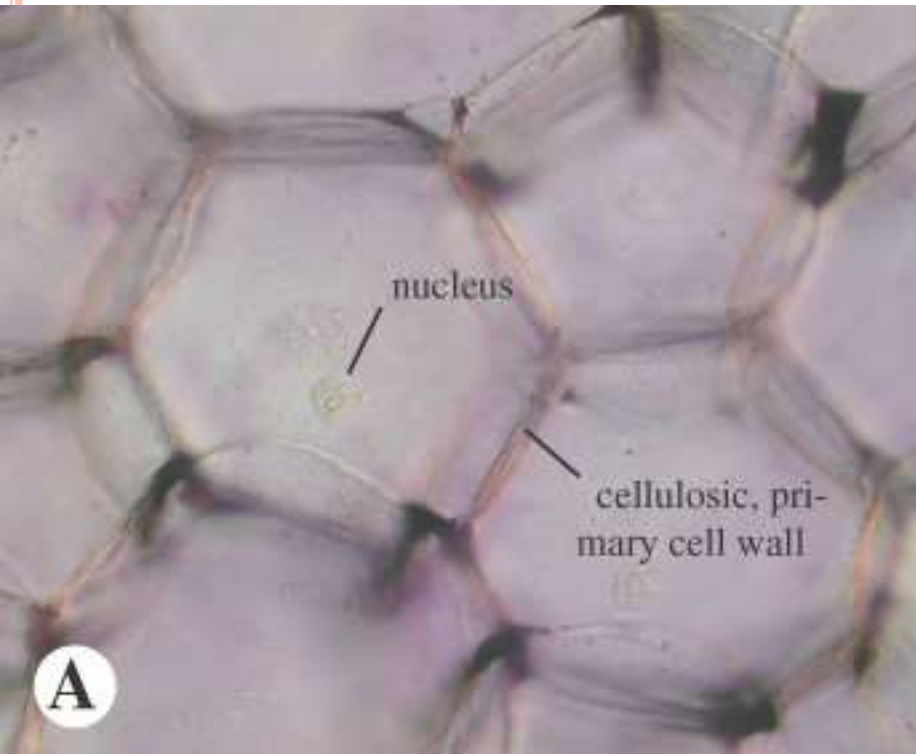
- 1) Dermal - outside layer(s)
- 2) Vascular - conduction
- 3) Ground - between dermal and vascular

Simple vs. Complex Tissue:

1 versus **2** or more cell types



GROUND TISSUE



Parenchyma: Gen. metabol.

- 1) Isodiametric to elongate
- 2) Primary cell wall
- 3) Living

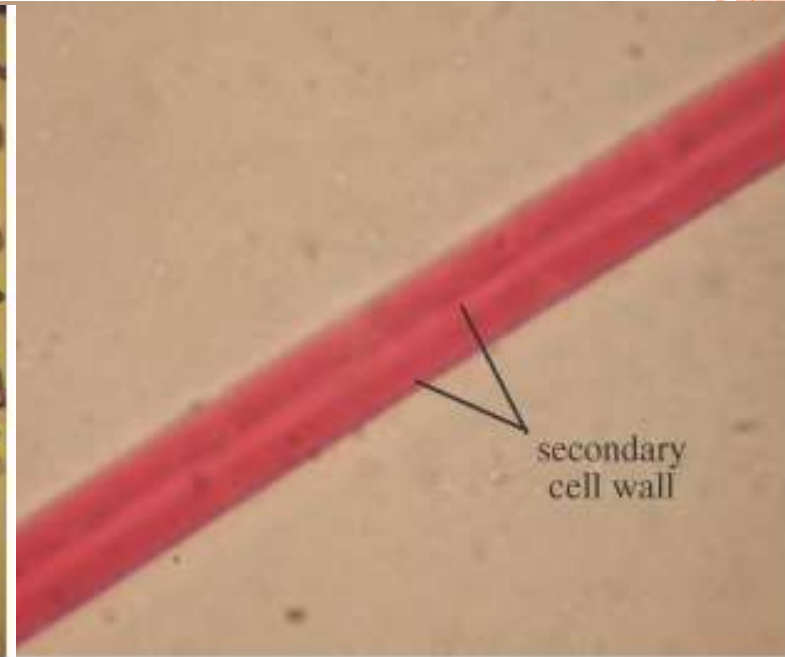
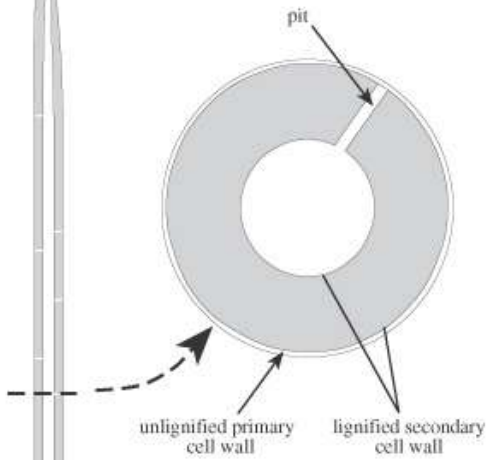
Collenchyma: support

- 1) Elongate
- 2) Primary cell wall thick, uneven, rich in pectins
- 3) Living

GROUND TISSUE

Sclerenchyma

- 1) Secondary cell wall (+ primary)
- 2) Dead at maturity (usually)



Fibers

Elongate, sharply tapering



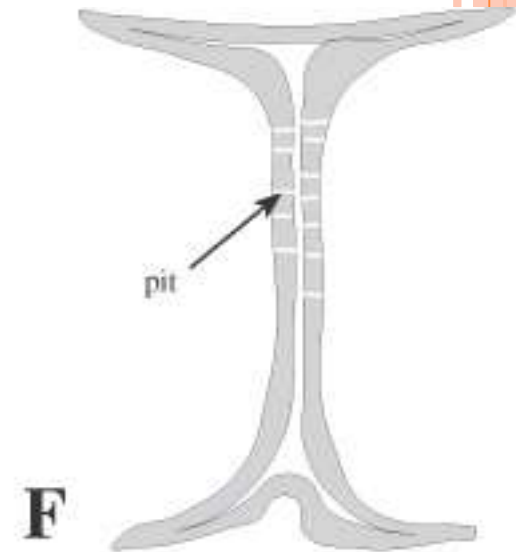
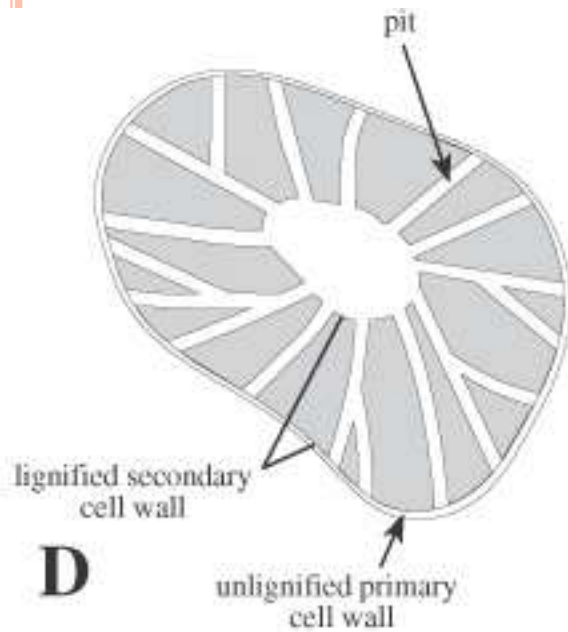
GROUND TISSUE

Sclerenchyma

- 1) Secondary cell wall (+ primary)
- 2) Dead at maturity (usually)

Sclereids

Isodiametric to irregular



VASCULAR TISSUE

Xylem

Water & mineral conduction

Tracheary elements + parenchyma +
sclerenchyma

Phloem

Sugar conduction

Sieve members + parenchyma + sclerenchyma

- Both complex tissues



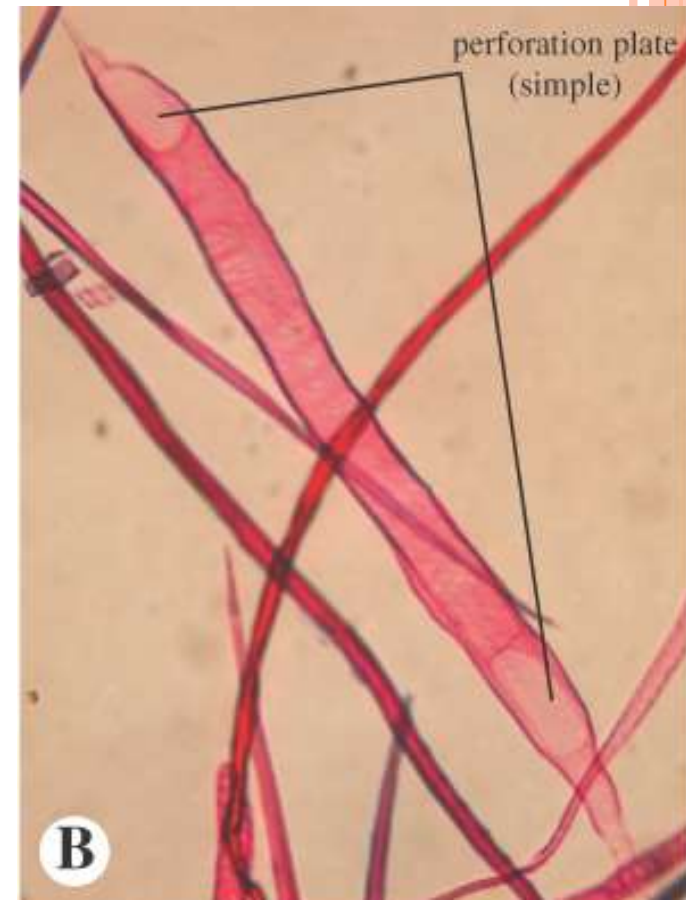
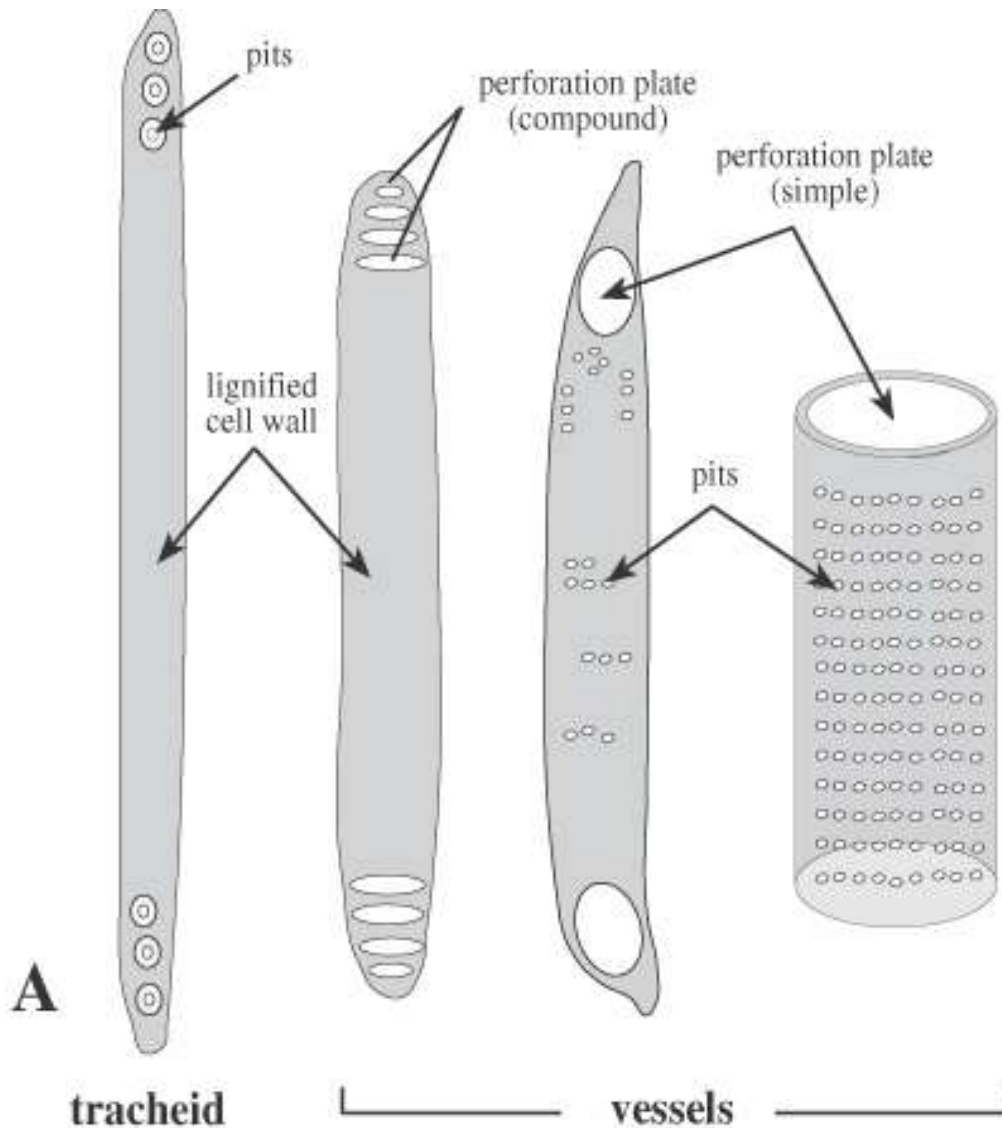
TRACHEARY ELEMENTS

Tracheids - Imperforate Vessels - Perforate

Angiosperms (most)

Gnetales

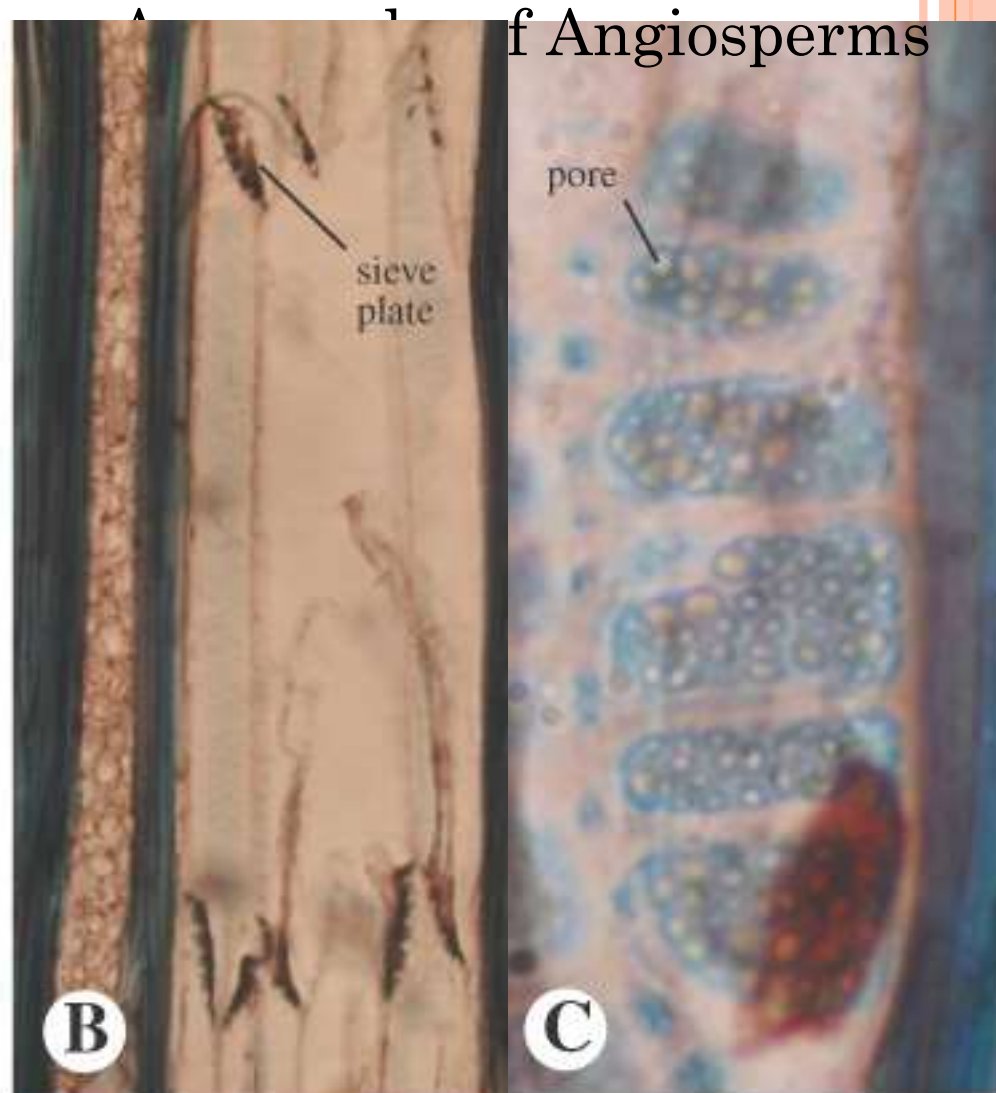
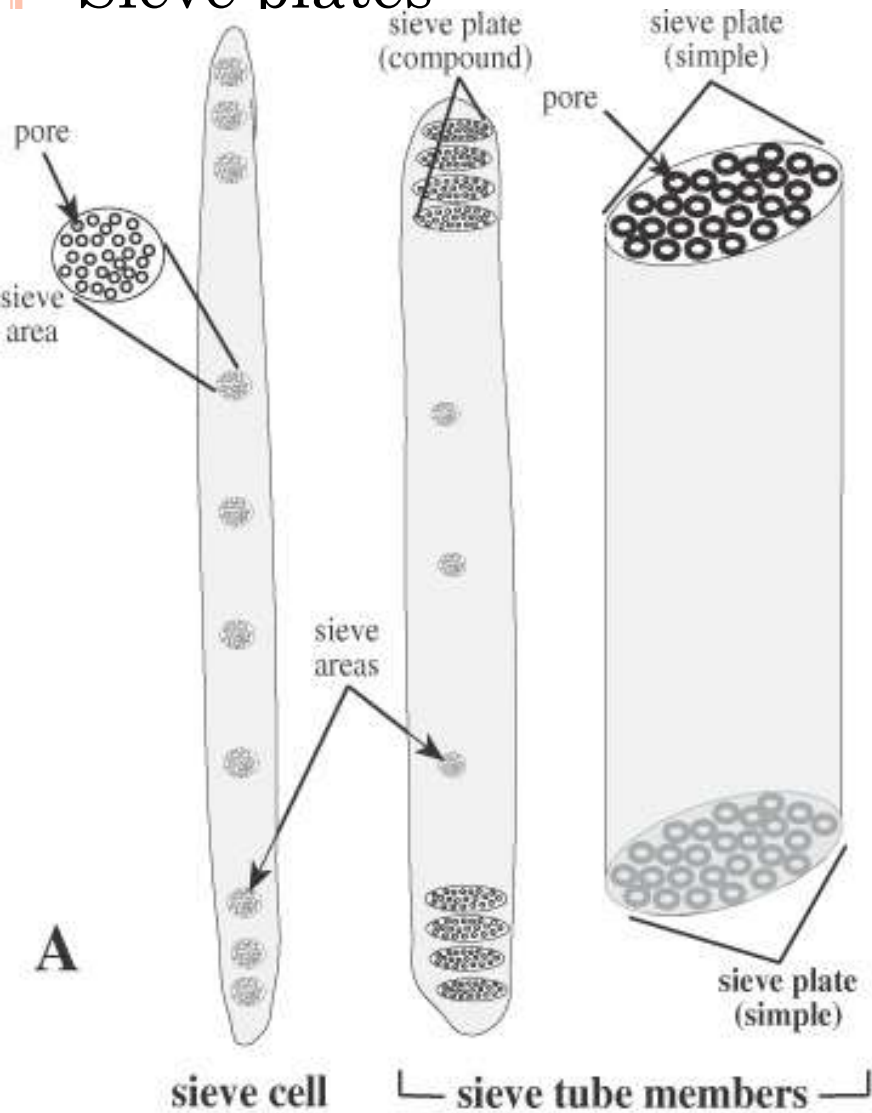
A few Monilophytes



SIEVE ELEMENTS

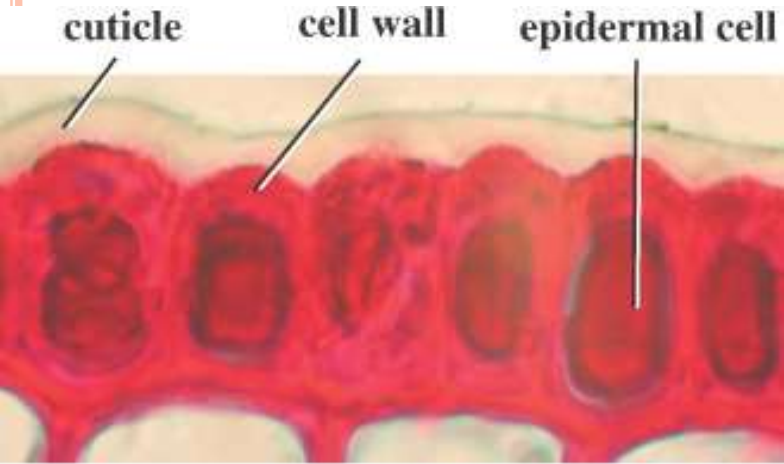
Sieve cells - No sieve plates
Sieve plates

Sieve tube members -

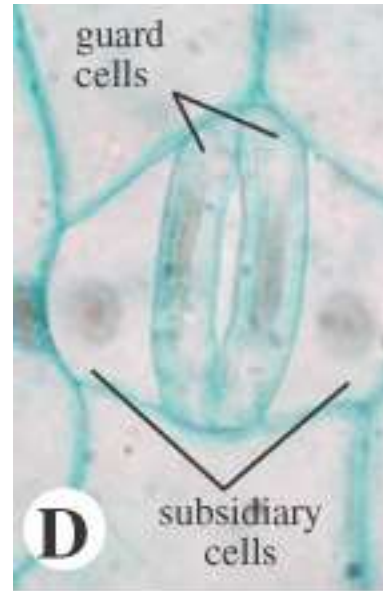
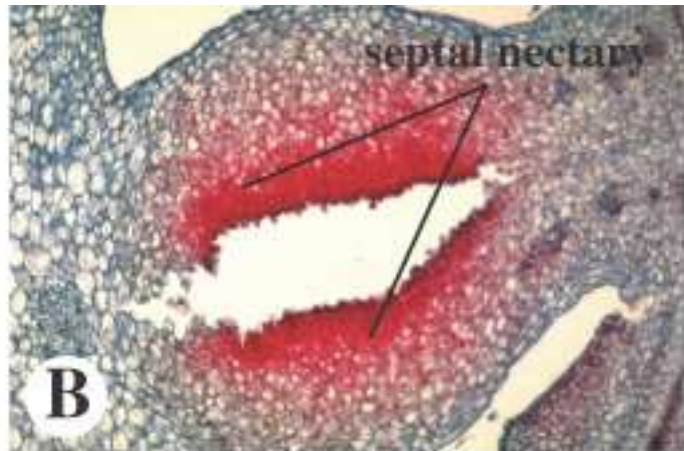
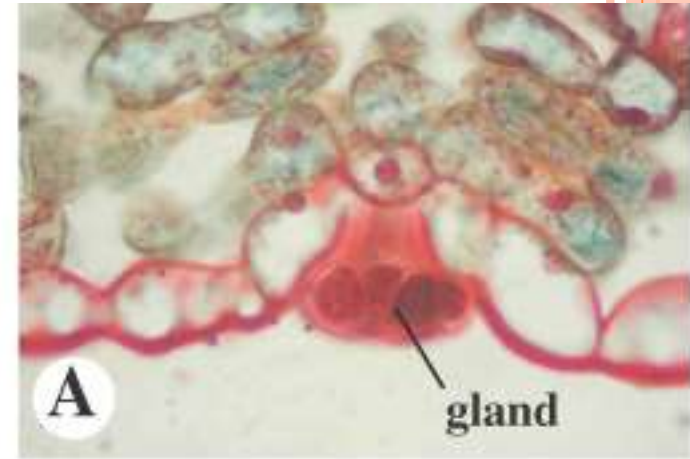


DERMAL & SECRETORY TISSUES & CELLS

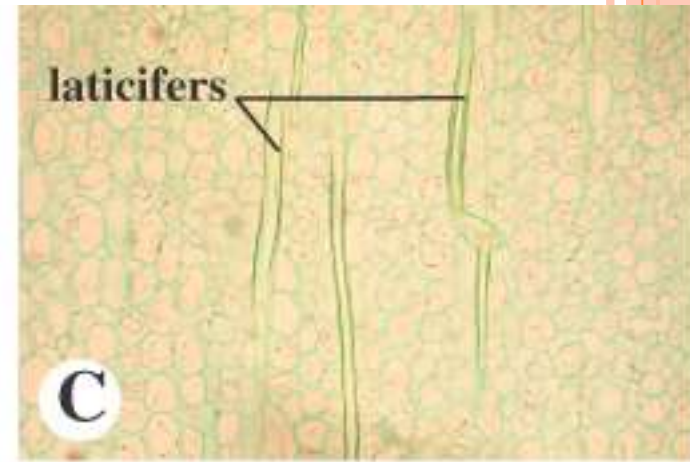
Epidermis



Glands



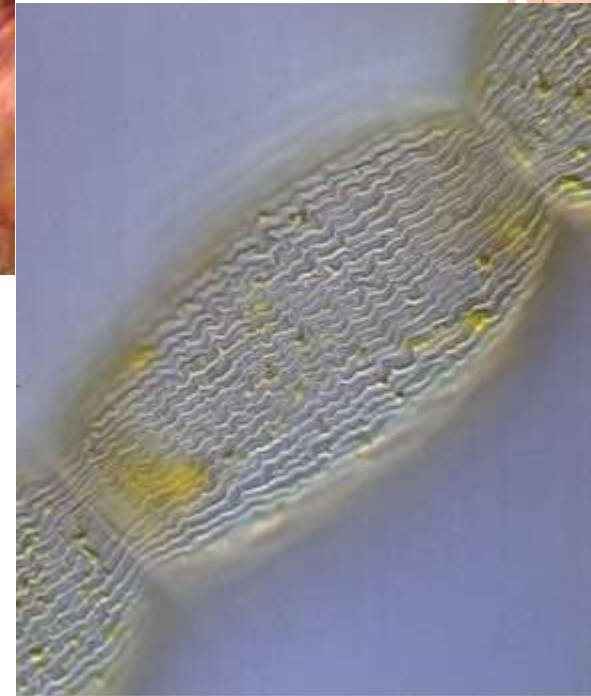
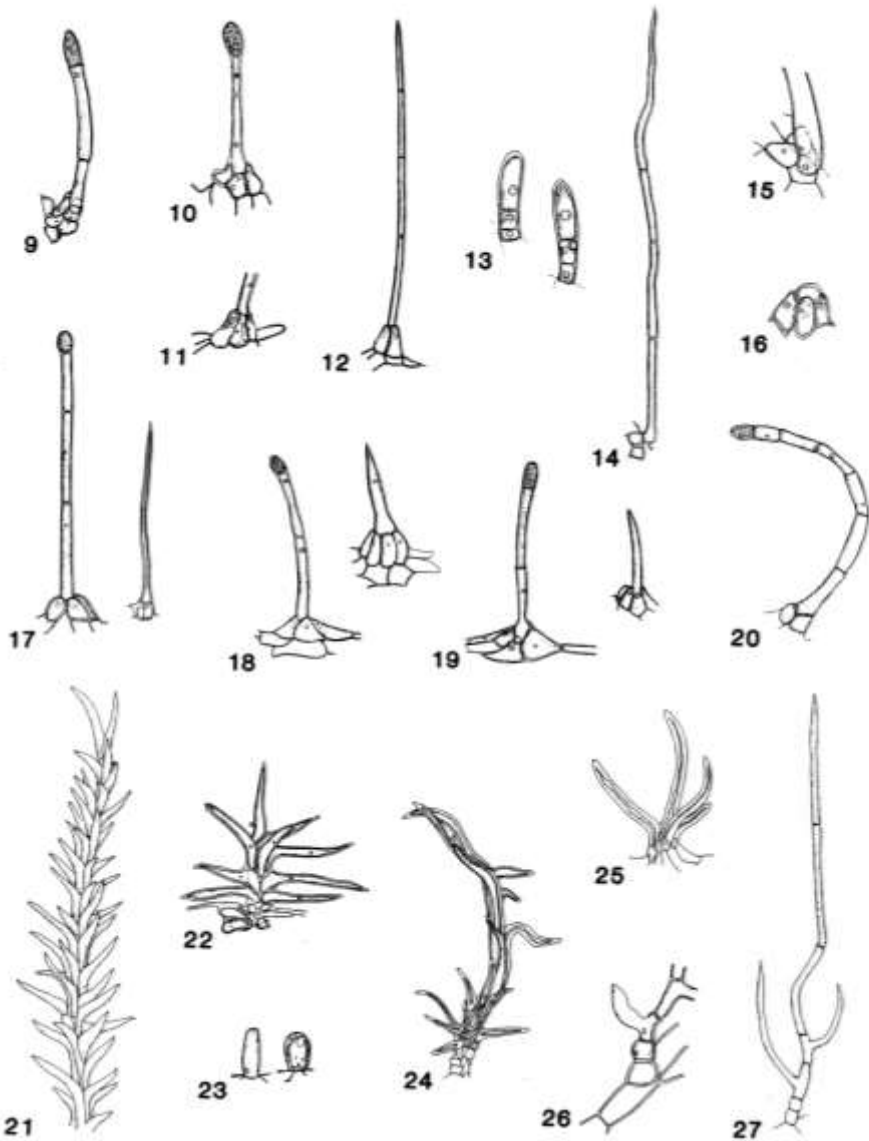
Stomates

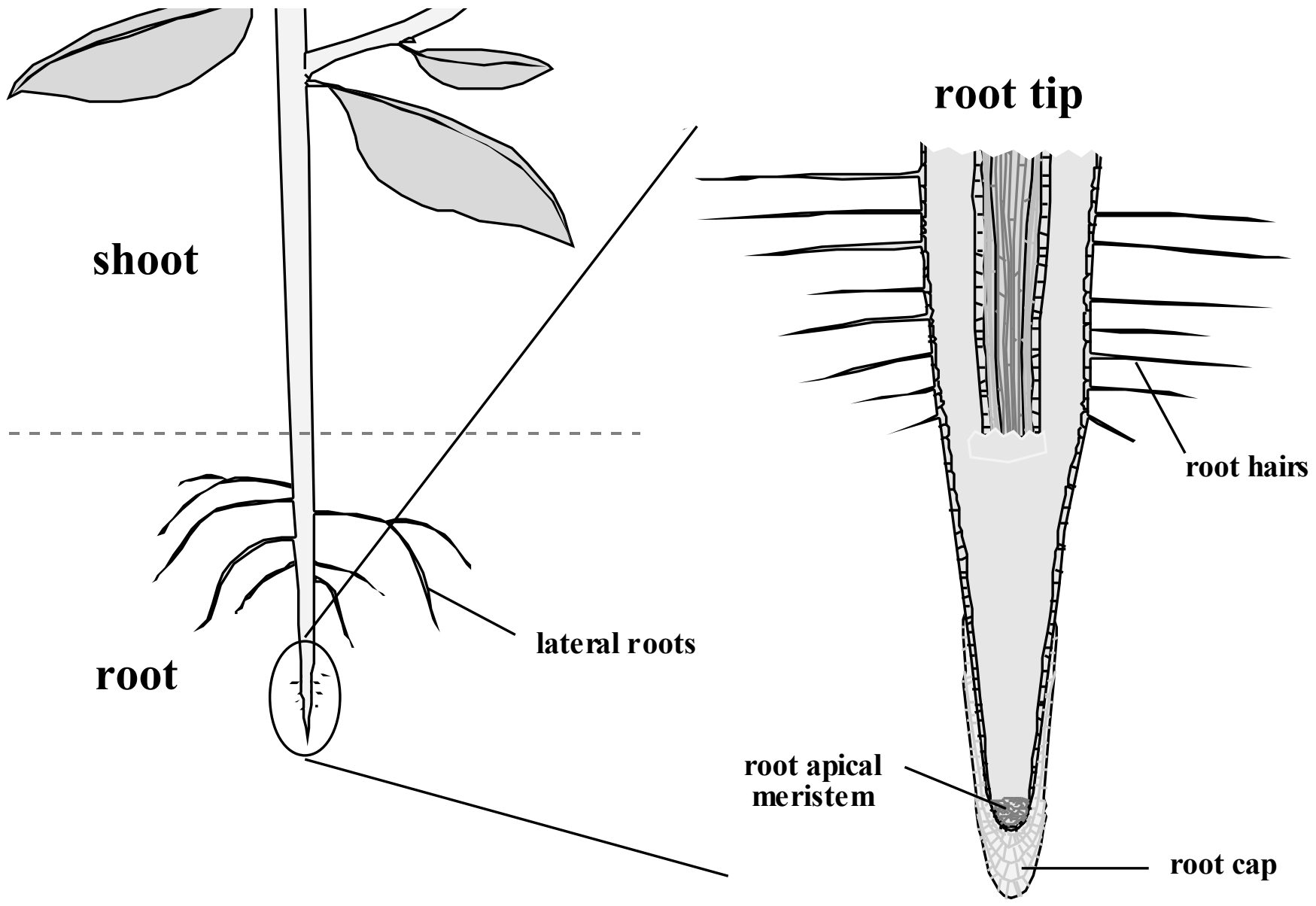


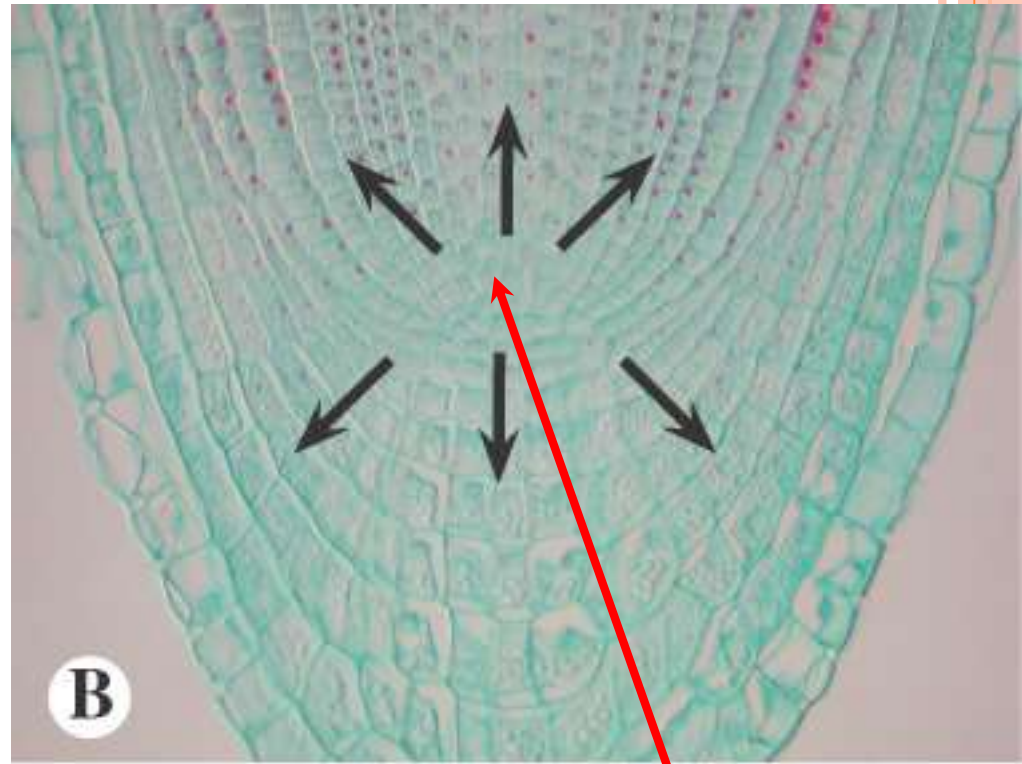
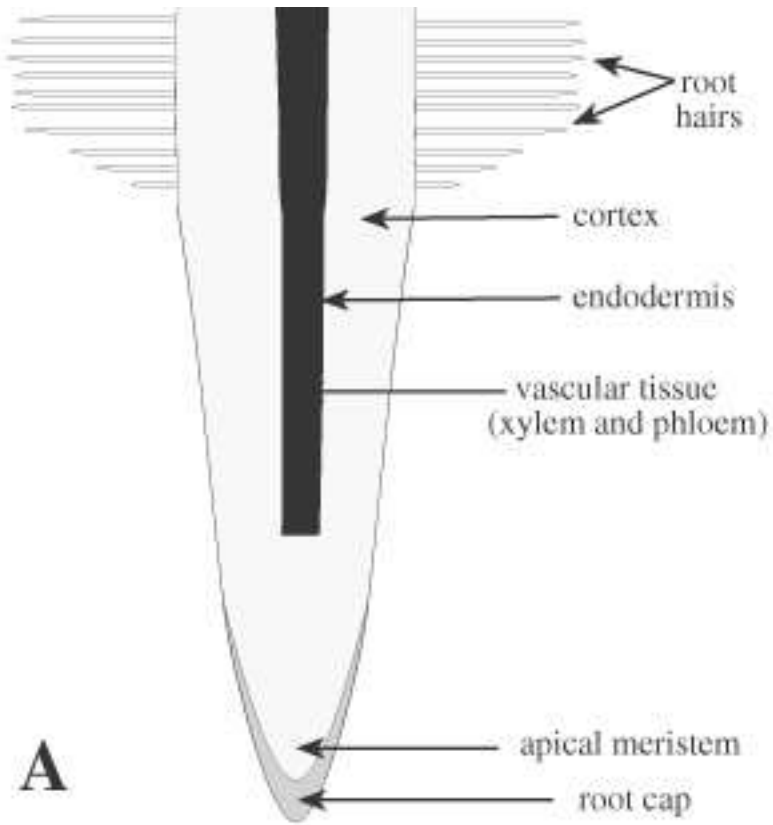
Laticifers

Nectaries

DERMAL TISSUES: TRICHOME ANATOMY





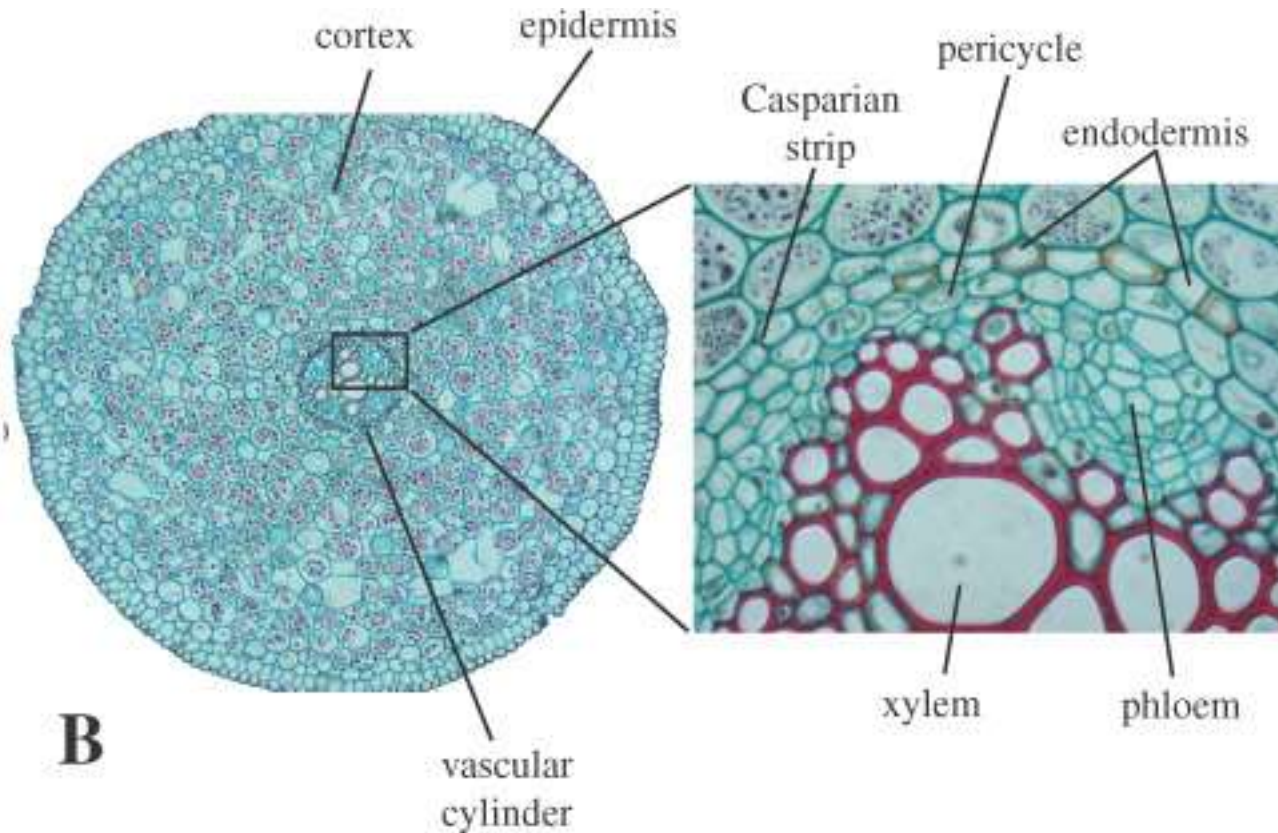


ROOT (l.s.)

- 1) Protective root cap
- 2) Absorptive root hairs

root apical
meristem

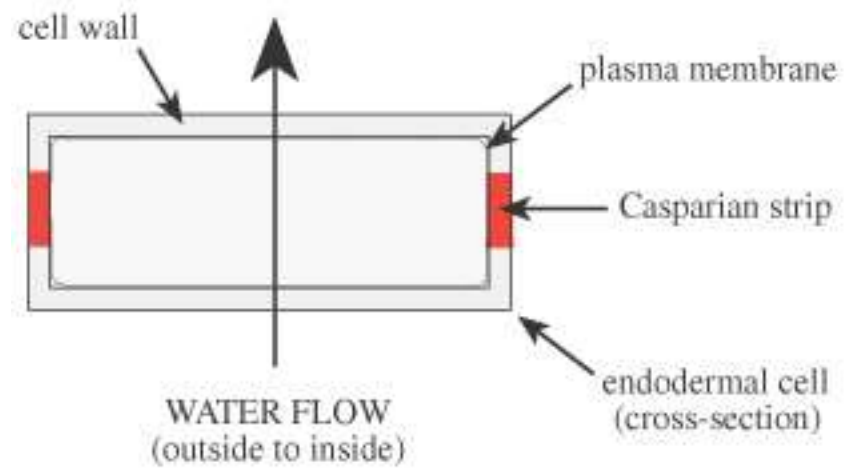
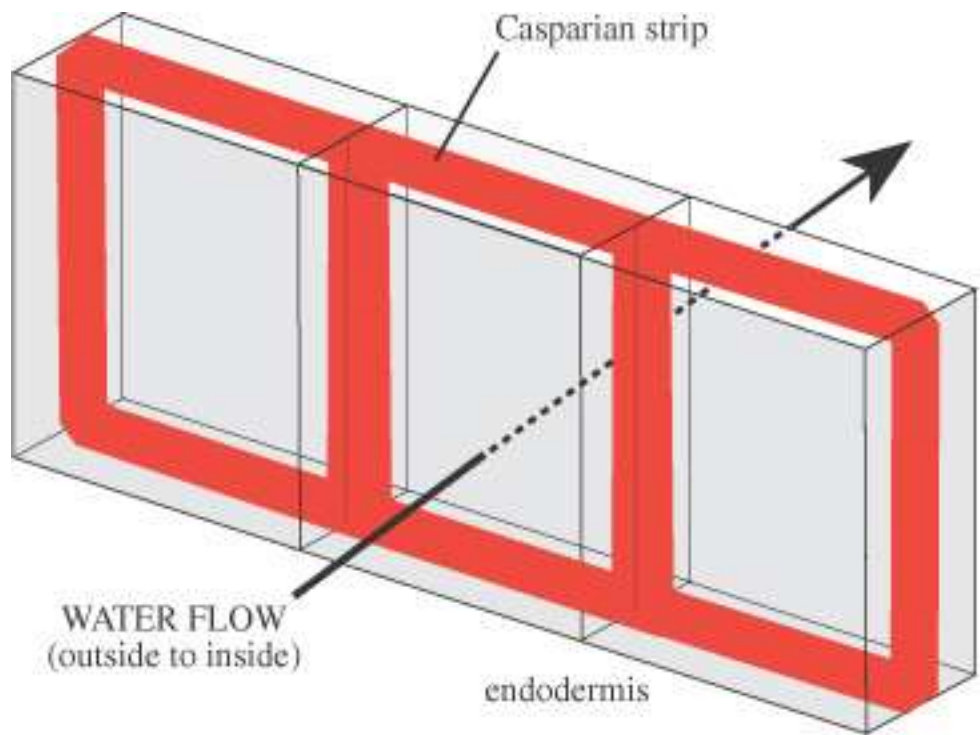




ROOT (c.s.)

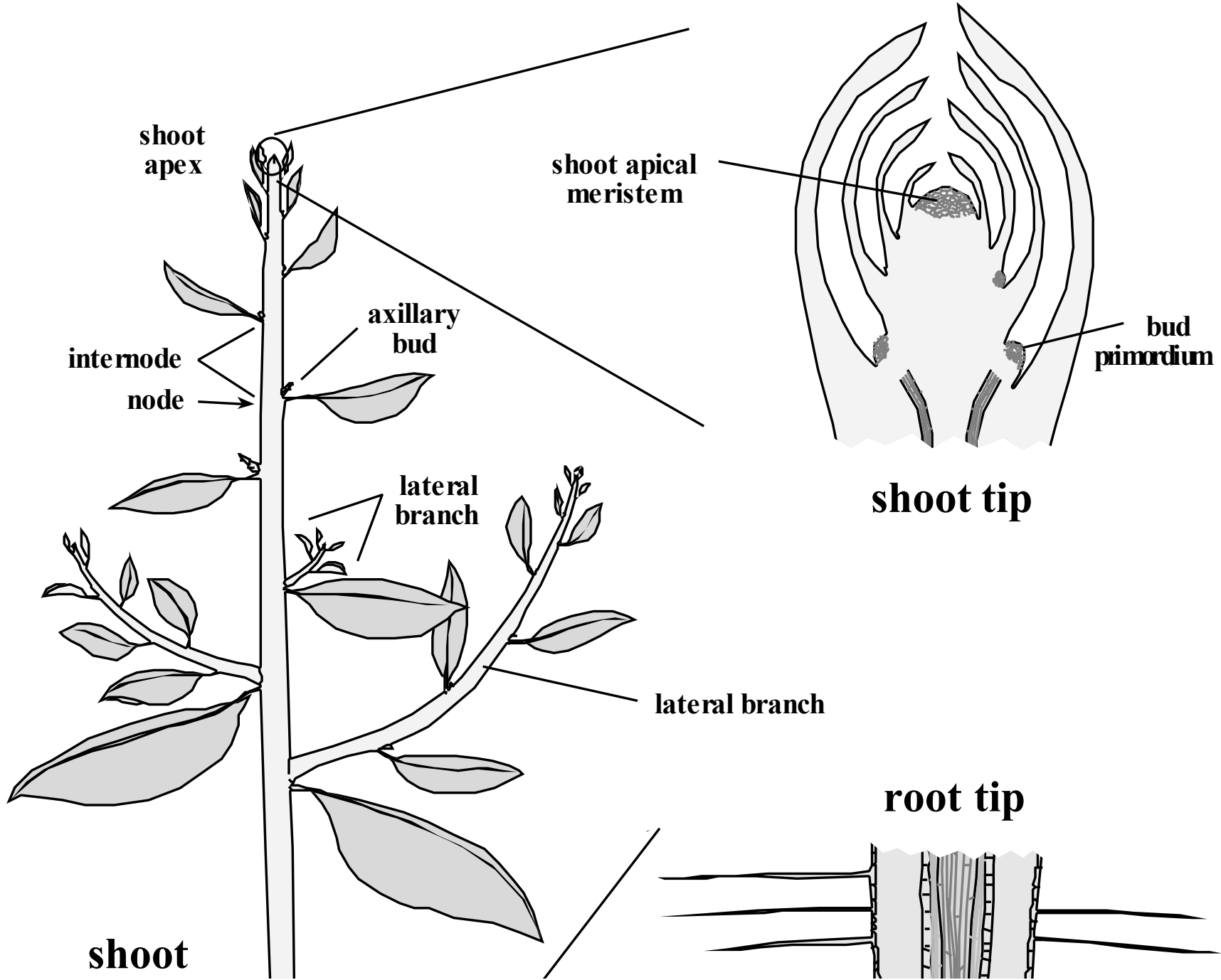
3) Give rise to new roots endogenously
(from within)



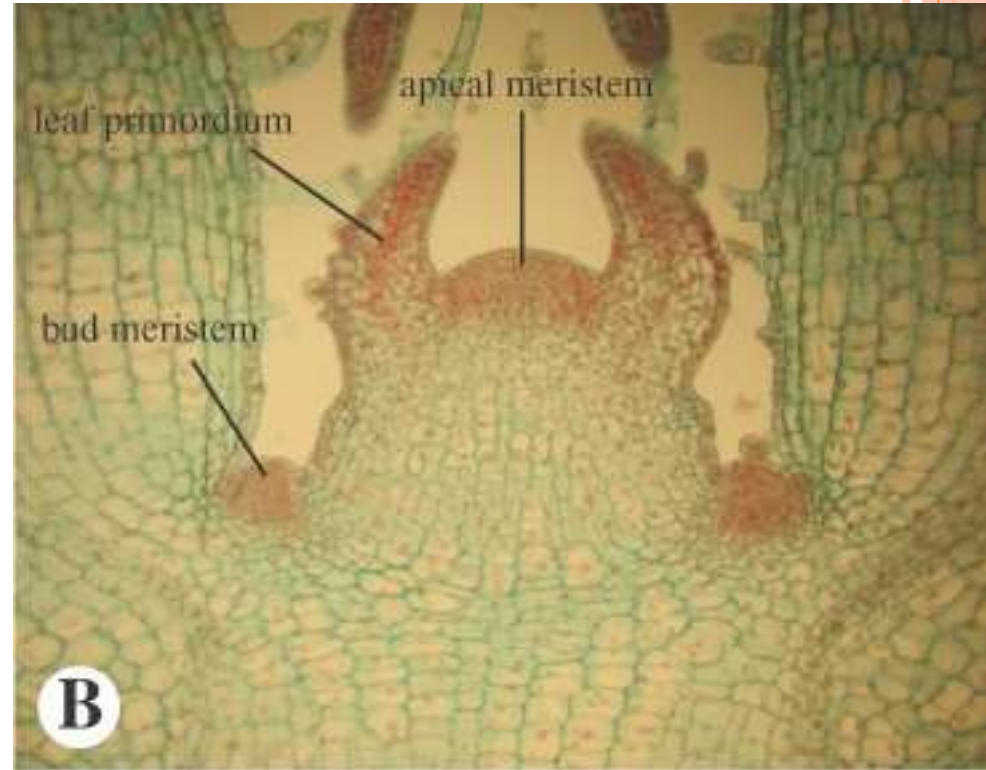
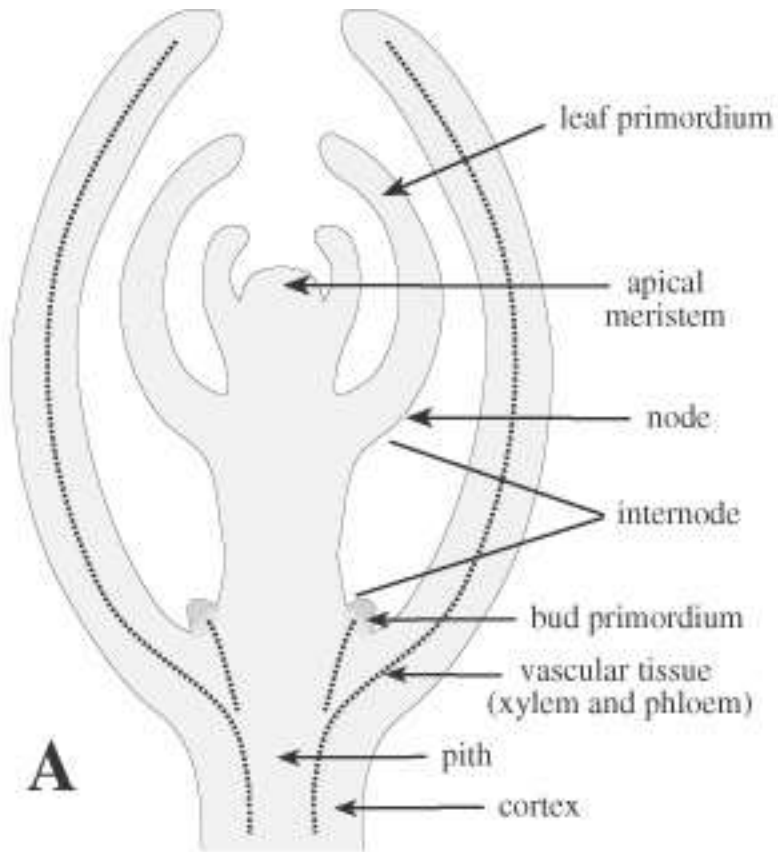


Casparian Strip
Function: forces fluids from outside through plasma membrane = selective absorption

Figure 10.13 The Casparian strip, a specialized feature of cells of the endodermis.

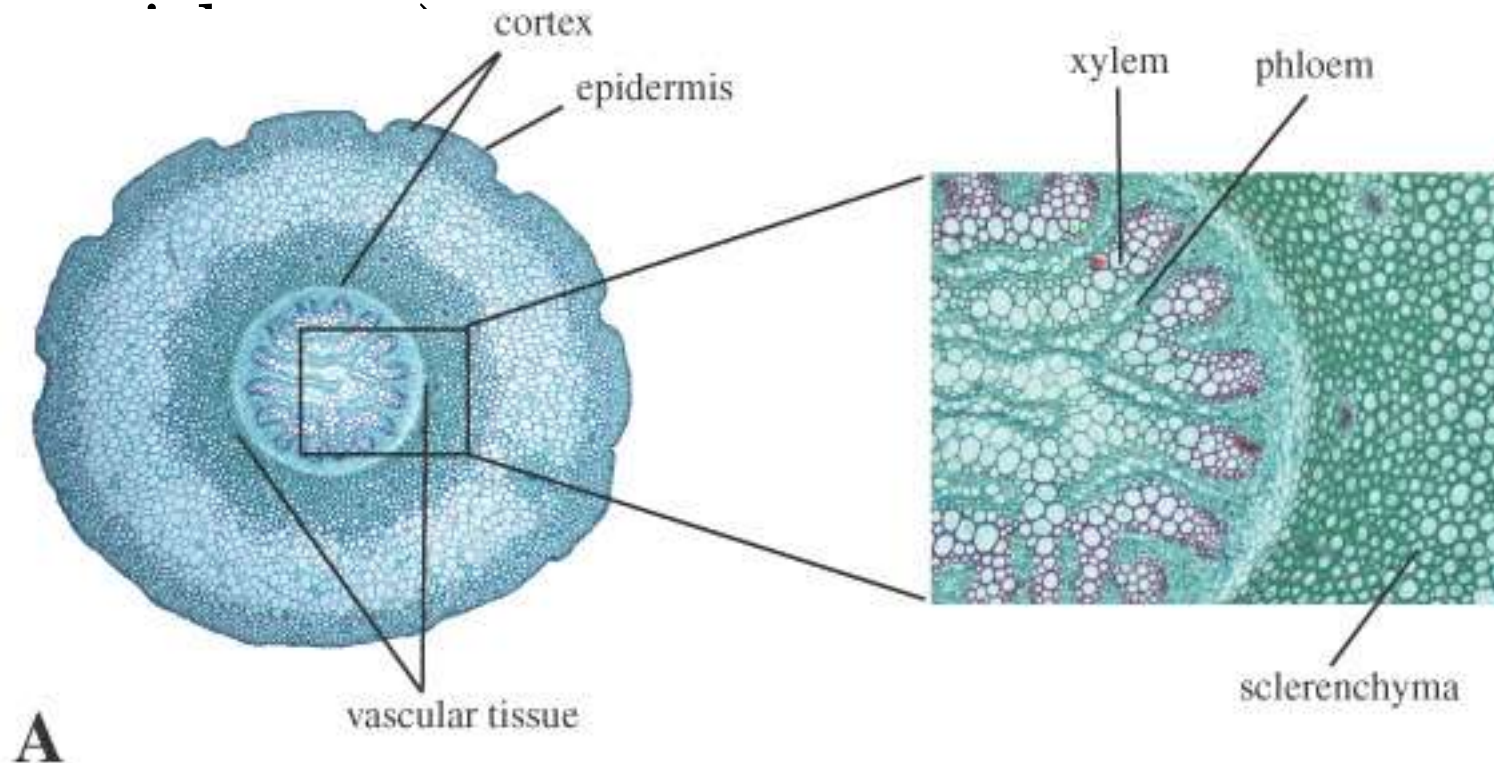


SPOROPHYTIC SHOOT

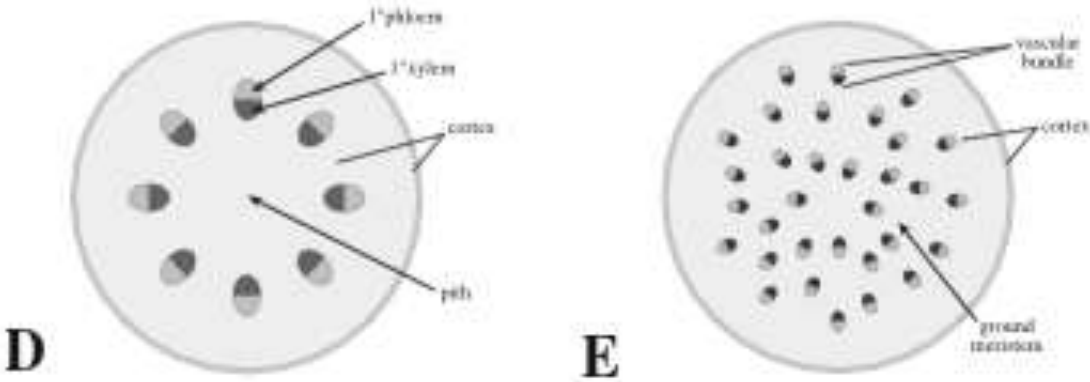
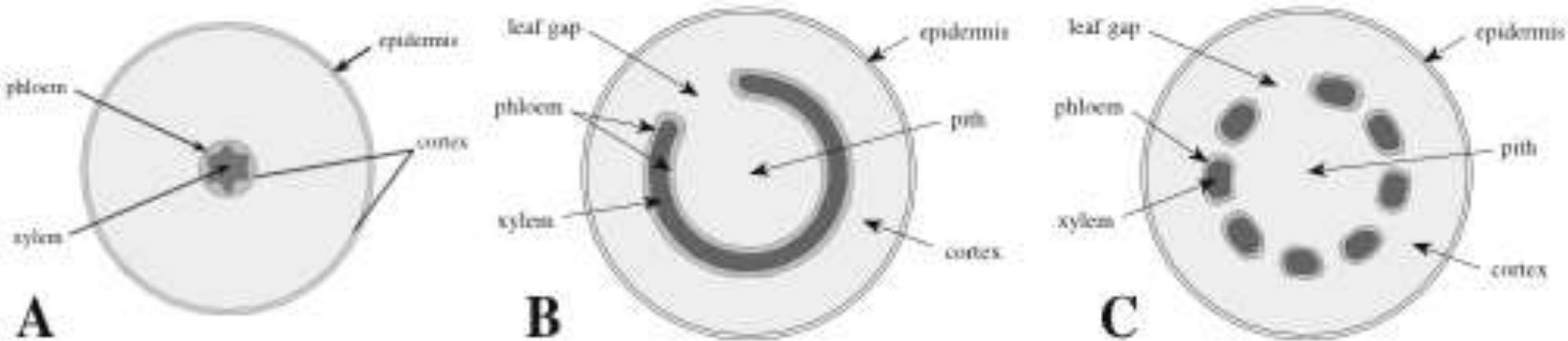


STEMS:

- Give rise to leaves exogenously
- Do not have a protective “cap” of cells
- Do not have root hairs (but may have



STELAR TYPES



eustele

atactostele



PROTOXYLEM MATURATION

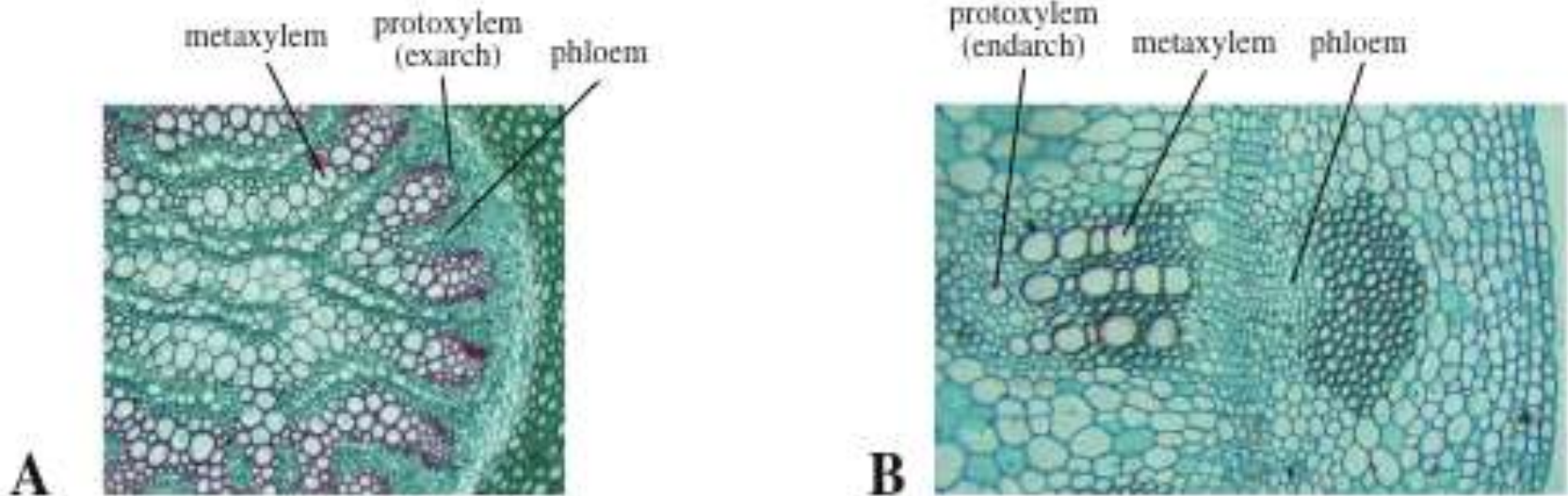
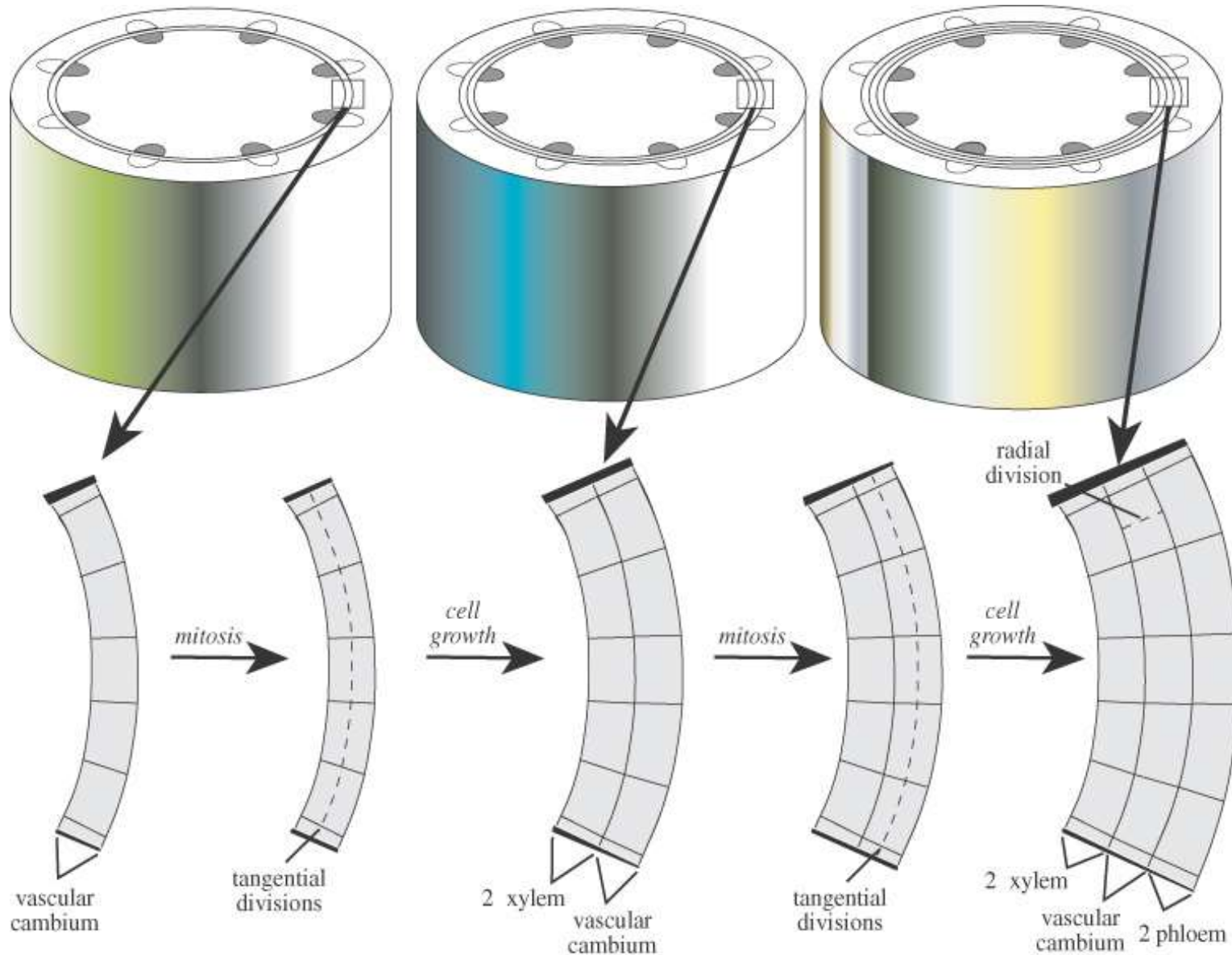
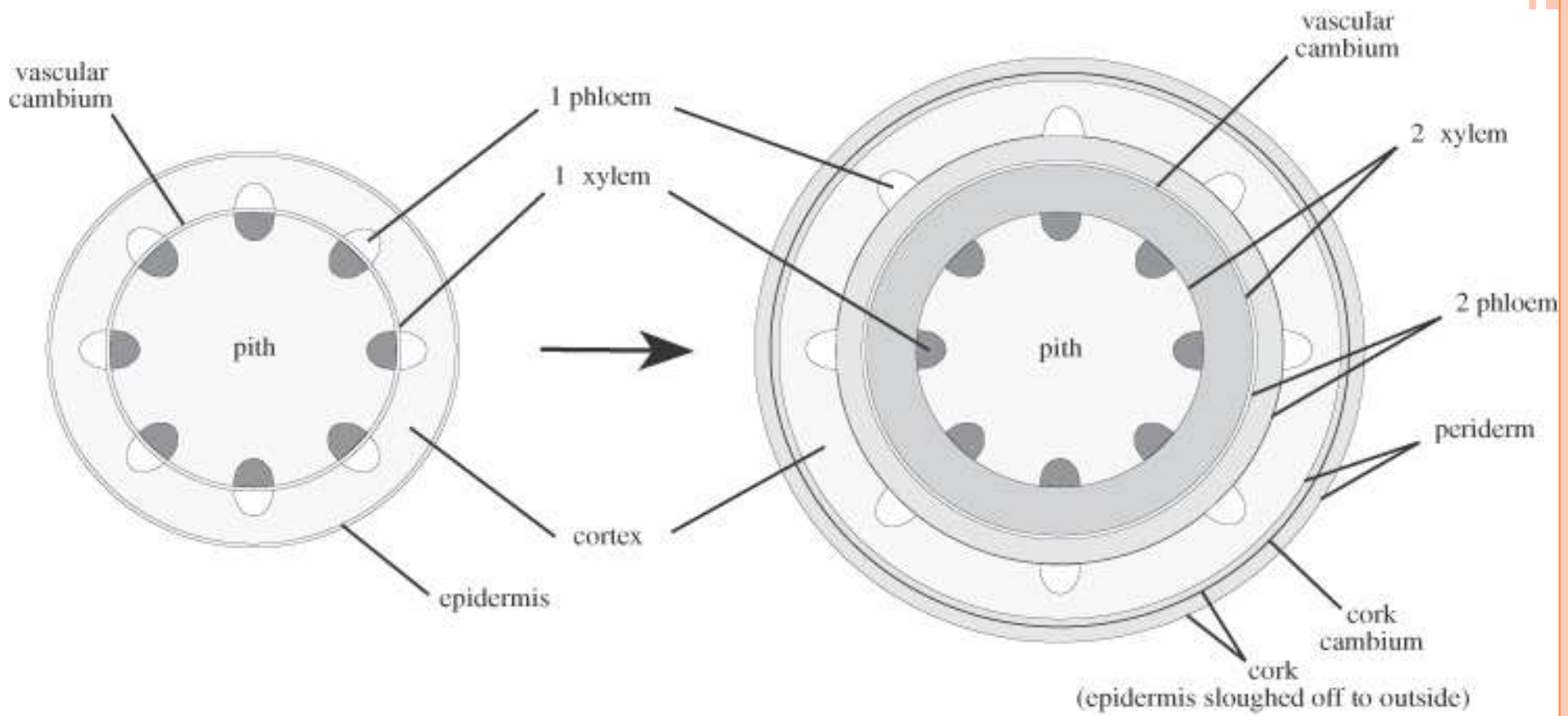


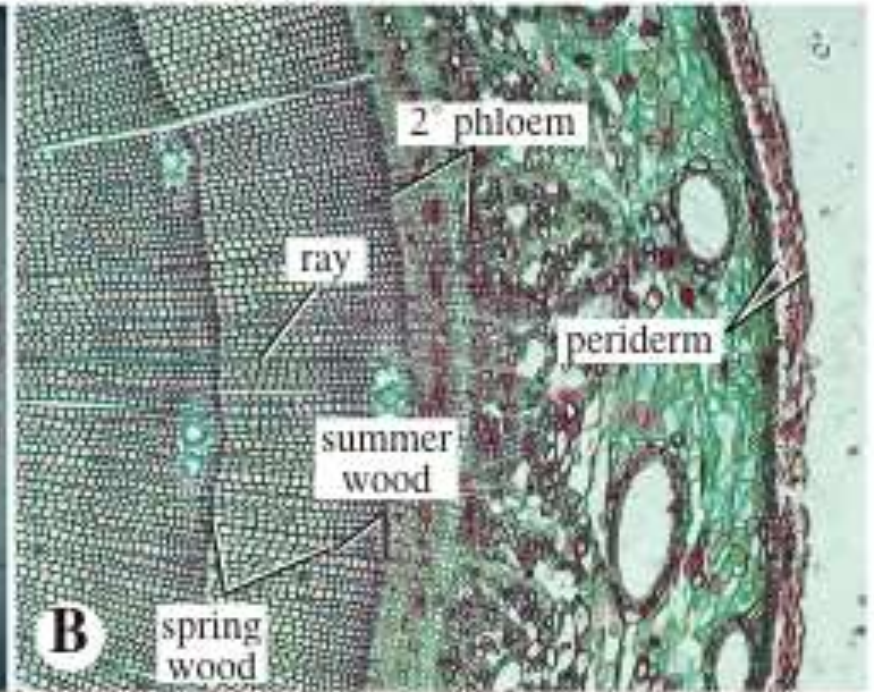
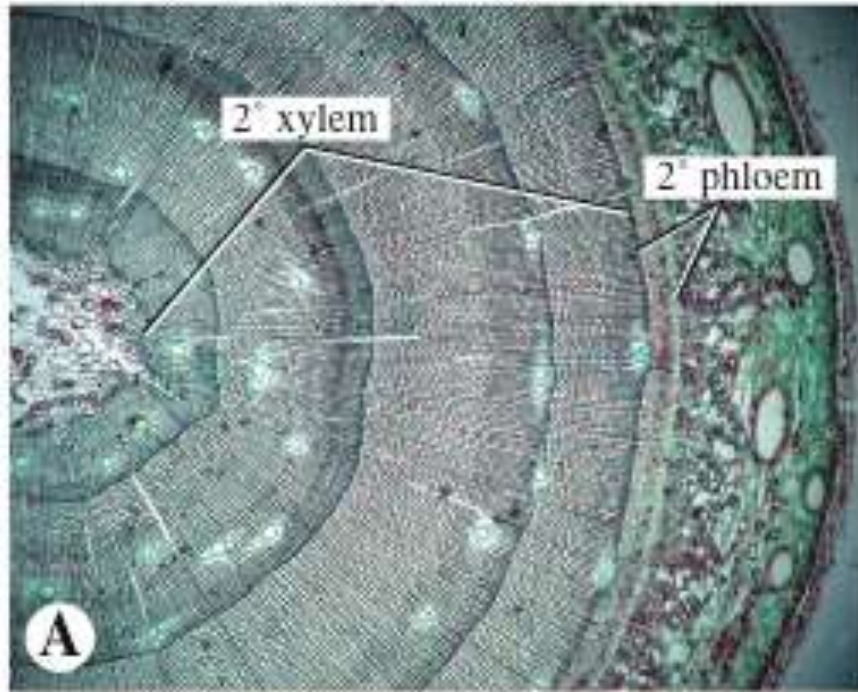
FIGURE 10.17 **A.** *Lycopodium* stem, showing exarch protoxylem development of protosteles. **B.** *Helianthus* stem, showing endarch protoxylem development of eustele.

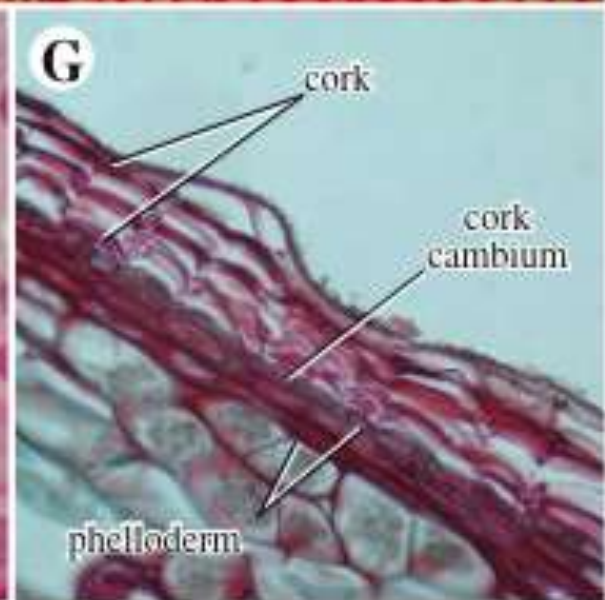
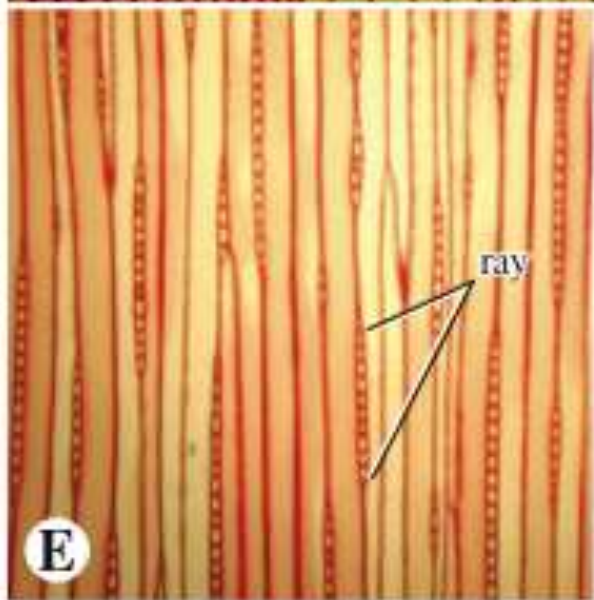
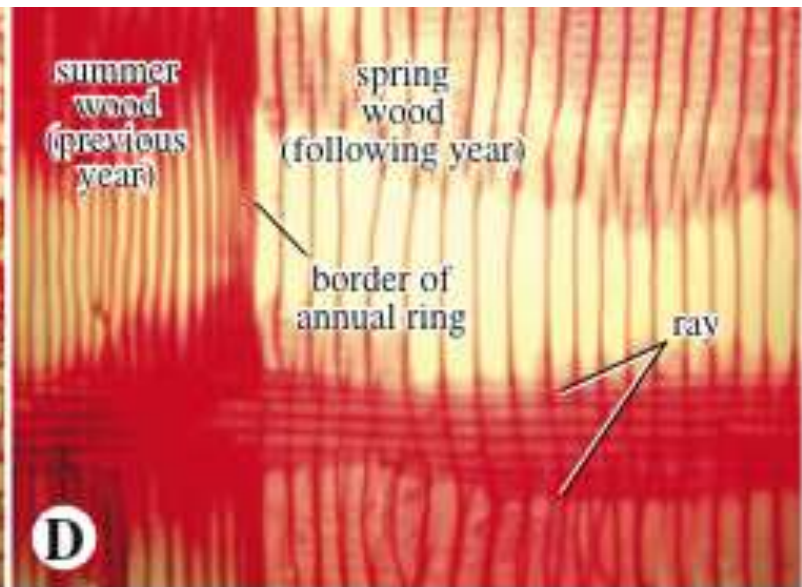
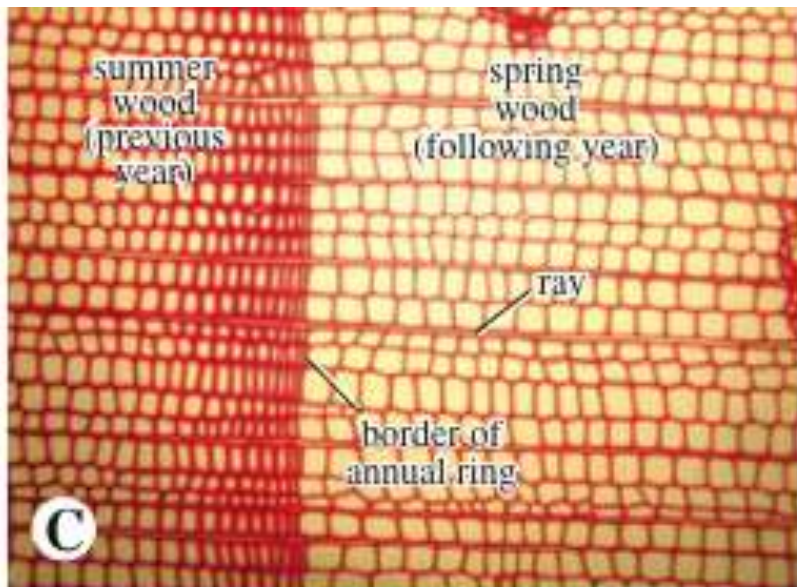


VASCULAR CAMBIUM - A LATERAL MERISTEM



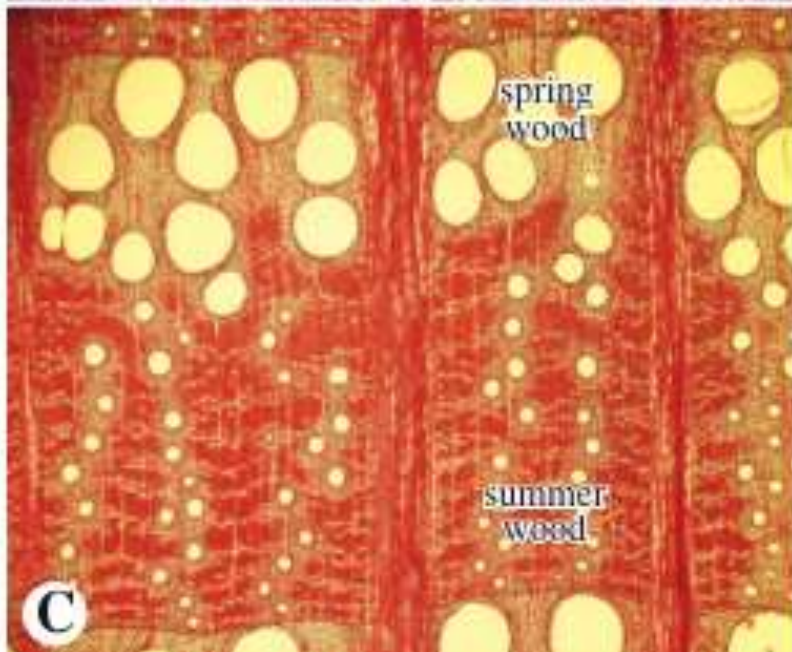
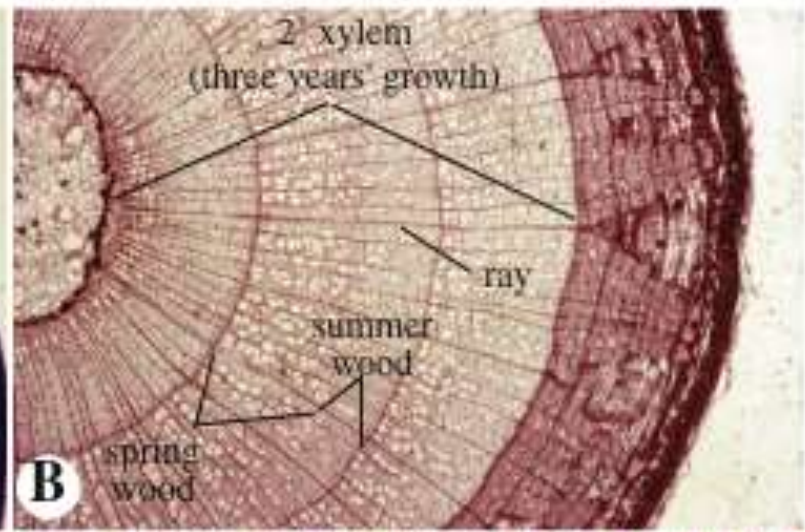
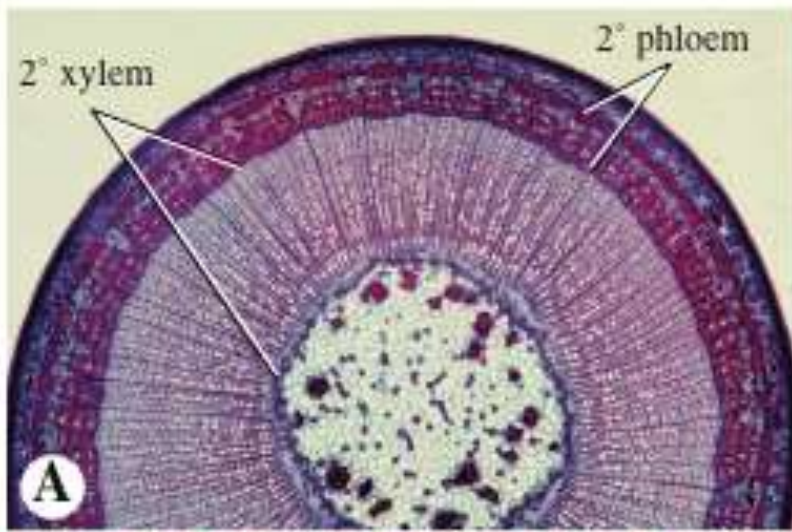






Conifers: non-porous



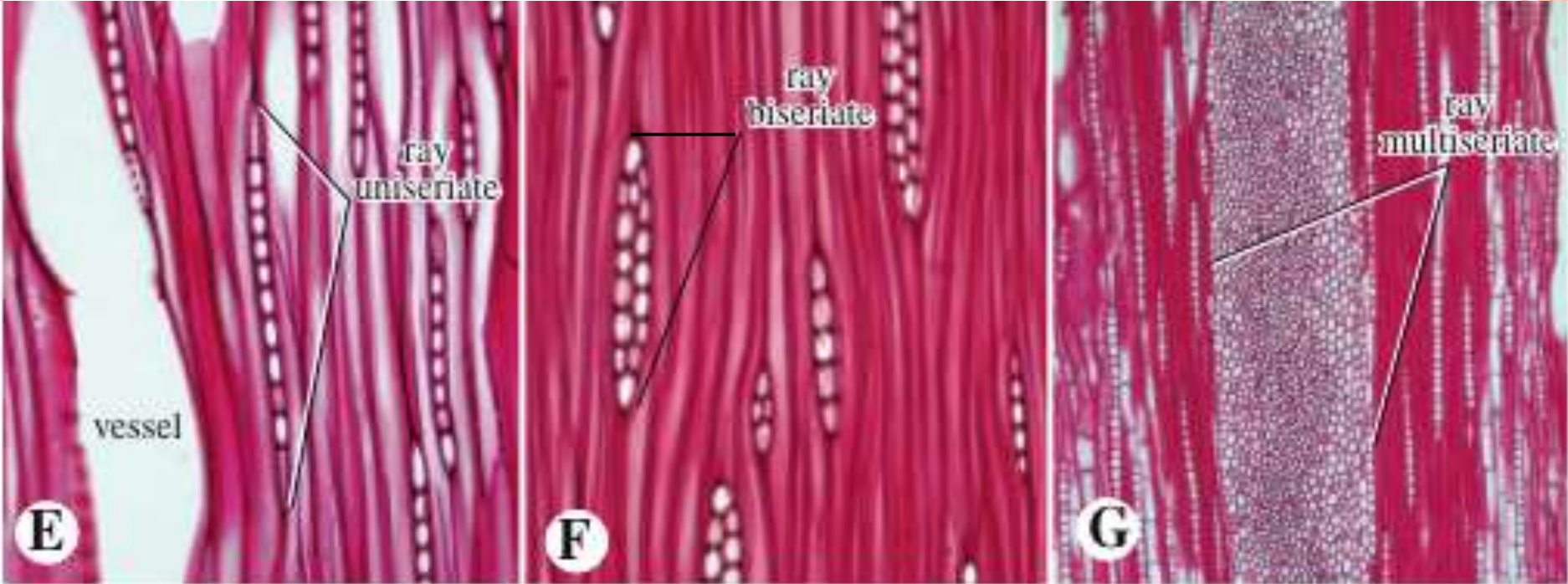


Ring porous

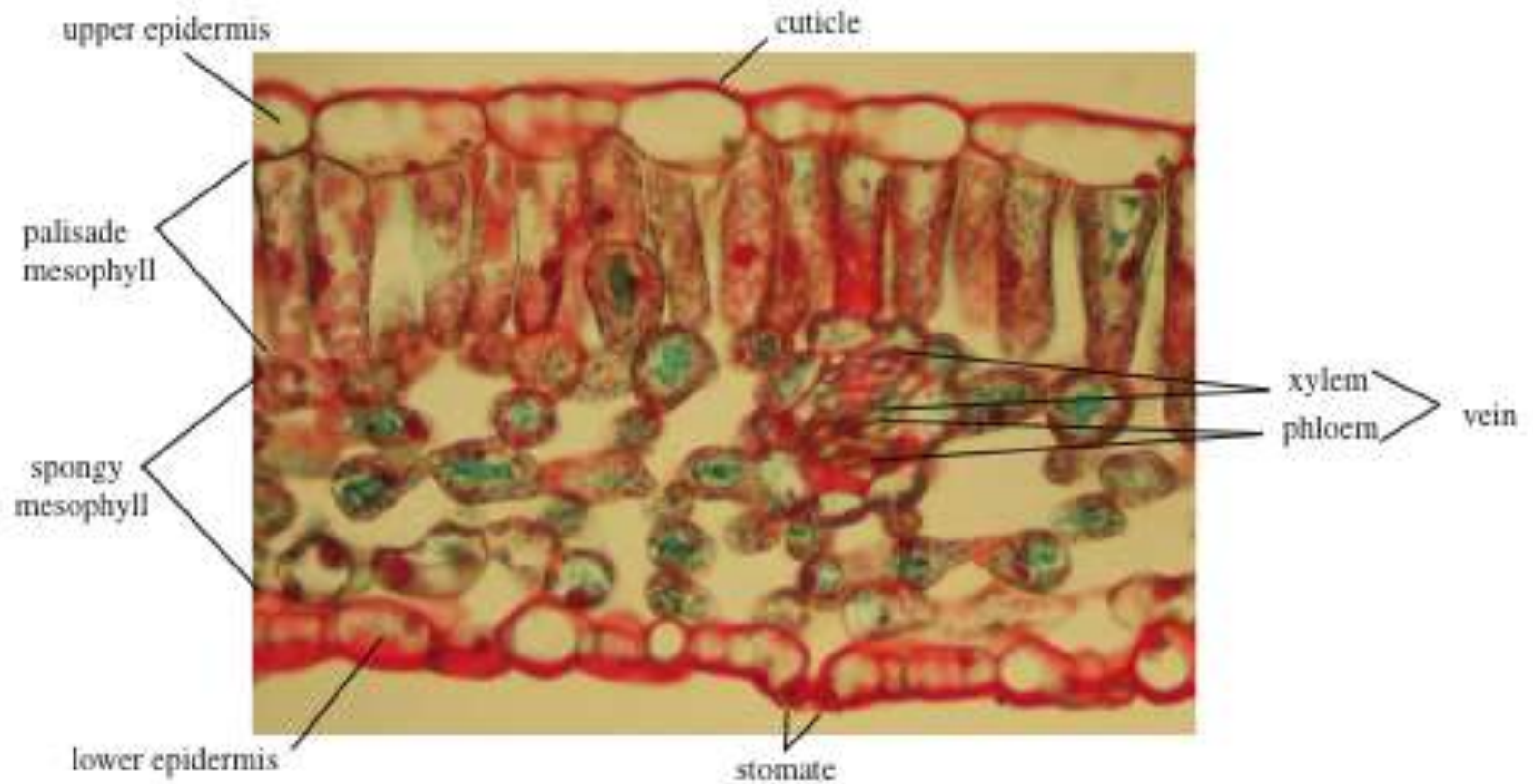
Diffuse porous



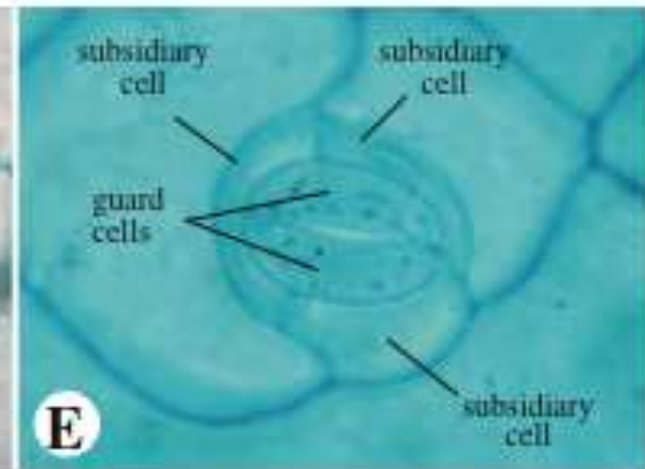
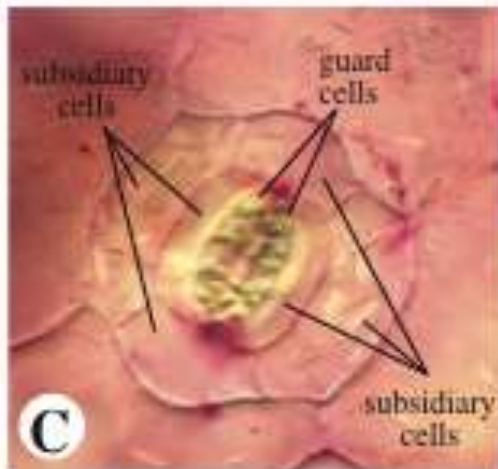
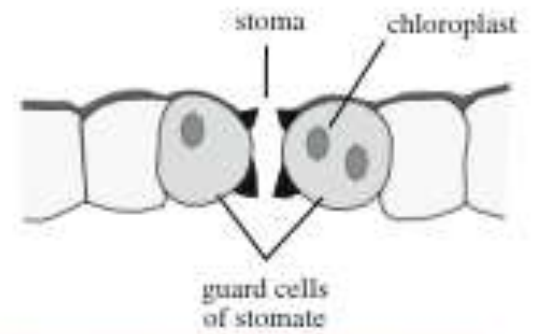
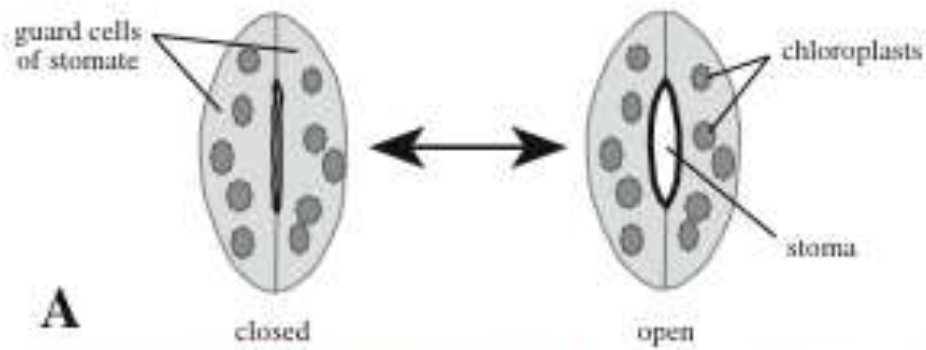
WOOD RAY ANATOMY



LEAF ANATOMY



STOMATA



Thank
You

