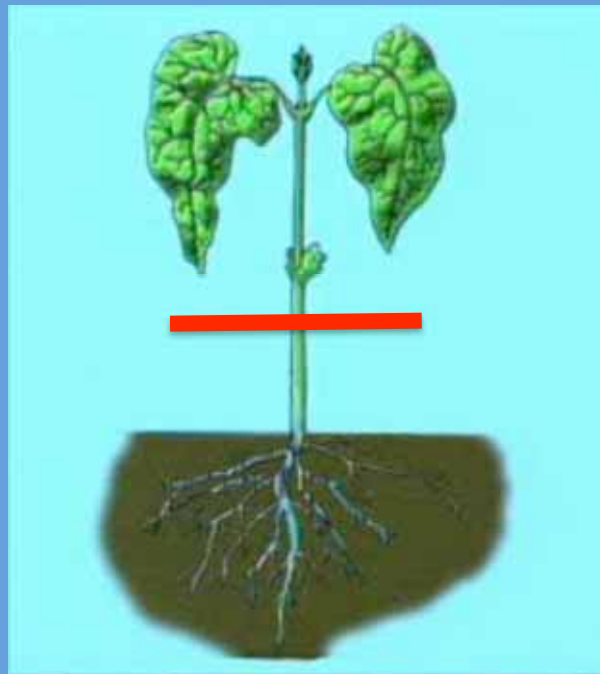


Plant Circulation

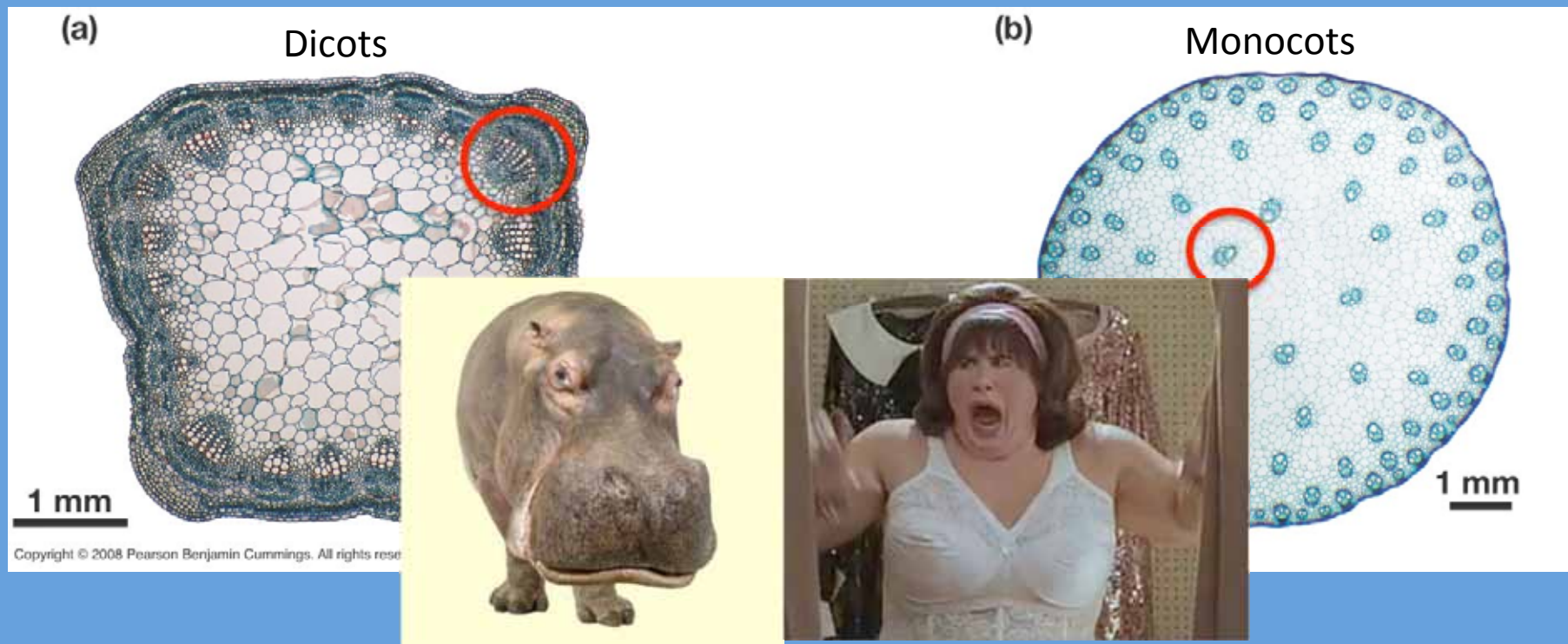
- We've seen transpiration in the xylem cells
- We've seen translocation in the phloem cells.



Plant Circulation

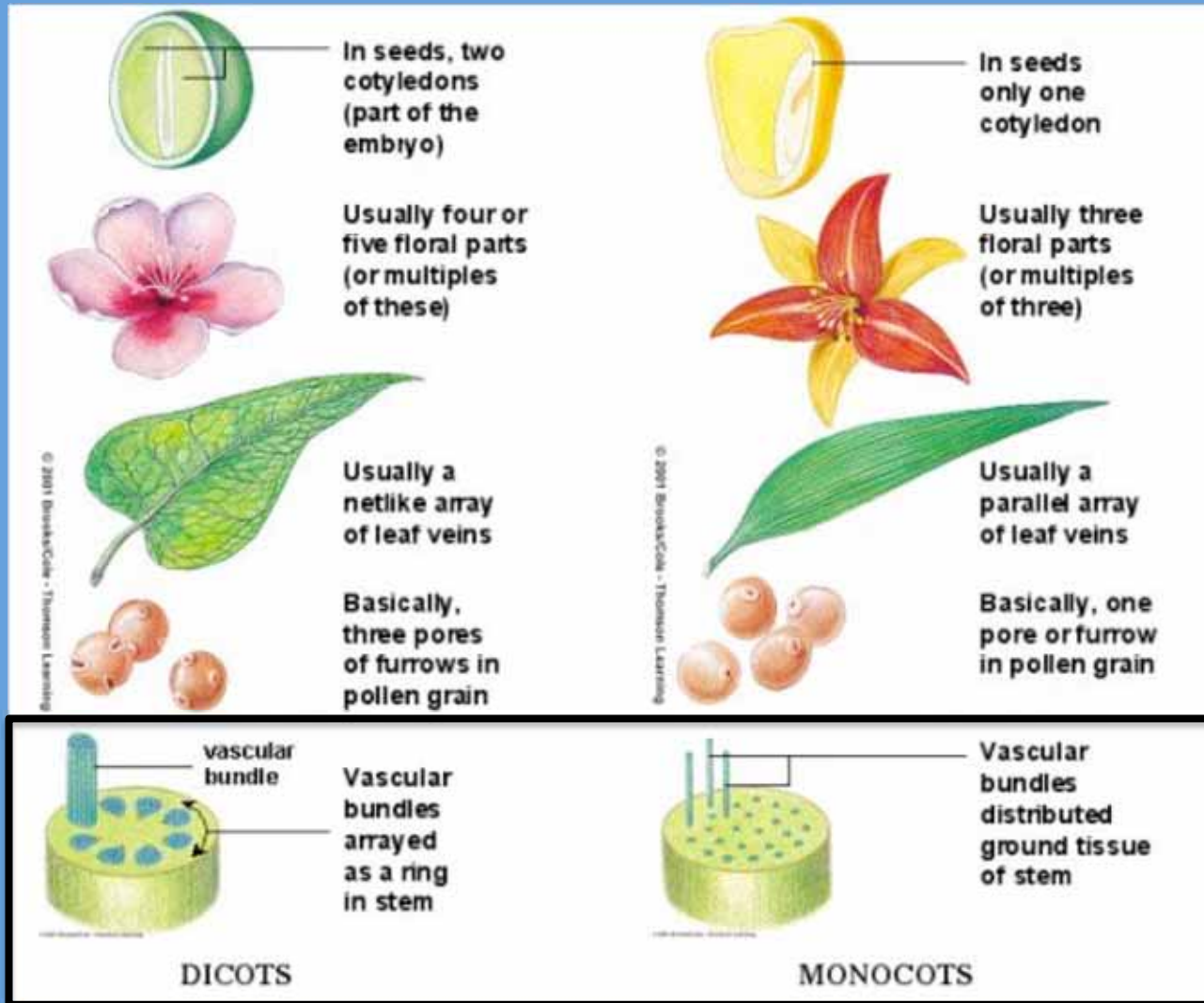
Stem View

- xylem and phloem cells are grouped in **vascular bundles**



Dicots vs. Monocots

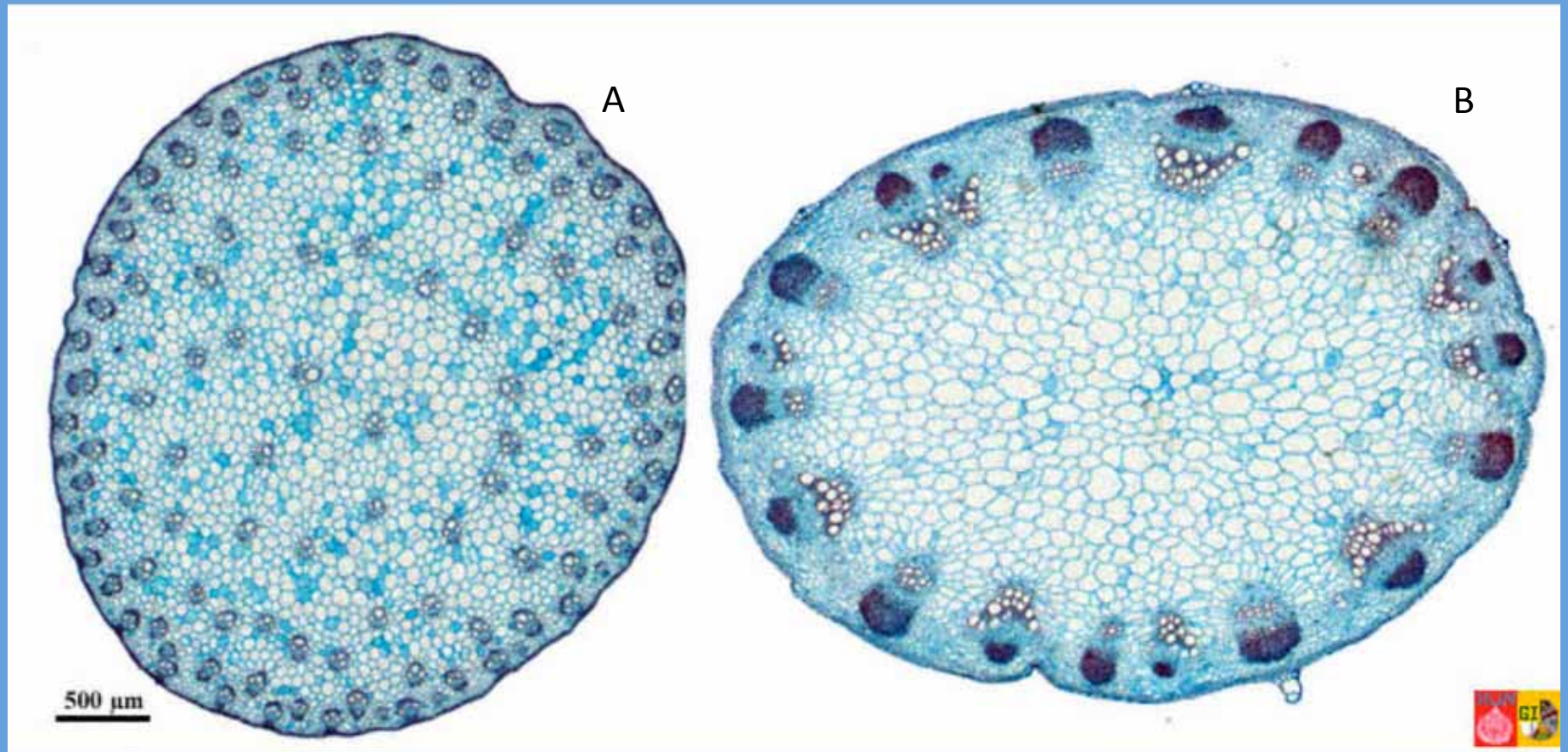
*Dicotyledons and Monocotyledons
two classes of flowering plants*



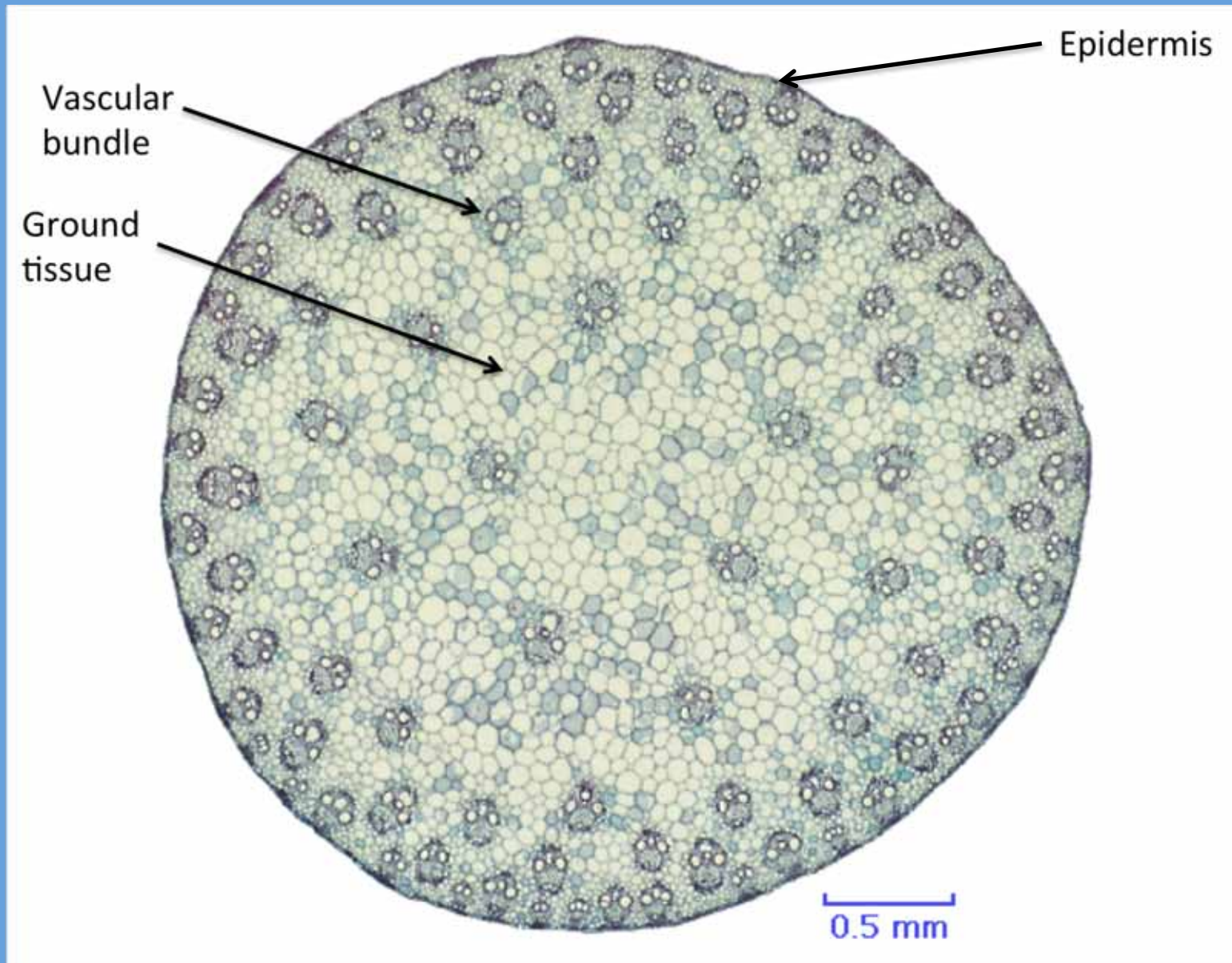
One ring
Distribution

Multiple ring
Distribution

Who are you calling a Monocot?



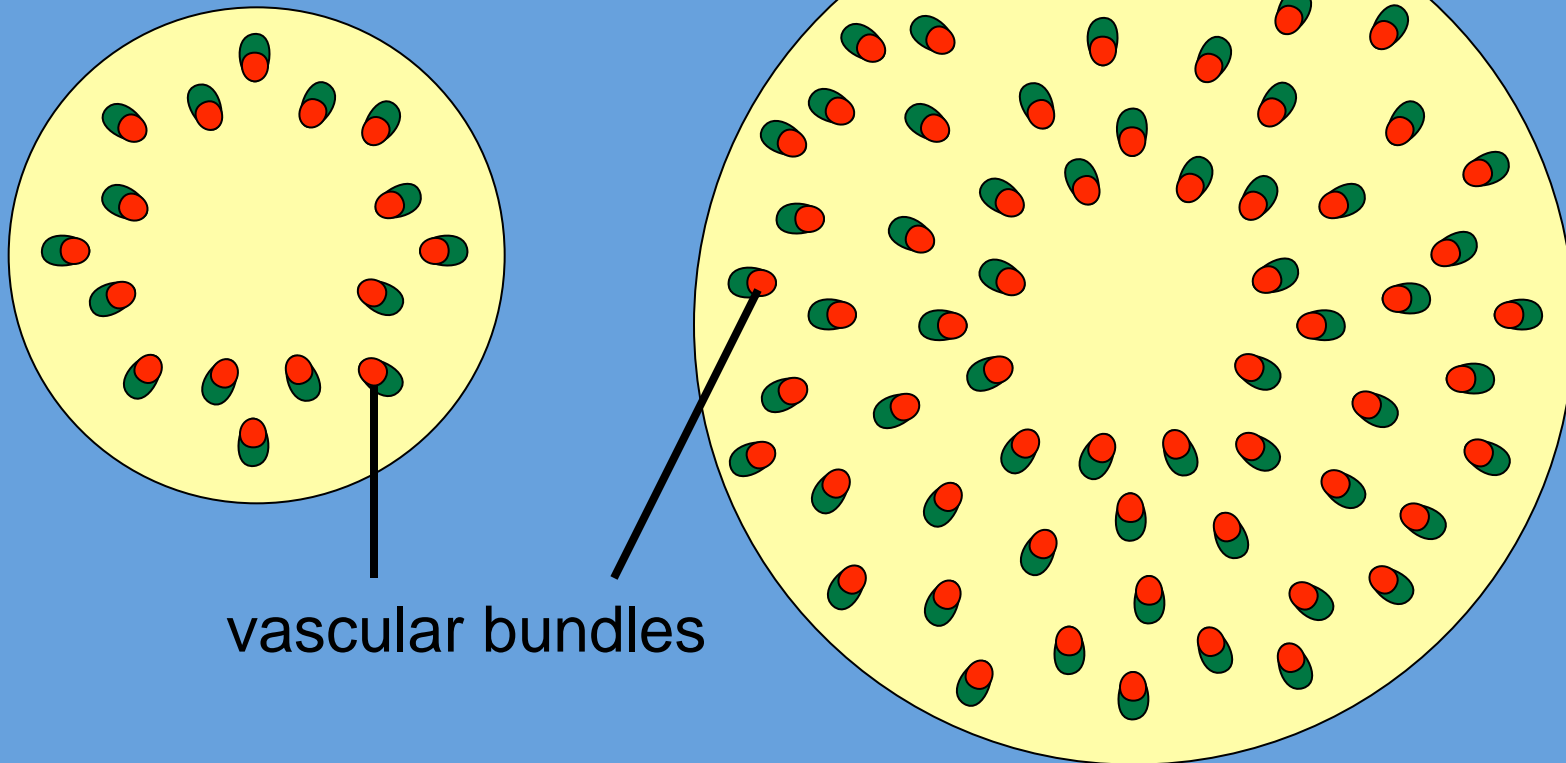
Monocot stem anatomy



Monocot stem anatomy

Mature Monocot

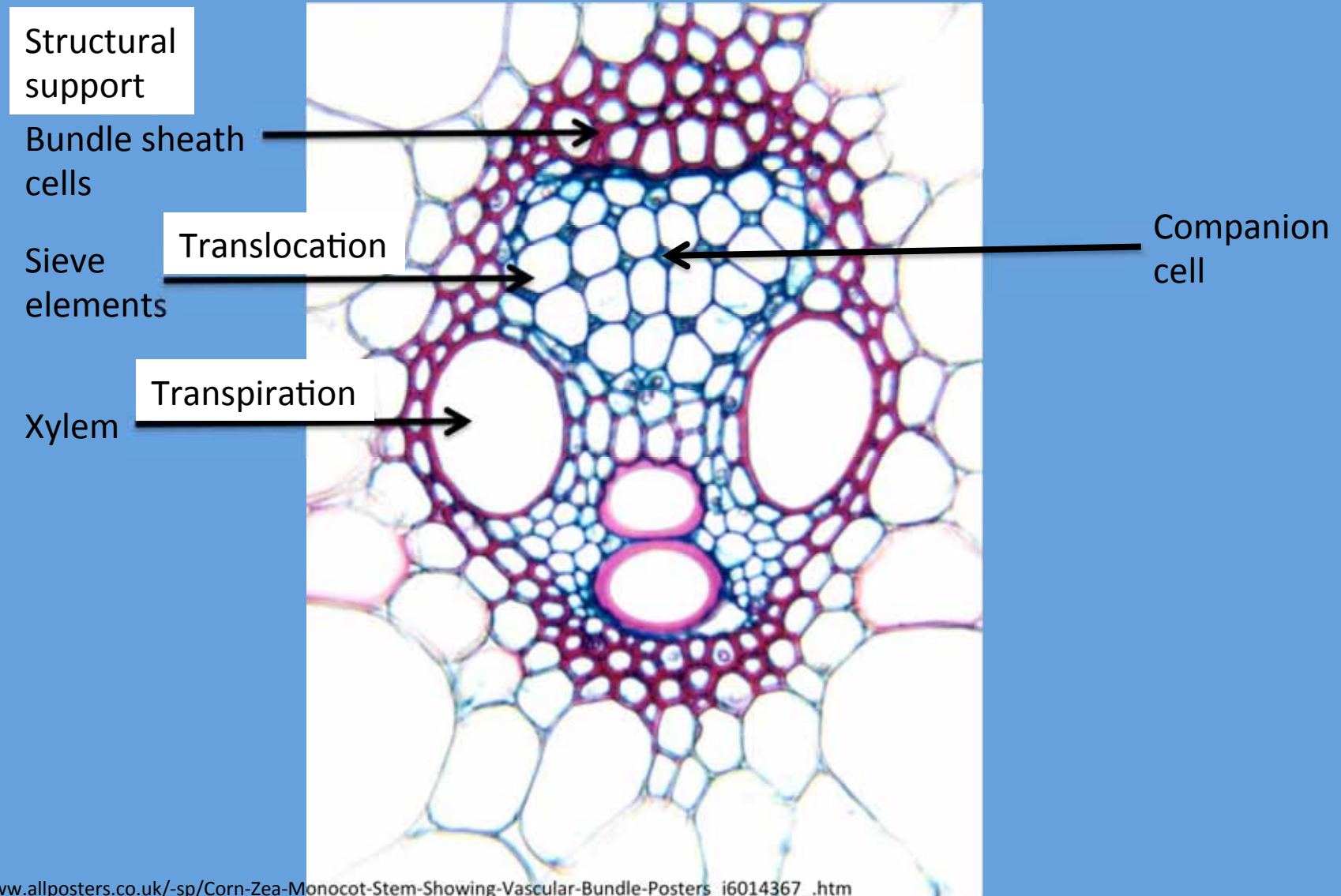
Young Monocot



As a monocot plant grows in diameter, new bundles are added toward the outside for increased circulation to the larger plant body.

Monocot Stem Anatomy

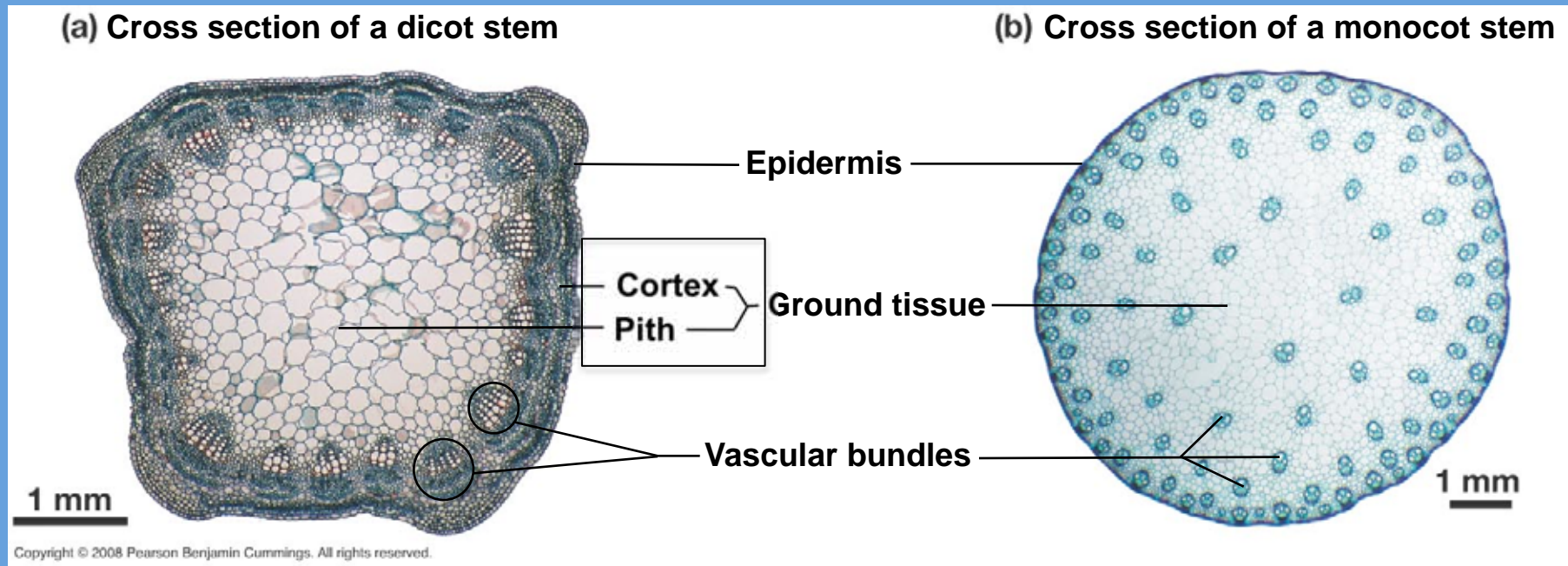
vascular bundle



Questions

- What cells provide structural support to monocots?
 - Bundle sheath cells (Lignin)
- What kind of arrangement do the vascular bundles take in dicots?
 - Singular ring of bundles

Dicots vs. Monocots

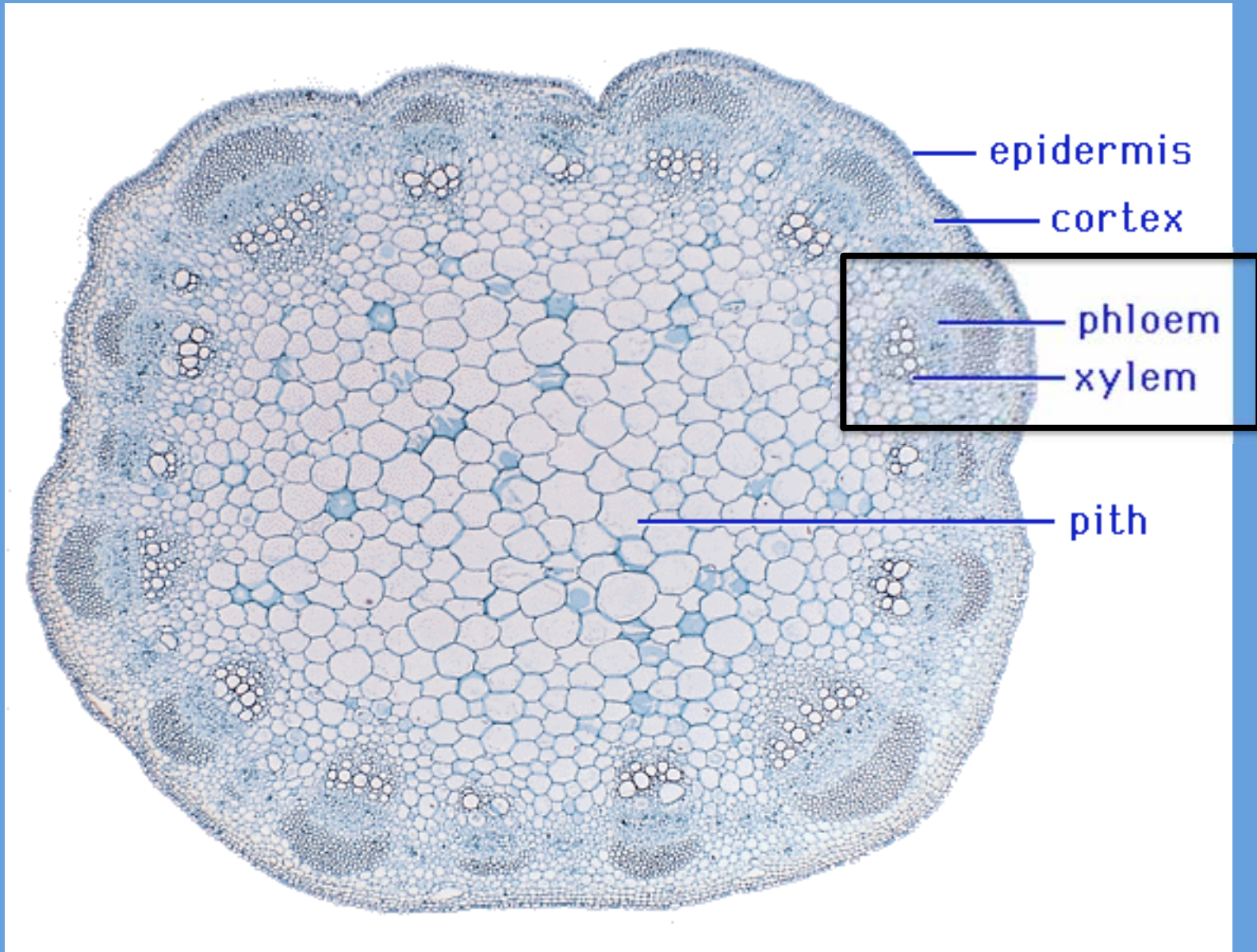


Dicots initially have one ring of vascular bundles

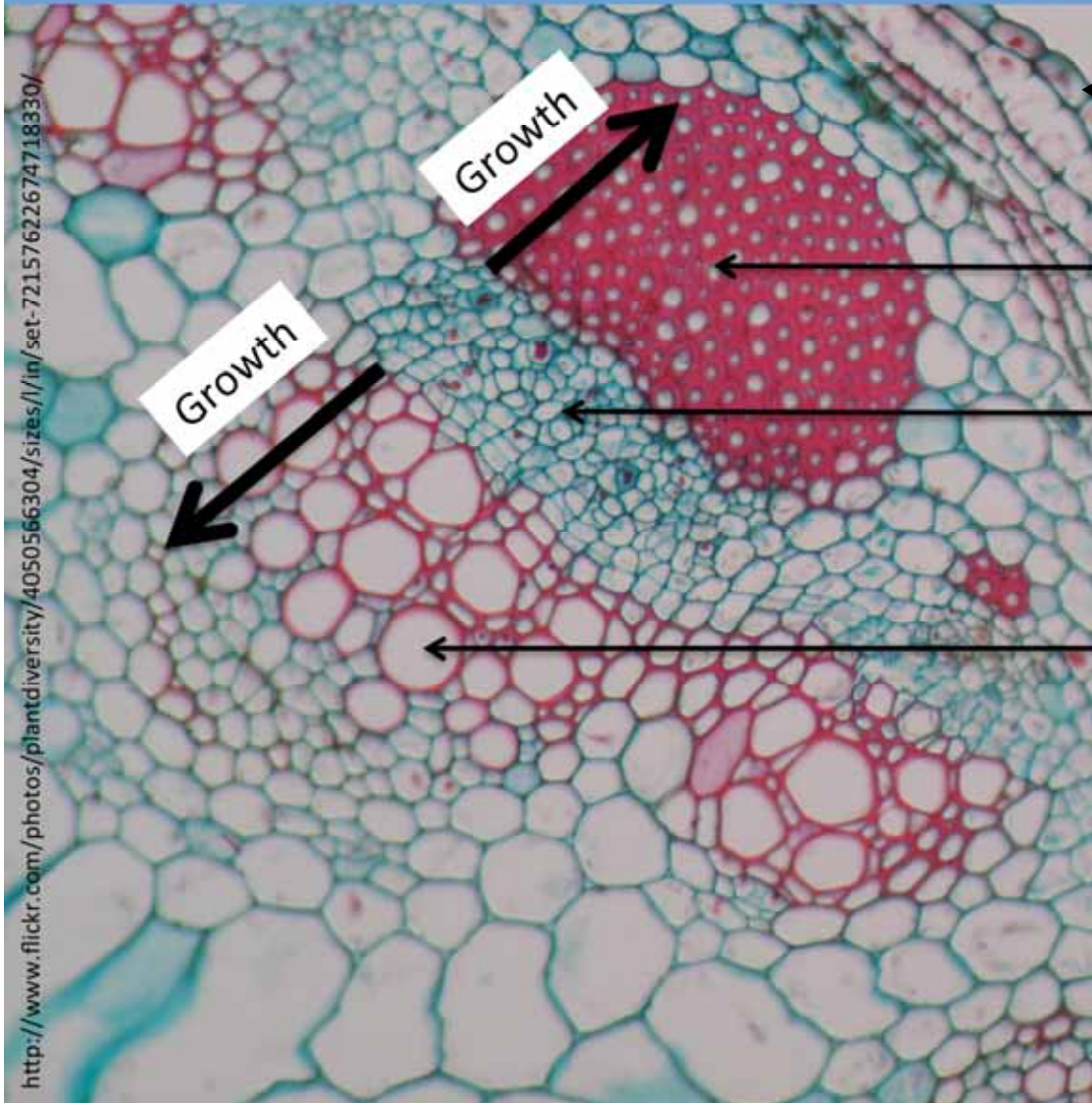
Monocots rapidly develop multiple, concentric, rings of vascular bundles

Dicot circulation: stem anatomy

Dicots have one ring of bundles...



Dicot Vascular Bundle



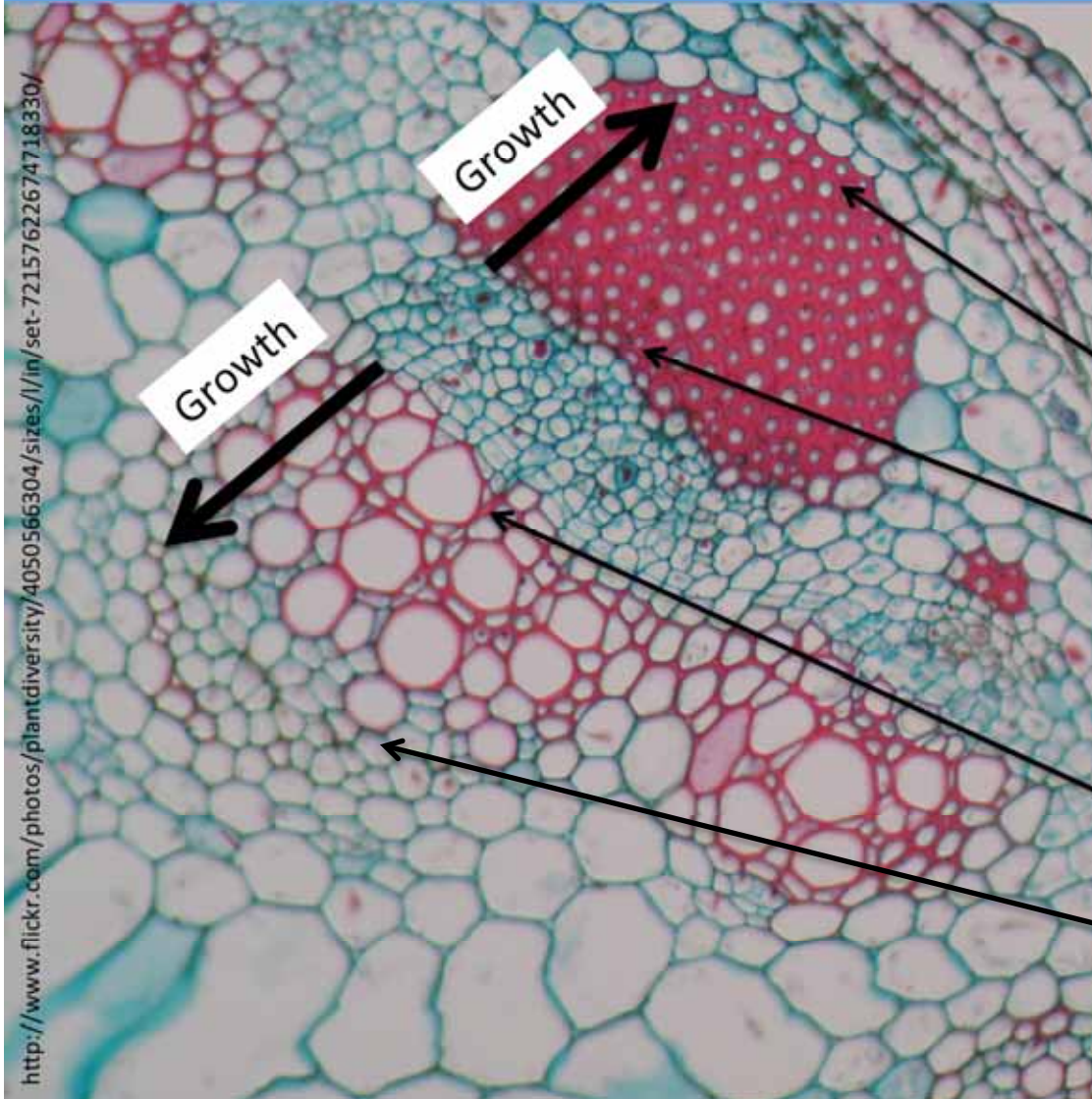
Epidermis

Phloem

Vascular
cambium

Xylem
vessel

Dicot Vascular Bundle



Oldest

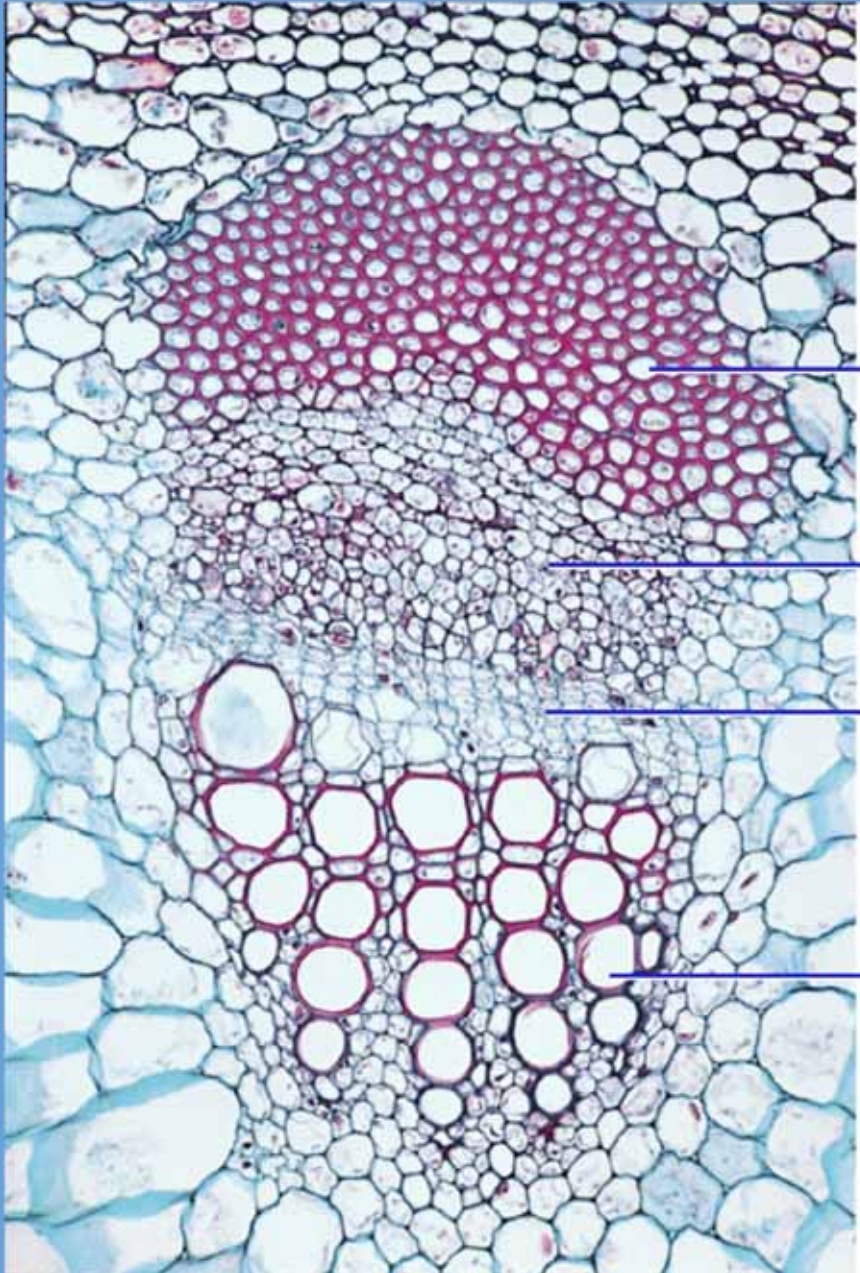
Newest

Newest

Oldest

Vascular cambium

Dicot stem anatomy: vascular bundle



phloem fibers

Support of Stem (Lignin)

functional phloem

Translocation

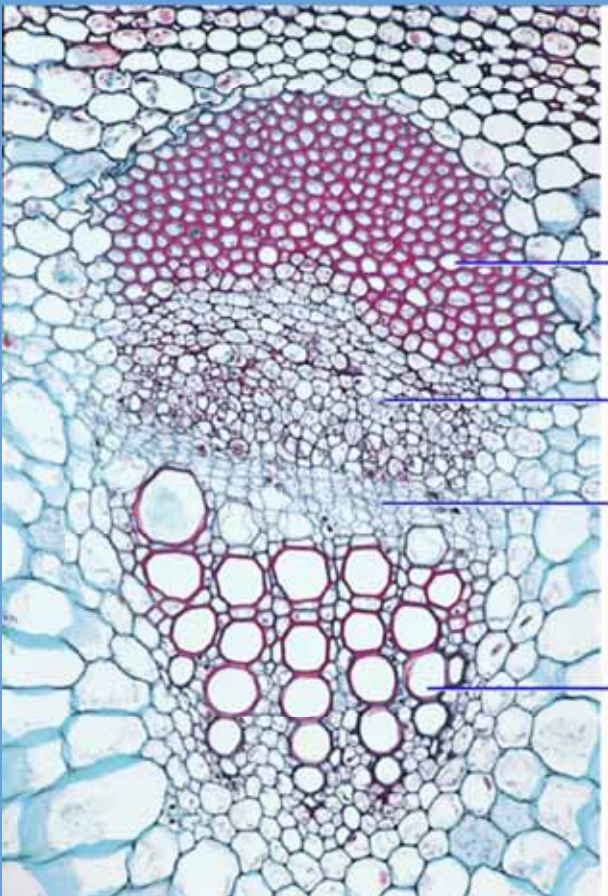
vascular cambium

Cell Division: More Xylem and
Phloem

xylem

Transpiration

Translation needed

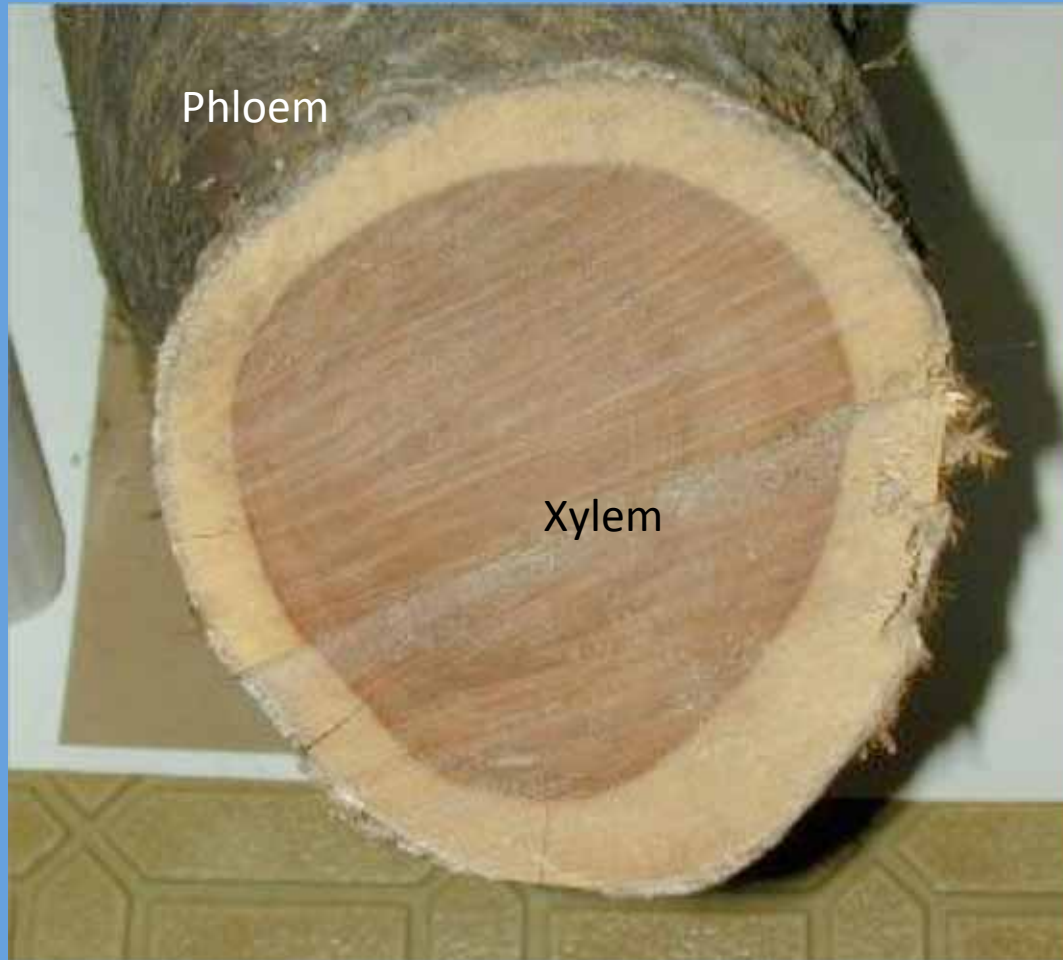


||



?

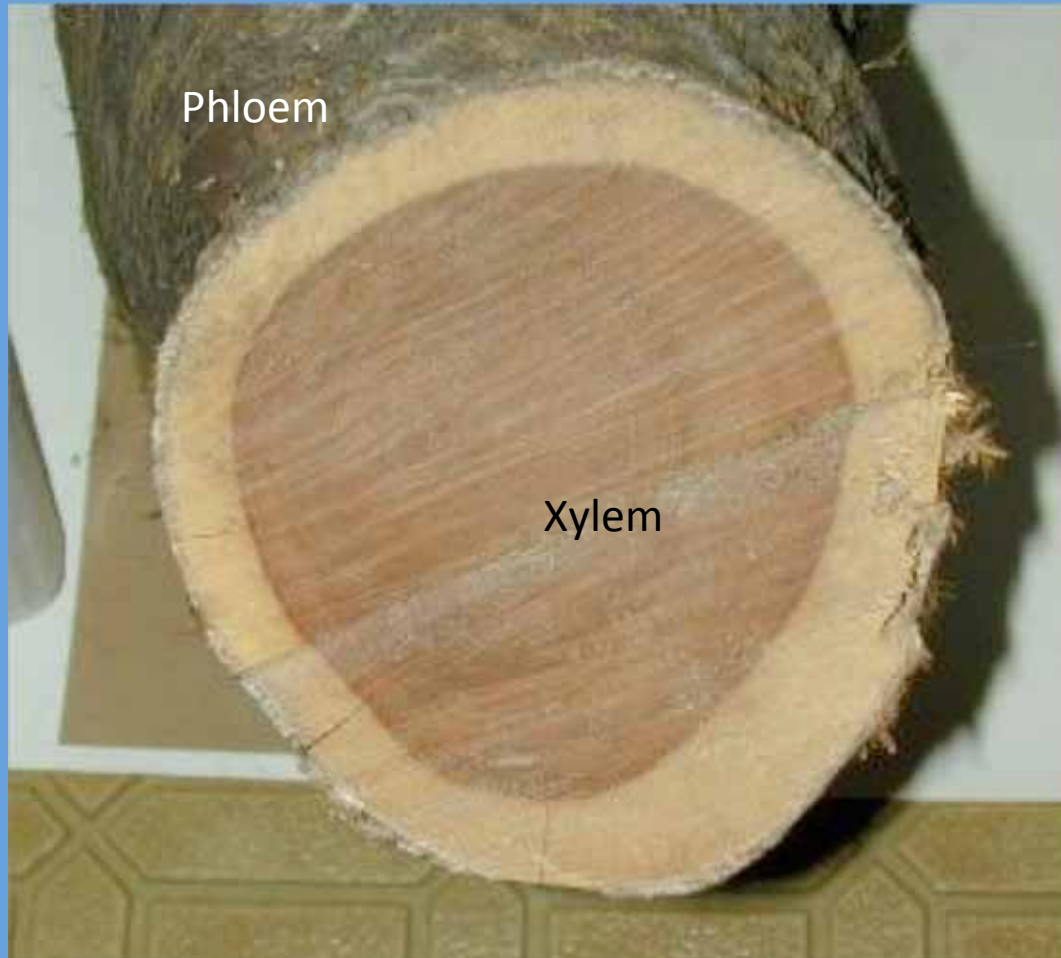
Hmm.



Phloem = bark

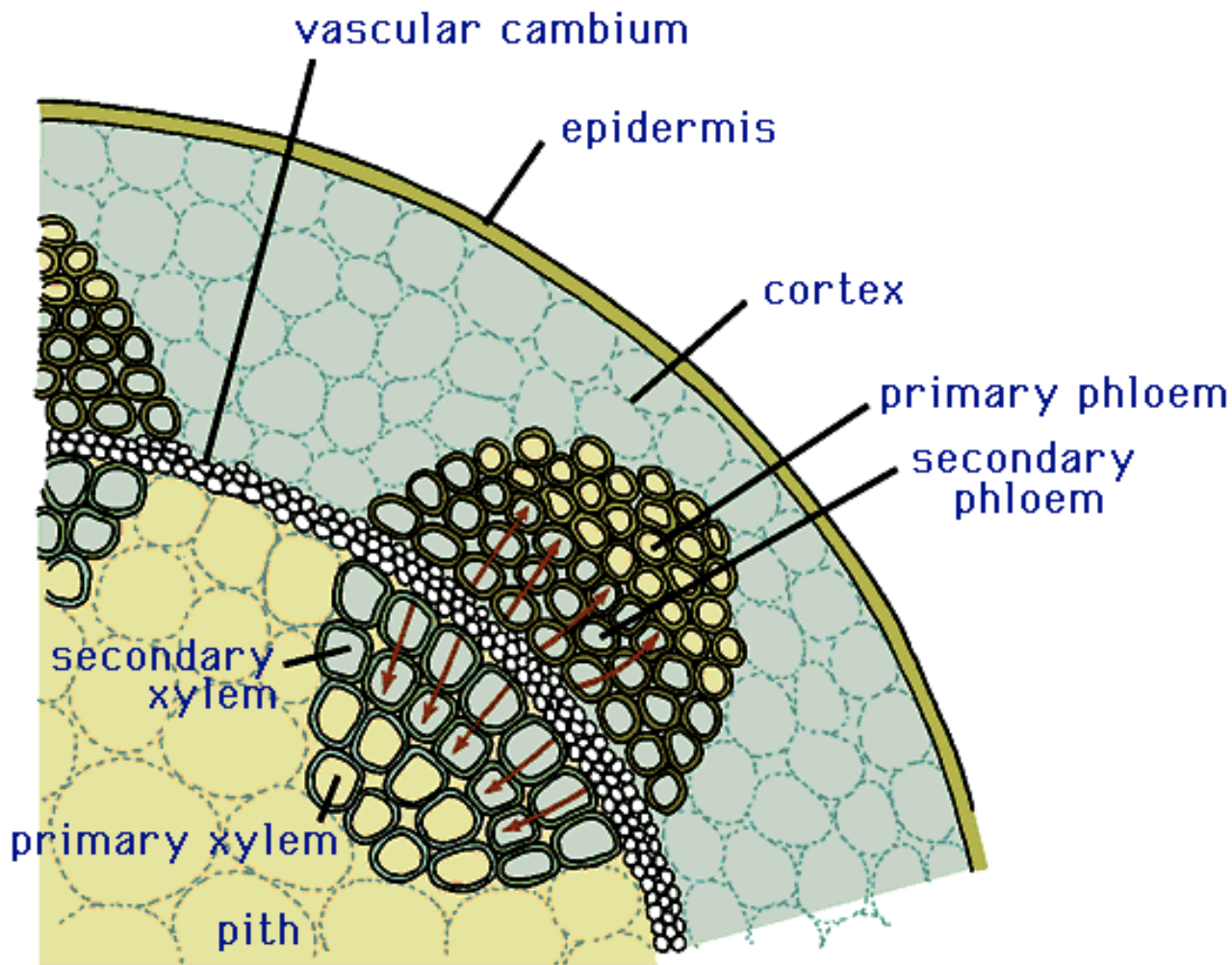
Xylem = wood

Hmm.



- If xylem and phloem both grow from the vascular cambium, why is there so much more xylem than phloem?
- Growth is asymmetrical between the two tissues.
- Secondary Phloem is eventually crushed and replaced

Dicot stem anatomy: vascular cambium adds **secondary tissues**



Primary xylem and phloem made by apical meristem

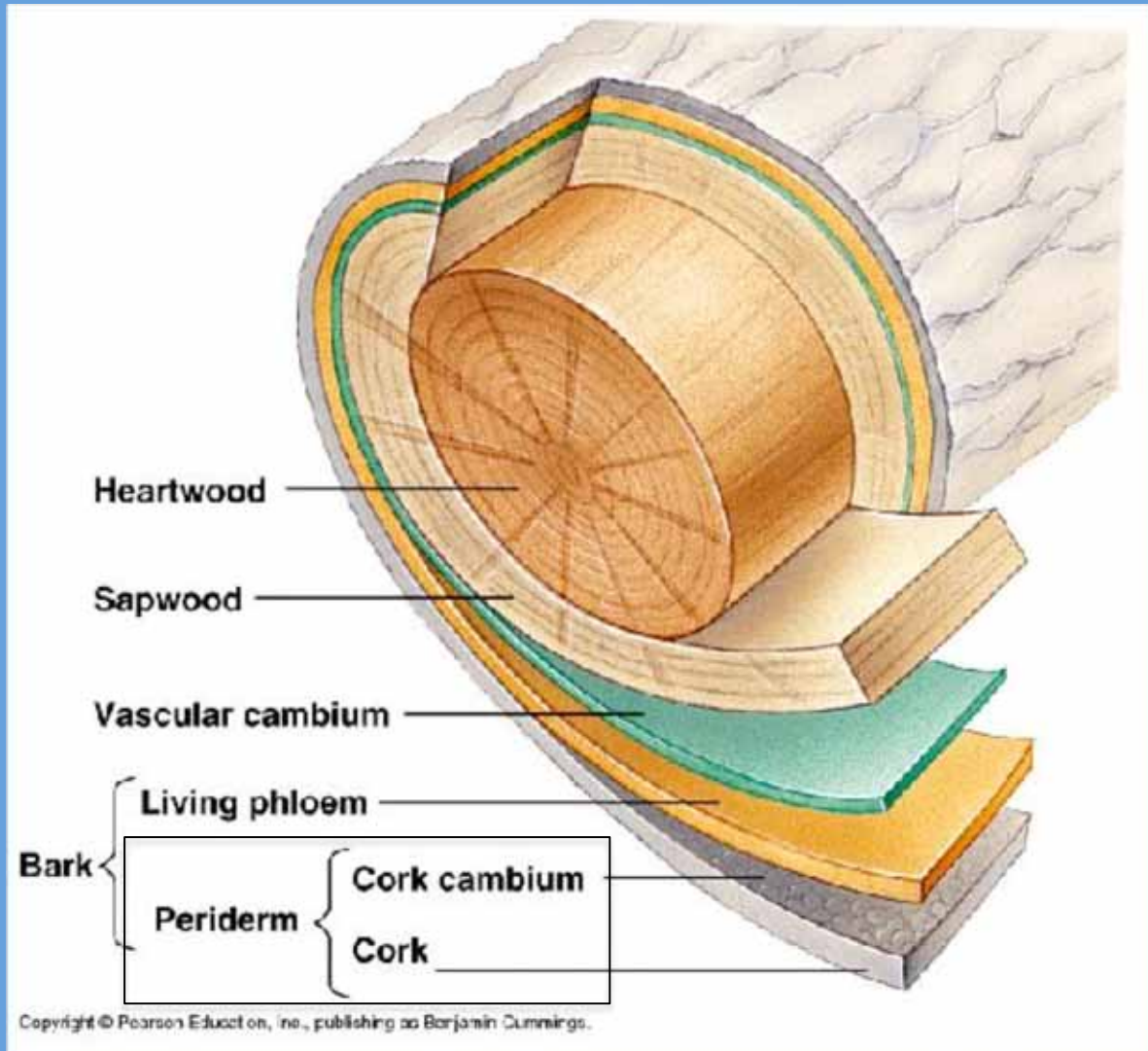
Secondary xylem and phloem made by lateral meristem

Meristem:
undifferentiated cells that still undergo mitosis and produce new cells

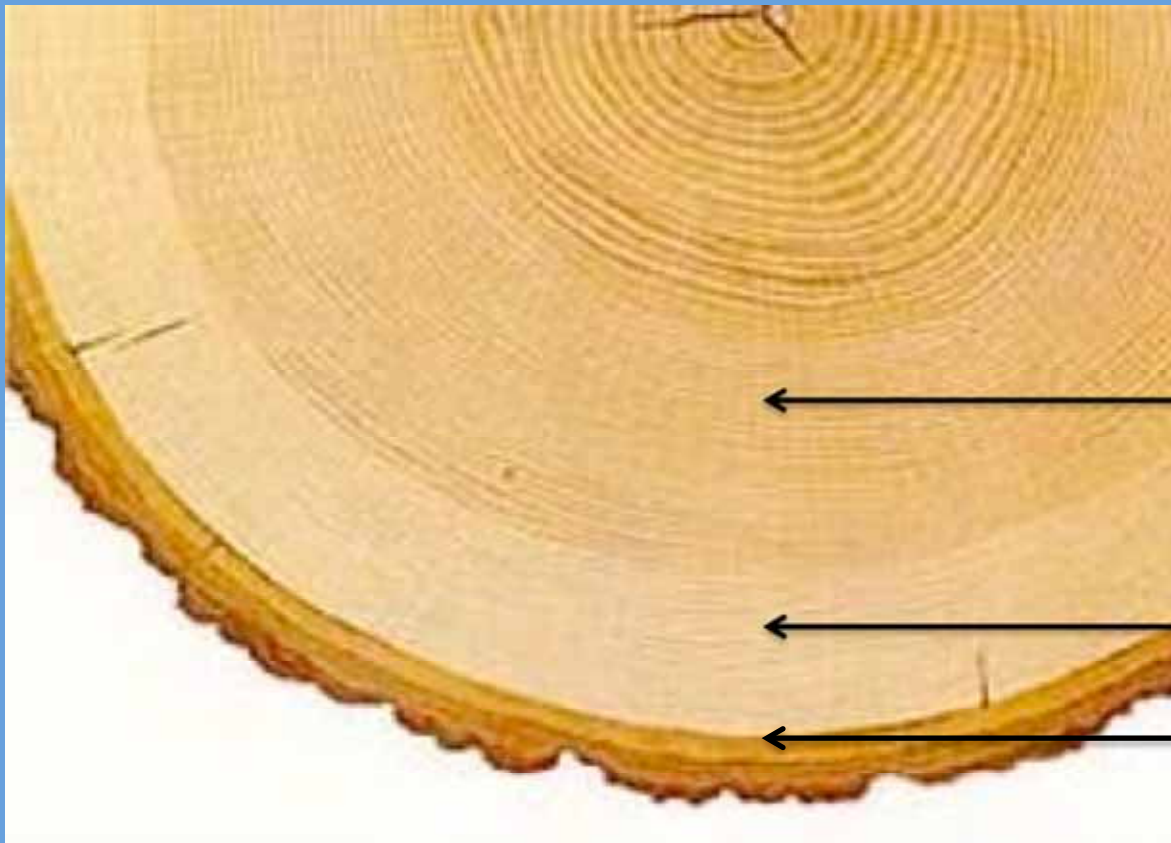
Heartwood = old xylem
filled with resin, gum

Sapwood = functional
xylem

Phloem + Periderm =
bark



Questions



- A heartwood
- B sapwood
- C Vascular cambium

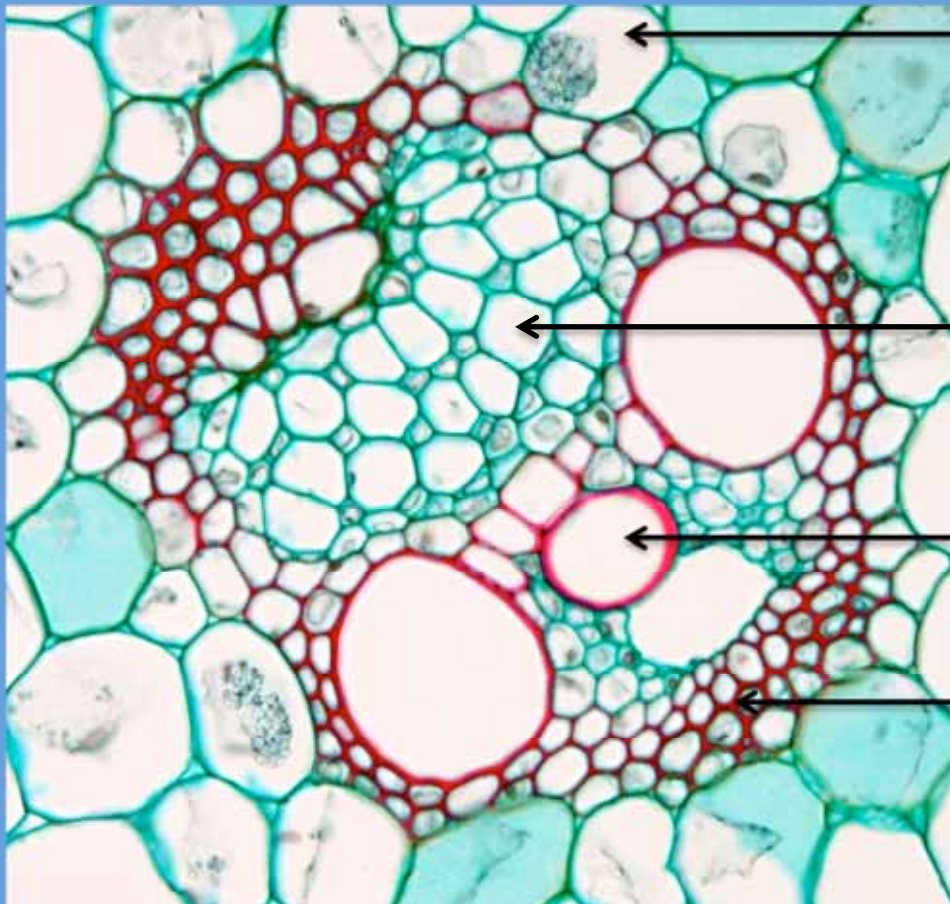
Questions

Where would you expect to find the phloem?



Question

Is this a monocot or a dicot?



- A Ground tissue
- B Sieve element
- C Xylem vessel
- D Bundle sheath