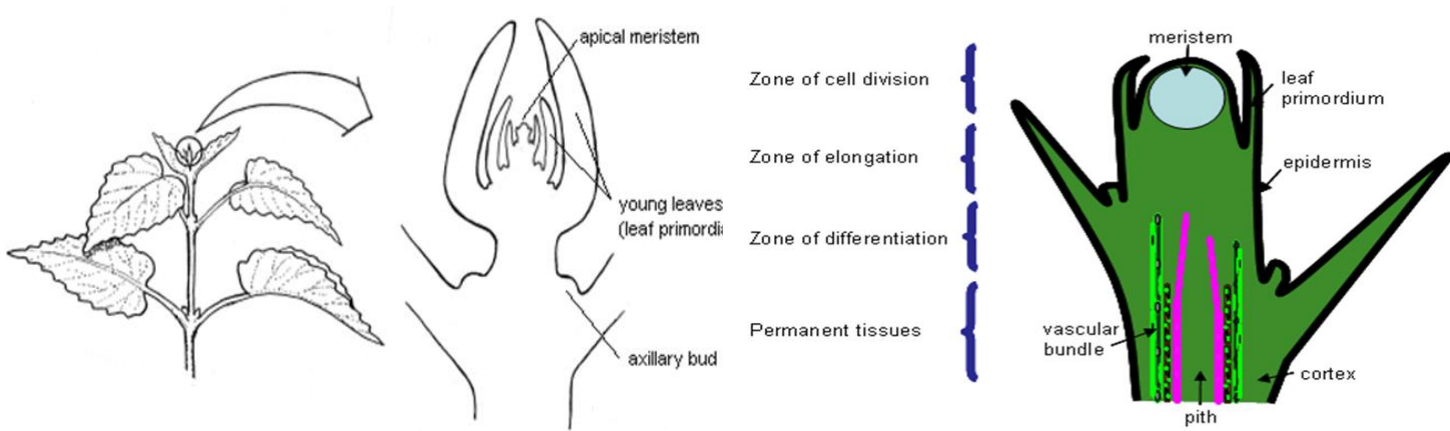


Plant Growth & Development - Section 24-1, p. 517-521

Plant Growth in Stems

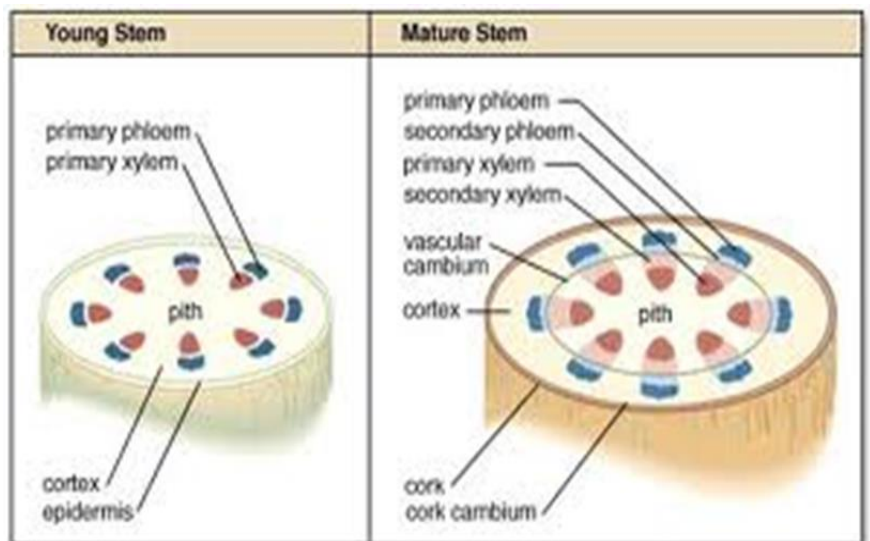
- Stems grow longer at their _____ as cells in the _____ divide
- Newly formed _____ larger in the _____ (area behind the meristem)
- Newly formed _____ into various cells that make up the stem in the _____ (behind the zone of elongation)



- Tissue produced by the apical meristem is called _____
- Stems and roots _____
- Tissue produced by other meristematic tissues (i.e. vascular and cork cambium) are called _____
- Secondary growth _____ of woody plants

Growth in Dicot Stems

- Vascular bundles occur in a ring within the stem, with vascular cambium in between the xylem and phloem

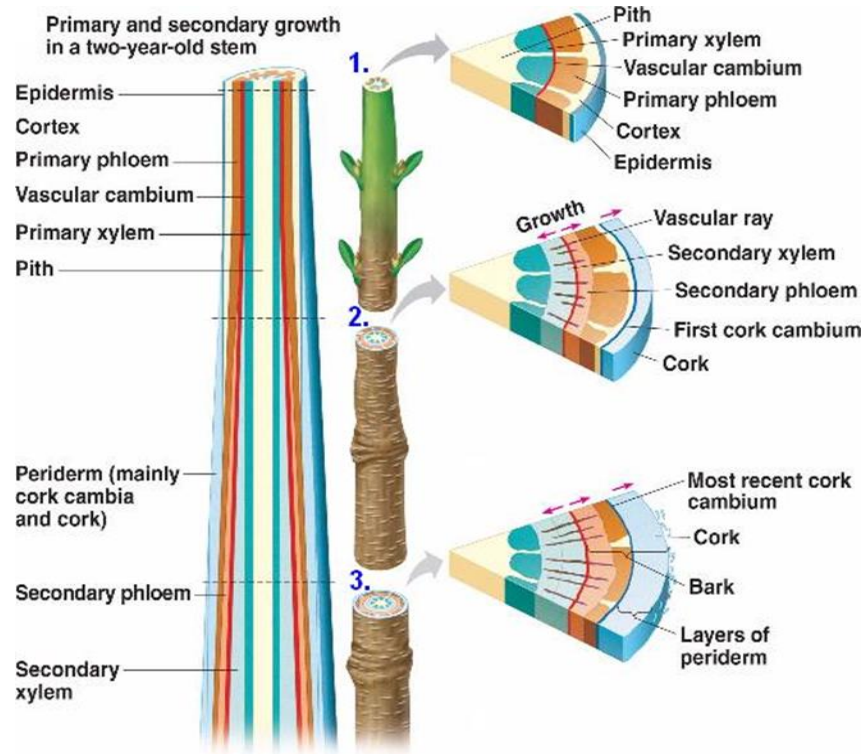


- In woody dicot stems, a layer of _____

_____ (between xylem and phloem) remains alive throughout the winter

- In spring, the vascular cambium cells begin to divide, producing new _____

_____ and _____ facing the outside of the stem



Growth in Dicot Stems - Xylem

- Sapwood - made up of _____ xylem cells that still

- Heartwood - older xylem cells that _____ water

- In the _____, vascular cambium makes _____ xylem cells

- Appear lighter than smaller cells
- In _____, vascular cambium makes _____ xylem cells
- Appear darker than larger cells

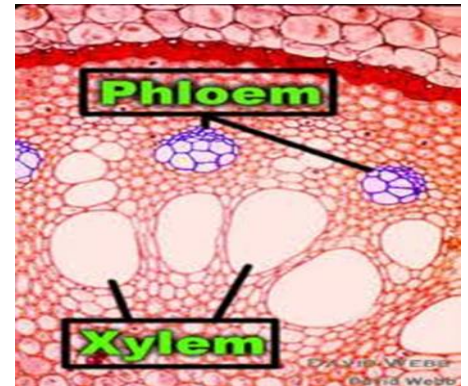
- Every year, a set of light and dark rings is deposited, forming annual rings
 - Annual rings used to determine age of a tree



Growth in Dicot Stems - Phloem

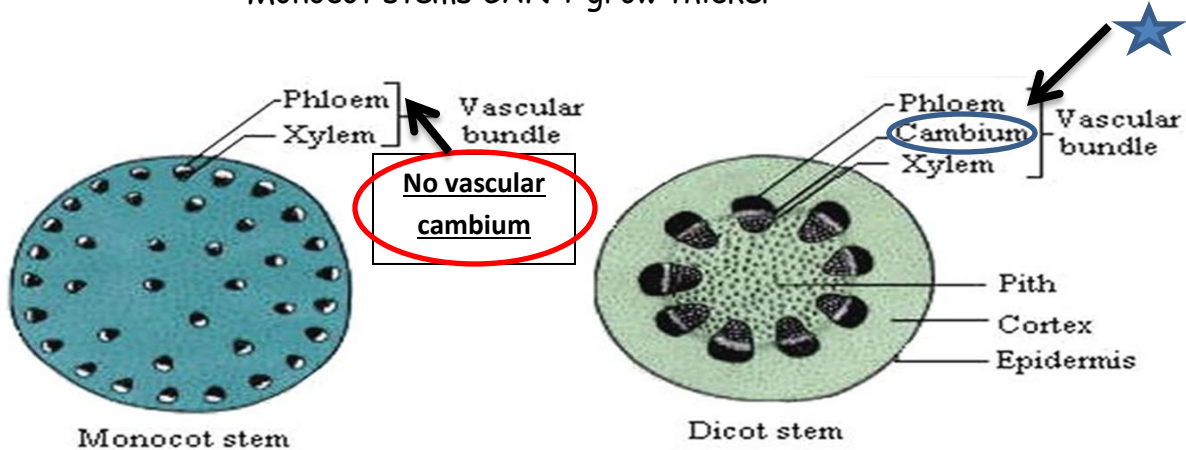
- Vascular cambium makes new phloem cells at the same time it makes new xylem cells
- The phloem layer never gets as thick as the xylem layer for _____ reasons:

- For every 6 or 8 xylem cells produced by the vascular cambium only one phloem cells is produced
- Phloem cells have thinner walls than xylem cells and are crushed as the stem grows thicker

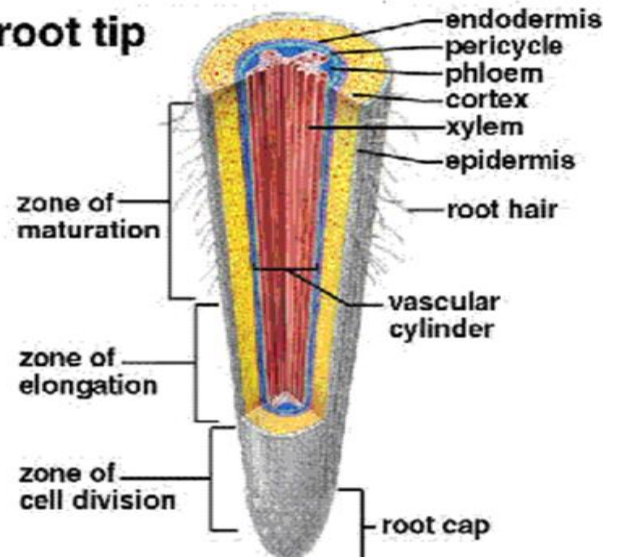


Growth in Monocot Stems

- Xylem and Phloem tissues are arranged in vascular bundles _____ throughout the stem
 - These bundles _____ vascular cambium so no new xylem and phloem cells can't be produced
 - Monocot stems CAN'T grow thicker



Dicot root tip



Growth in Roots

- Roots grow in _____ as the _____ produces new cells near the root tip

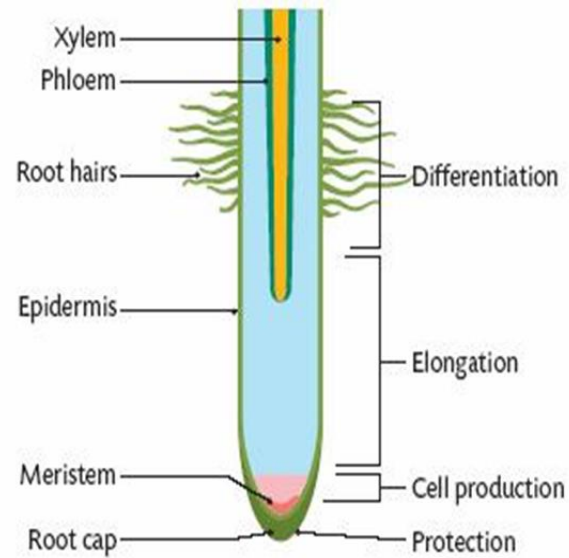
Root Cap -

- _____ cells as root forces its way through soil
- Secretes slippery substance to _____ not as it goes through soil

- Roots grow longer at their _____ as the cells in the _____ divide

- Newly formed cells _____ in the _____ (area behind the meristem)
 - Most of the increase in root length occurs here

- Newly formed cells _____ into the various cells that make up the root in the _____ (behind the zone of elongation)



☞ Try This...

Why don't most monocot stems grow thicker?

How do stems and roots grow in length?