GENERAL BOTANY Lecture 16 - Stems: Primary Growth

I. Main functions of stems
- A. Support
- B. Conduction of water and nutrients
- C. Storage
- D. Production of new living tissue

II. Primary stem growth in angiosperms - dicots and monocots
- A. FOCUS ON DICOTS
  - 1. What gives rise to different tissues?
    - a) Meristems
    - b) Cells differentiate - become destined to dermal, ground, or vascular
    - c) protoderm = dermal; ground mer. = ground; procambium = vascular
  - 2. Apical meristem - angiosperms - tunica & corpus structure
    - a) Shoot apex - point above youngest primordia (lateral outgrowth from apical meristem that will become a leaf
    - b) Promeristem - place where no visible differentiation can be seen (can be same as shoot apex)
    - c) Very top cells comprise the tunica; other cells corpus
      - 1) Tunica
        - a) Gives rise to the protoderm, i.e., epidermis
      - 2) Lower Tunica & Corpus
        - a) Gives rise to ground meristem and procambium, i.e., ground & vascular tissues
  - 3. Differentiation of cells
    - a) Dermal tissue
      - 1) Epidermis - covered by a cuticle
      - 2) Can have chloroplasts and starch grains in the chloroplast
    - b) Ground tissue
      - 1) All around procambial strands
      - 2) Two parts
        - a) Cortex - outer part between procambial strands & epidermis
        - b) Pith - inside region
    - c) Procambial strand
      - 1) Phloem - outside & continuous
        - a) Called protophloem - later becomes crushed
      - 2) Xylem - inside & discontinuous (no immediate need for water)
        - a) Called protoxylem - later becomes torn apart (monocots - protoxylem lacuna looks like a big hole) or obliterated (dicots)
  - 4. Arrangement of vascular bundles - DICOTS
    - a) Originate as ring of "residual mer." that differentiates - xylem & phloem
    - b) Bundles become separated by regions of parenchyma (pith rays)
    - c) Bundles are arranged in a ring-like structure
- B. DIFFERENCES BETWEEN DICOTS AND MONOCOTS
  - 1. Arrangement of vascular bundles is scattered
  - 2. Pith and cortex cannot be defined
  - 3. Very few species undergo secondary growth
    - a) Most grasses lack a vascular cambium

III. Additional primary growth of vascular tissue - DICOTS AND MONOCOTS
- A. Phloem - conduction of organic stuff (sugars)
  - 1. Protophloem - permits conduction of organics during rapid growth - later crushed
  - 2. Metaphloem - matures and functions after rapid growth
- B. Xylem - conduction of water and mineral nutrients
  - 1. Protoxylem - permits conduction of solubles during rapid growth - later gets torn apart to form a lacuna (monocots) or obliterated (dicots)
  - 2. Metaxylem - matures and functions after rapid growth