

Cells and Tissues of the Plant Body  
Chapter 23

Chapter Outline

- Apical meristems
- Growth, morphogenesis, and differentiation
- Internal organization of the plant body
- Ground tissues
- Vascular tissues
- Dermal tissues

Apical Meristems and Their Derivatives

- Root and shoot tips
- Extend plant body
- Initials and derivatives
- Primary growth
- Indeterminate growth

Growth, Morphogenesis, and Differentiation

- Three processes of development
  - Growth
  - Morphogenesis
  - Differentiation

Internal Organization of the Plant Body

- Tissues
  - Structural and functional units of cells
  - Grouped into tissue systems in plants
    - Ground (fundamental)
    - Vascular
    - Dermal
  - Characteristic pattern
  - Simple vs. complex tissues

Ground Tissues

- Parenchyma
  - Usually living at maturity
  - Capable of mitosis
  - Some cells have secondary walls
  - Photosynthesis, storage, secretion, transport

- Transfer cells
- Collenchyma
  - Living at maturity
  - Common in strands or cylinders
  - Usually elongated
  - Unevenly thickened, nonlignified primary wall
  - Support young, growing organs
- Sclerenchyma
  - May be dead at maturity
  - Thick, often lignified secondary wall
  - Strength and support plant parts not elongating
  - Two types of cells
    - Sclereids
    - Fibers

#### Vascular Tissues

- Xylem
  - Water-conducting tissue in vascular plants
  - Derived from
    - Procambium
    - Vascular cambium
  - Principal conducting cells
    - Tracheary elements
    - Elongated cells with secondary walls, no protoplasts at maturity, may have pits
      - Tracheids
      - Vessel elements
  - Differentiation
    - Programmed cell death
  - Other xylem cells
- Phloem
  - Transports food, amino acids, lipids, hormones, floral stimulus, proteins, viruses
  - Principal conducting cells
    - Sieve elements
      - Sieve cells
      - Sieve-tube elements
    - Primary walls
    - Living protoplasts at maturity
    - Callose and P-protein
  - Parenchyma
    - Companion cells
    - Albuminous cells
    - Other cells for storage

- Fibers and sclereids

#### Dermal Tissues

- Epidermis
  - Outermost cell layer of primary plant body
  - Specialized cells
    - Guard cells
    - Trichomes
    - Others
- Periderm
  - Replaces epidermis in secondary growth

#### Summary

- Primary growth from apical meristems
- Three processes of development
- Three tissue systems