

GENERAL BOTANY Lecture 19 - Roots

- I. Root development and structure**
- A. Root cap - protects the tip of the root**
 - B. Apical meristem - gives rise to meristematic tissue**
 - 1. Quiescent center - frequency of mitoses is low
 - 2. Proximal meristem
 - a) Protoderm - produces epidermis
 - b) Ground meristem - produces ground tissue (cortex and endodermis)
 - c) Procambium - produces vascular tissue (vascular cylinder referred to as the stele)
 - C. Developmental zones of the root**
 - 1. Zone of cell division (meristematic zone) - tip of root
 - a) Apical meristem & primary meristematic tissues
 - 2. Zone of cell elongation (above division zone)
 - a) Cells grow in length & diameter - little division or differentiation
 - 3. Zone of cell differentiation (uppermost - kinda where root hairs are visible)
 - a) Secondary wall formation
 - b) Formation of root hairs and endodermis
 - D. Primary root cross-section**
 - 1. Dicot
 - a) Epidermis - outermost layer - no cuticle - produces hairs
 - b) Cortex - middle tissue between epidermis and vascular cylinder - undifferentiated parenchyma cells - major region of nutrient absorption
 - c) Endodermis - encases the vascular cylinder (stele) - seals off stele from cortex
 - 1) Casparian strip - waxy thickening in cell walls of endodermal cells - contains suberin and waxes - keeps water in
 - d) Stele
 - 1) Everything inside endodermis
 - 2) Xylem occurs in radiating arms in center (diarch, triarch, etc.)
 - 3) Phloem occurs between xylem arms
 - 4) Pericycle forms a layer of parenchyma cells just to the inside of the endodermis
 - 2. Monocot - similar to dicot root, but with pith in center of the stele
 - a) Monocot stele is different because it doesn't really have "arms" and because its vascular tissue is in a polyarch arrangement
 - E. Secondary tissue of roots - laid down similarly to that of shoots**
 - 1. Vascular: Secondary xylem to the inside; secondary phloem to the outside
 - 2. Cork: Phellem to the outside and phelloderm to the inside (root bark consists of phellem and phelloderm)
- II. Root function**
- A. Anchorage - holds plants in place**
 - B. Storage - reservoir of carbohydrates and other organics**
 - C. Conduction - passageway for nutrients**
 - D. Absorption - take up water and nutrients**