

**PLANT ANATOMY Lecture 24 - Variations in Leaf Development & Structure (LVPs and Gymnosperms);
& Leaf Abscission**

- I. Brief review of angiosperm leaf development**
 - A. Leaf growth arises from division throughout the young primordium**
 - B. Marginal and submarginal initials give rise to growth of the leaf**
 - C. Emphasis is on intercalary growth (intercalary meristem located within the leaf)**
 - D. Generalized leaf development**
 - 1. Divisions in tunica and outer part of corpus provide initial cell divisions**
 - a) Peripheral zone very important in making leaves**
 - b) Marginal initials and submarginal initials give rise to leaf primordium**
 - c) Organizing zones develop**
 - 2. Cells in abaxial area end up getting stretched**
 - 3. Cells in lower palisade become spongy**
 - 4. Cells in adaxial area continue dividing**
 - E. Dicot vs. monocot vein development**
 - 1. Dicot: midrib (acropetal), main laterals (basipetal), then minor**
 - 2. Monocot: major (acropetal), additional (basipetal), then commissural**
- II. Fern leaf development and structure**
 - A. Begins as a fiddlehead structure**
 - 1. Comes from differentiation of the apical cell**
 - a) Some fern leaves have indeterminate growth and thereby resemble stems**
 - 2. Marginal meristem gives rise to marginal initials and submarginal initials**
 - B. New tissue is added to the periphery of the leaf**
 - 1. New tissue "keeps marching onward"**
 - 2. Tendency is toward open dichotomy**
 - C. Characteristics that make ferns unique from angiosperms**
 - 1. Open dichotomous**
 - 2. Presence of sori (which have spore-bearing structures - sporangia)**
 - 3. Endodermis on vascular bundle**
 - 4. Axillary buds NOT fixed - buds that form branches can occur anywhere**
 - 5. Leaf growth is by apical cell and THEN marginal meristem**
 - 6. Can have chloroplasts in epidermal cells**
- III. Gymnosperm leaf development and structure**
 - A. Leaf is all "scrunched" together**
 - 1. Generalized structure**
 - B. Characteristics that make gymnosperms unique from angiosperms**
 - 1. Open dichotomous or single midvein**
 - 2. Endodermis (maybe present) that prevents water loss - especially in the winter**
 - 3. Transfusion tissue - acts as "extra" vascular tissue (may be an evolutionary carry-over)**
 - 4. Rosette cells - modified mesophyll that can expand and collapse (especially helpful in the winter)**
- IV. Leaf abscission - the last event in leaf development**
 - A. Signals turn on leaf abscission mechanism - abscisic acid**
 - B. Tyloses develop to plug xylem vessels**
 - C. Cells in abscission zone die**
 - D. Sclerenchyma develop adjacent to abscission zone**
 - E. Leaf is left hanging by mesophyll cells**
 - F. Callose is deposited after organ "drop" and then a periderm forms to replace epidermis**
 - G. Some believe abscission zones are not necessary (some oaks lack the zone)**