

Woody Plants

WSU and UI Master Gardeners
February 25, 2020
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Topics

- ▣ **What is a Woody Plant?**
 - **Tree Biology**
 - **CODIT**
- ▣ **Planting & Pruning**
- ▣ **Tree Triage**

Woody Plant or Not ?





**This
Member of
Yucca family
is called a
Joshua Tree.
Is it also a
woody plant?**

Are Palm Trees Really Trees?

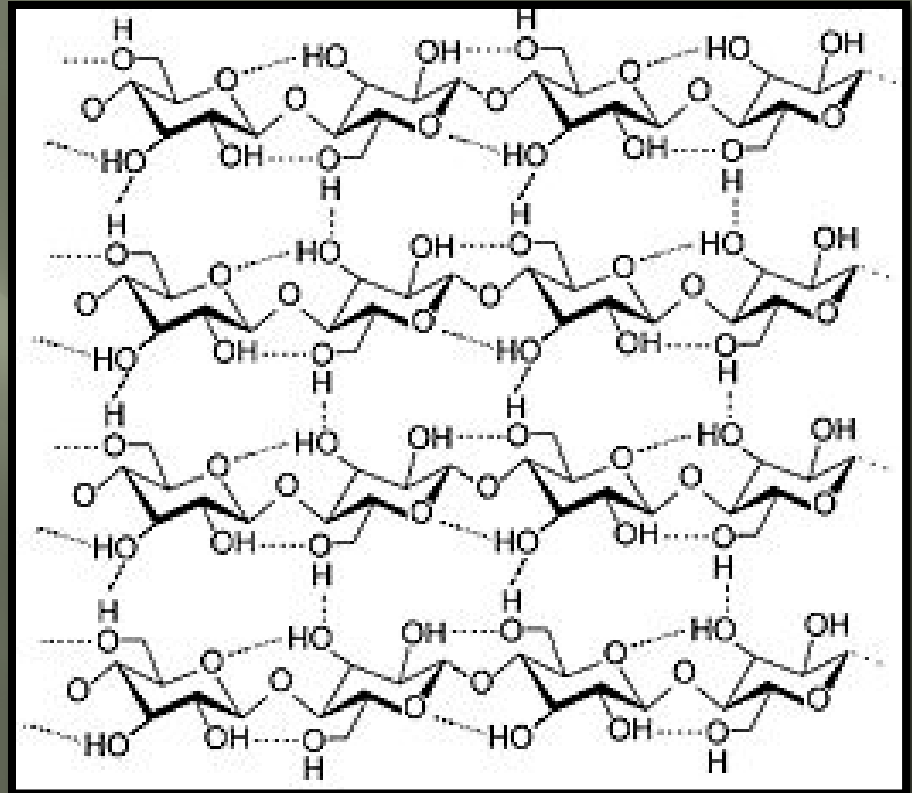


**Woody
Plant
or Not ?**



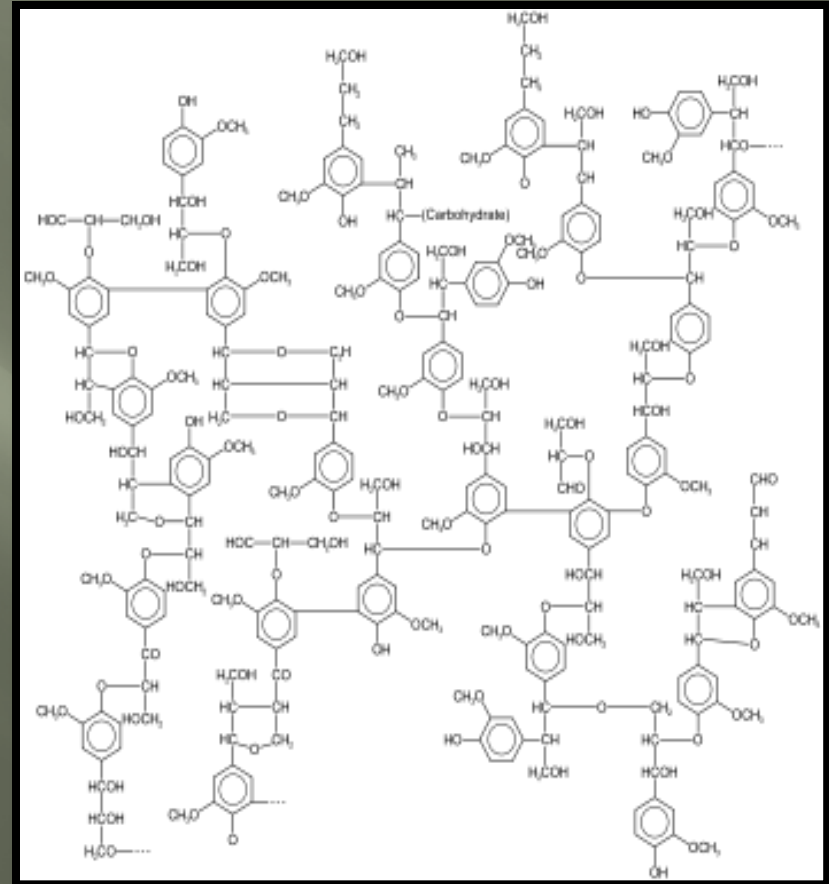
Woody Plants Produce Cellulose

- ▣ $C_6H_{10}O_5$
- ▣ Strengthens Cell Walls
- ▣ Combustible
- ▣ Insoluble in water
- ▣ Only partially digestible – dietary fiber
- ▣ 40 to 50% of wood volume

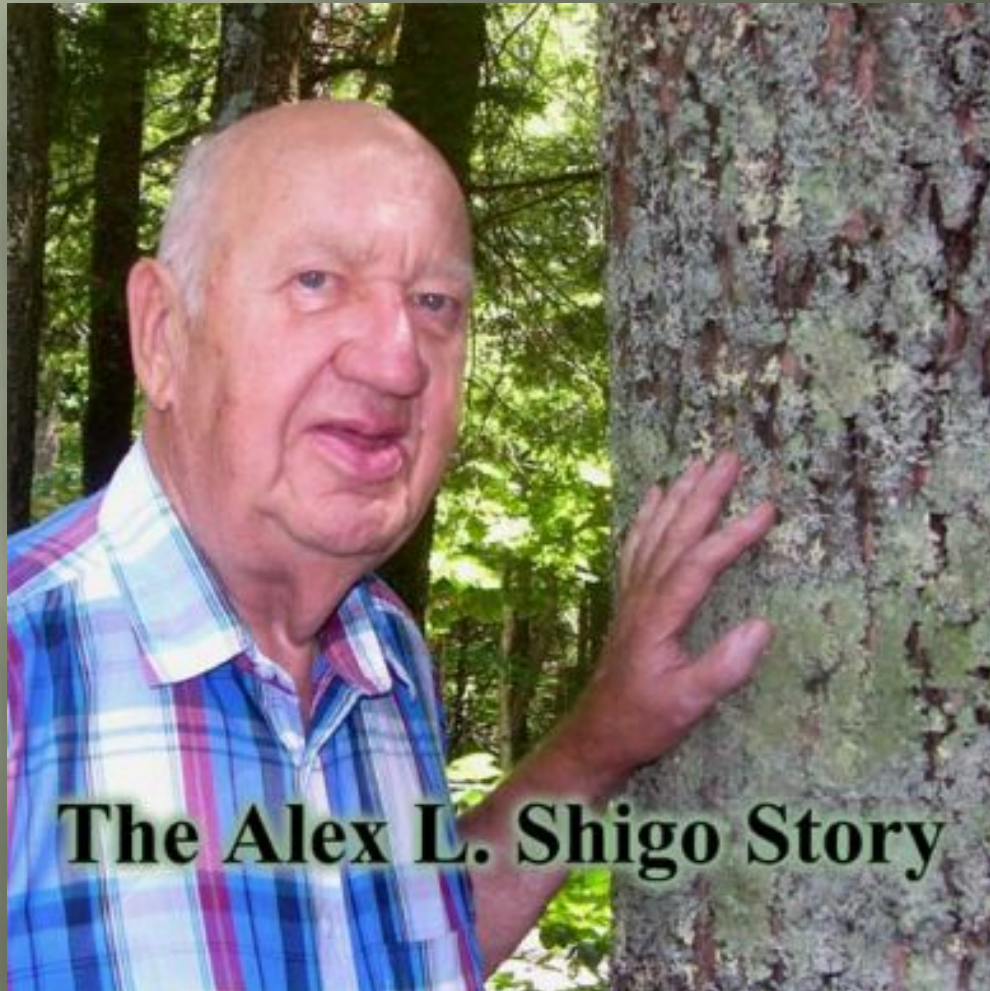


Woody Plants Produce Lignin

- ▣ $C_9H_{10}O_2$
- ▣ Strengthens cell walls in Xylem
- ▣ Sequesters carbon
- ▣ 30% of wood volume
- ▣ Decomposes slowly
- ▣ Becomes humus
- ▣ Increases water holding capacity of soil
- ▣ Increases cation exchange



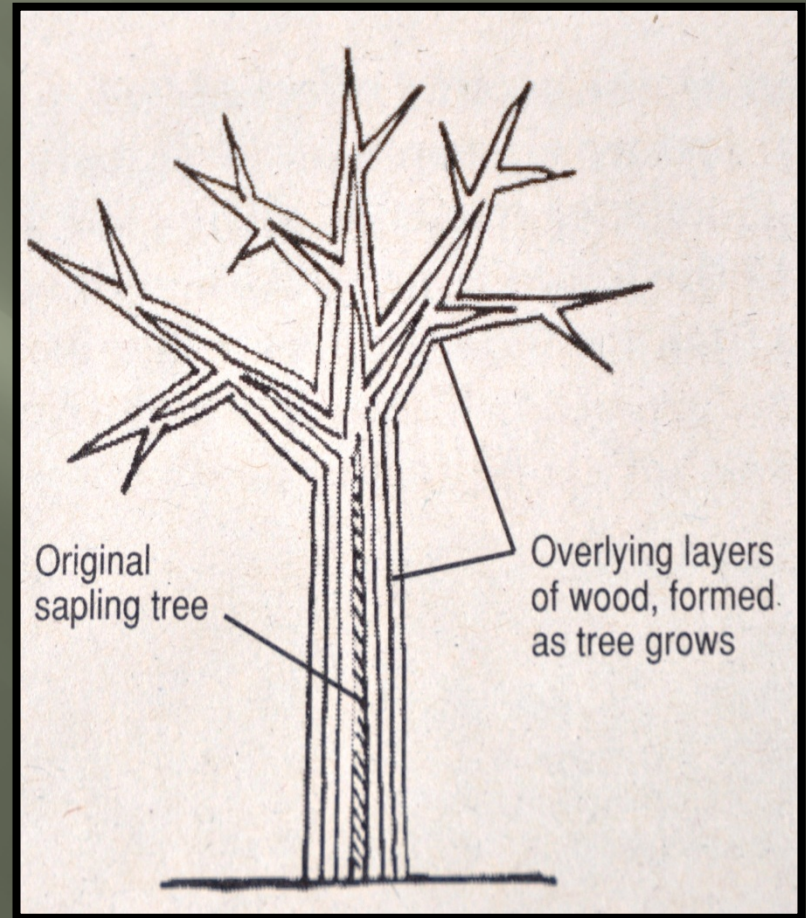
Trees are long-lived compartmentalizing perennials



The Alex L. Shigo Story

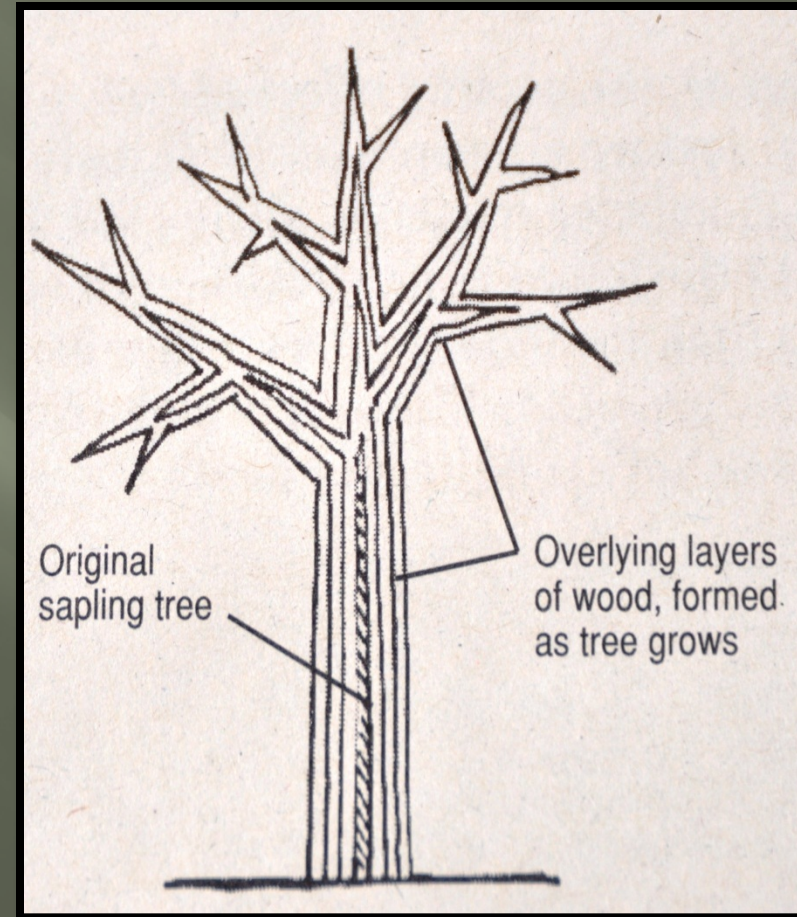
Trees vs. Other Plants

- ▣ Trees have secondary growth
- ▣ Trees grow radially as well as vertically



Trees vs. Mammals

- ▣ Mammals are re-generating organisms
- ▣ Trees are generating organisms
- ▣ Trees are Autotrophs – they produce their own food



Woody Plants Can:

- ▣ **Grow**
- ▣ **Reproduce**
- ▣ **Compartmentalize
Damage**
- ▣ **Sequester Carbon**
- ▣ **Defend themselves**

Trees can GROW

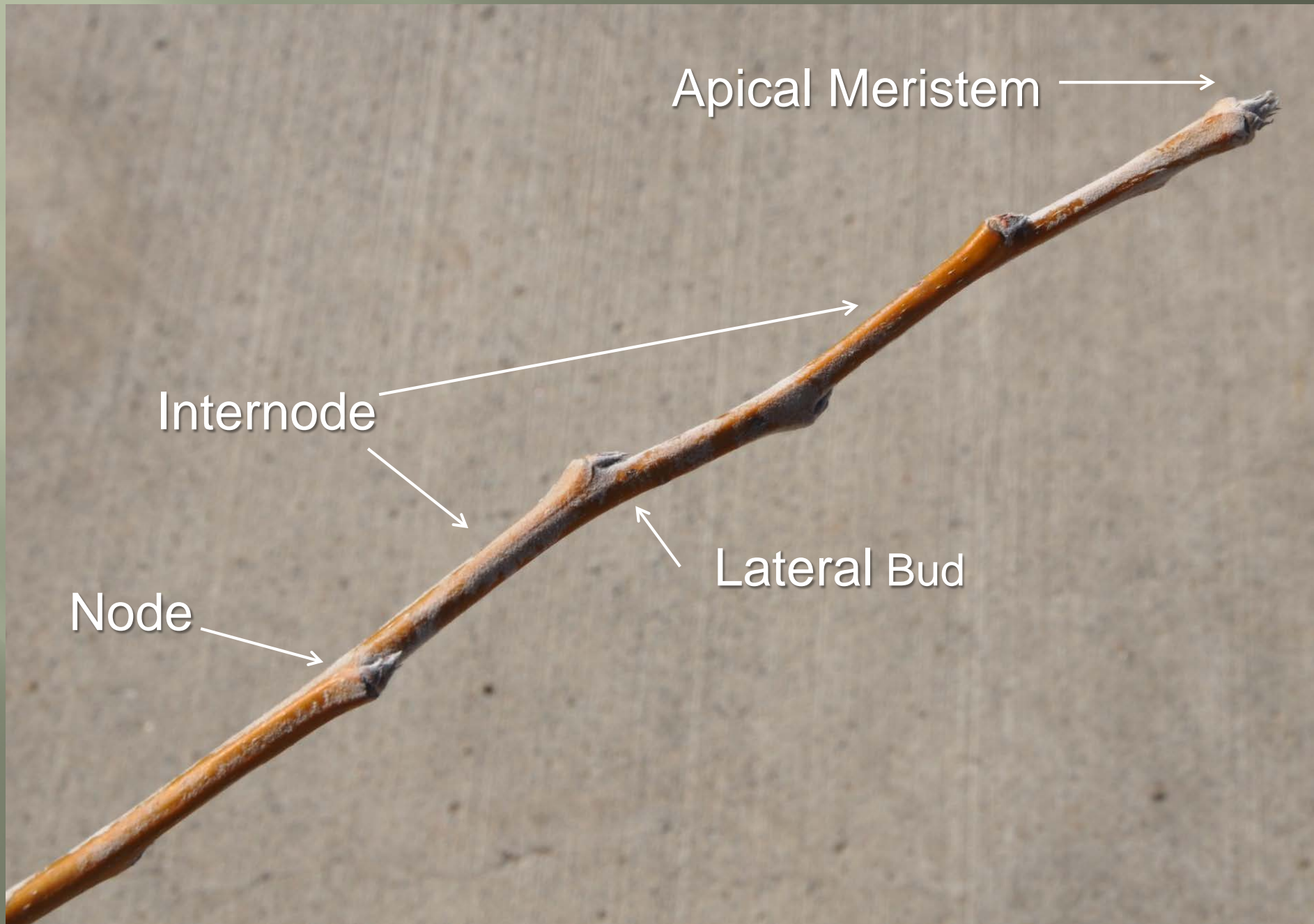


Meristems: How trees grow

Undifferentiated tissue in which active cell division takes place

Found in:

- Root tips
- Buds
- Cambium
- Cork Cambium
- Latent Buds



Apical Meristem →

Internode →

Node →

← Lateral Bud

Latent Buds



Twig Anatomy showing twig extension/ growth

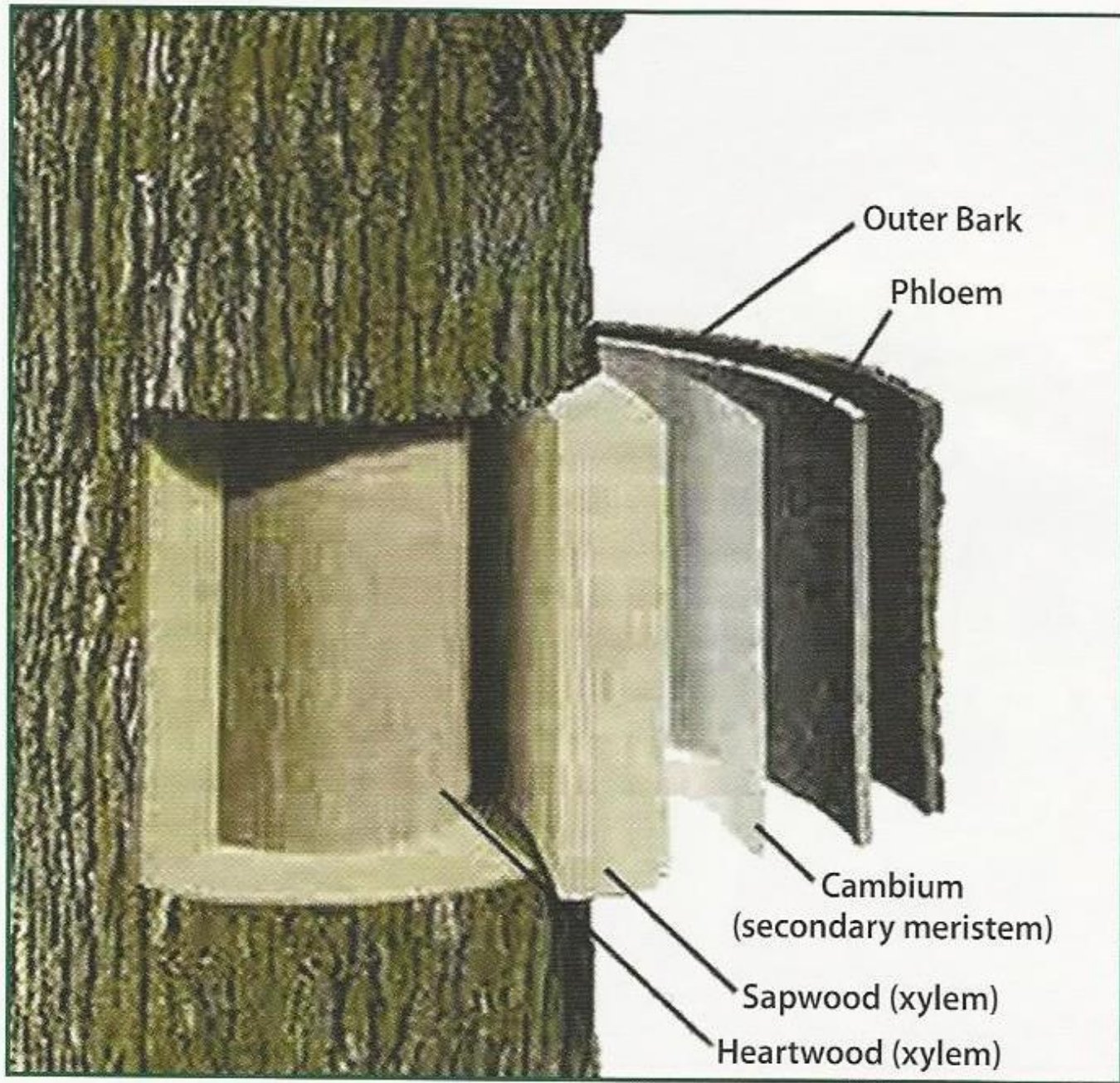


65 year old Tulip Tree, *Linodendron tulipifera*



A Tree's Life is open book

Whorls
Terminal growth
Lateral growth
Buds
Candles



Phloem

Xylem



Bark

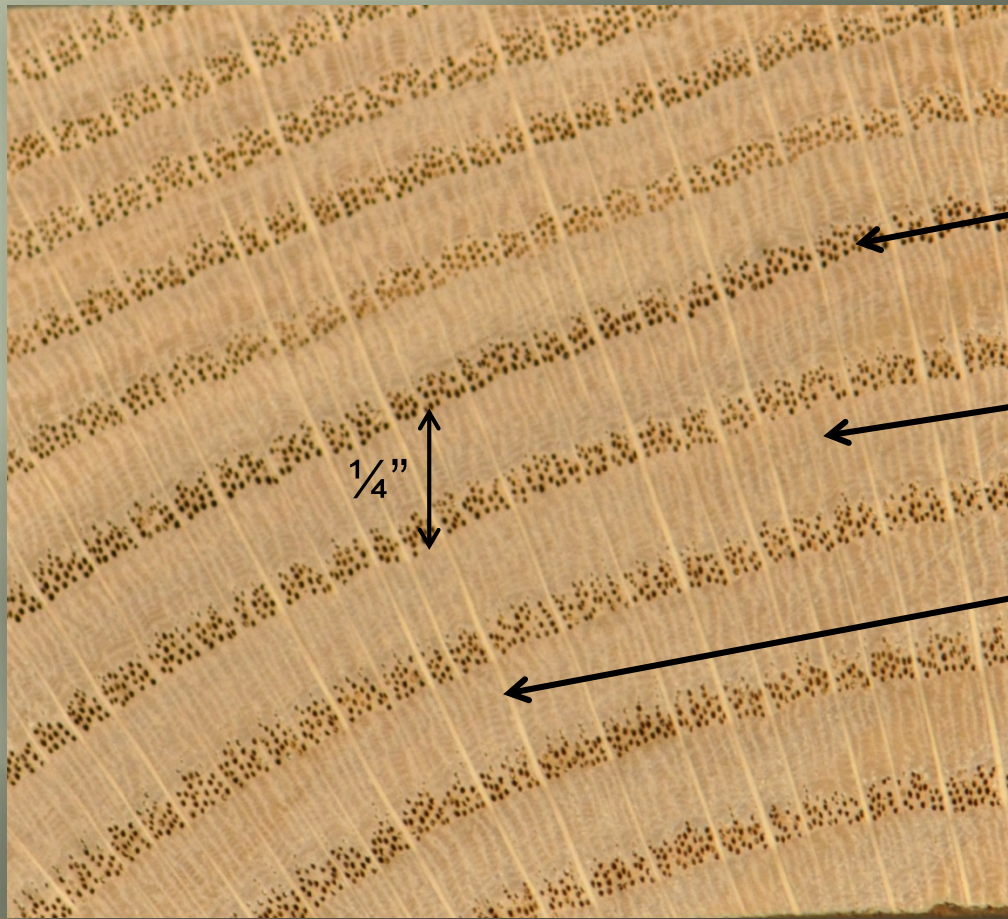
Cambium

Heartwood

Phloem and Xylem Functions

- Conduction of water and dissolved minerals
- Support the weight of the tree
- Storage of carbohydrate reserves
- Defense against spread of disease and decay
- Radial growth of tree

White Oak Cross Section



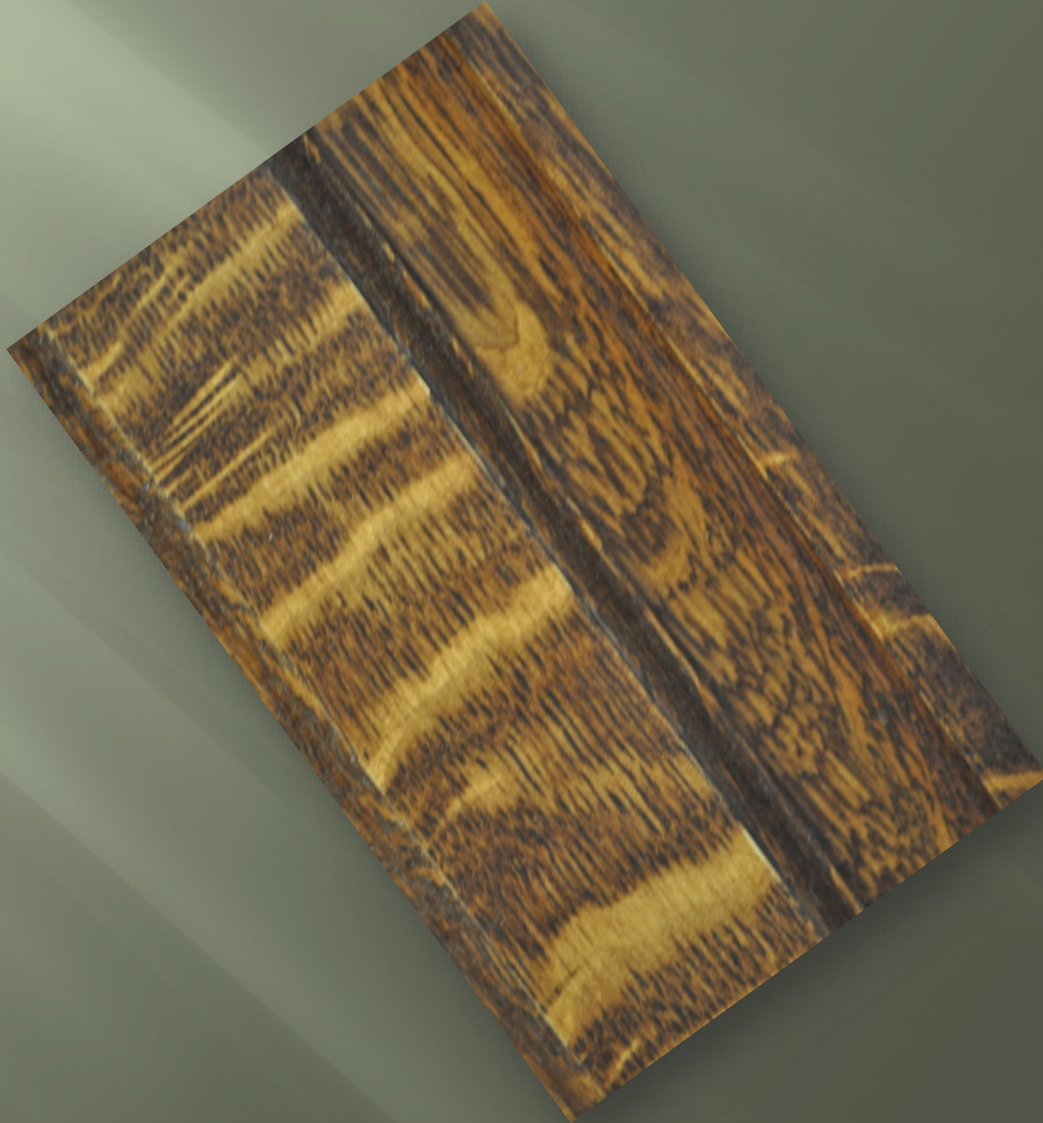
Annual Rings

Spring Wood

Summer Wood

Rays

Quarter Sawn Oak



Exfoliating Bark?



Exfoliating Bark?



Trees can Reproduce



Accepted Taxonomic Units

Kingdom - Plantae

Division - Panerogamia

(Flowering plants, seed bearing)

Class - Gymnosperms - Angiosperms



**Naked Seed,
*Conifers***



Fruit Bearing



Monocots

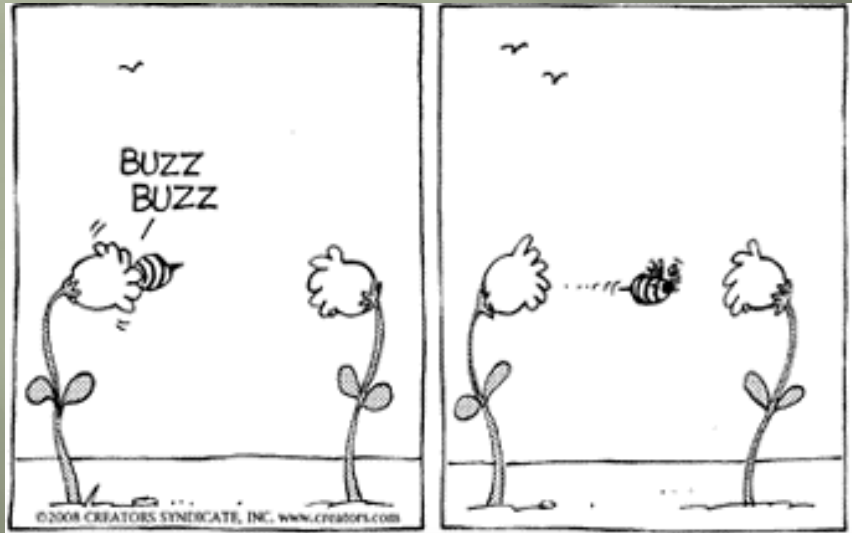


Dicots

Gymnosperms/ Angiosperms

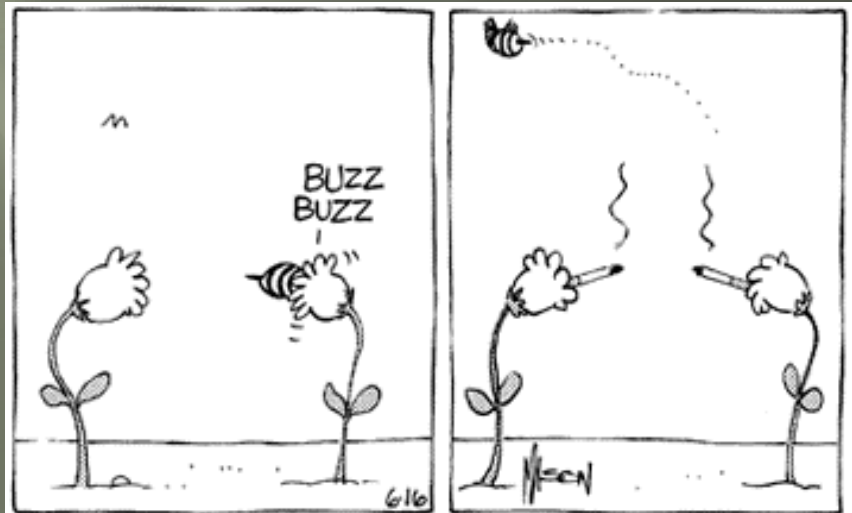


Frank Talk About Tree Reproduction



“Some people don’t realize plants have sex at all” *

Perfect flowers – both male and female parts in one flower (apples)



Male and female parts on the same tree

Male and female parts on different trees

*Thomas Leo Orgen
Allergy Free Gardening

Monoecious - Dioecious

- ▣ One House (Gr.)
- ▣ Male and Female same plant

- Pine
- Fir
- Alder
- Birch
- American Beech
- Black Walnut
- Oak

- ▣ Two households (Gr.)
- ▣ Male and Female parts on different plants

- American Holly
- Green Ash
- Osage Orange
- Tree of Heaven
- Yew
- Willow
- Ginkgo

Trees

Compartmentalize

CODIT

Compartmentalization
of Decay (Damage) In
Trees

CODIT



Boundary setting process creates up to 4 walls

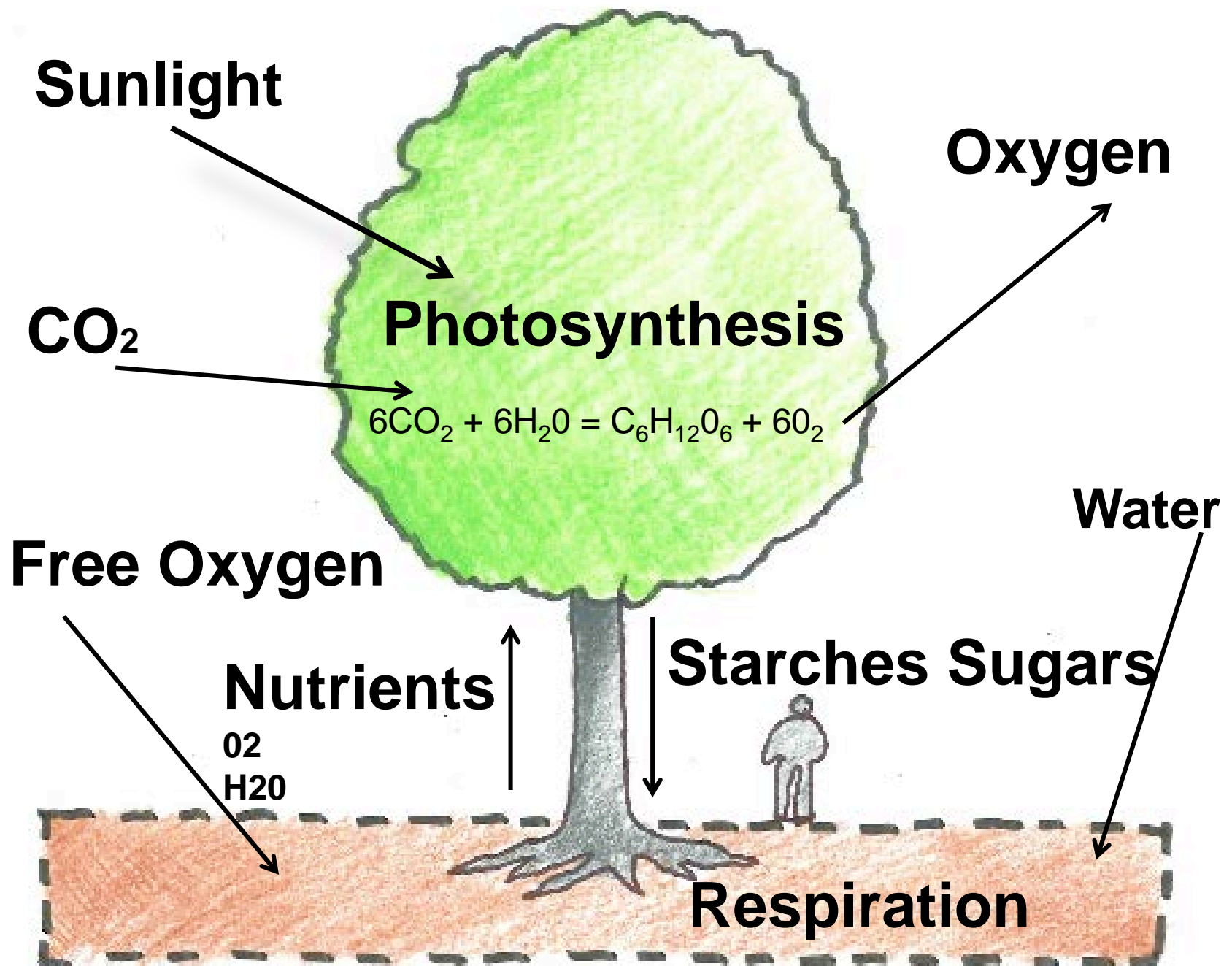
- Wall 1 – plugs xylem, weakest wall
- Wall 2 – growth rings
- Wall 3 – Rays
- Wall 4 – Along cambium, strongest wall



Douglas Fir, *Pseudotsuga menziesii*



Trees can
SEQUESTER
CARBON

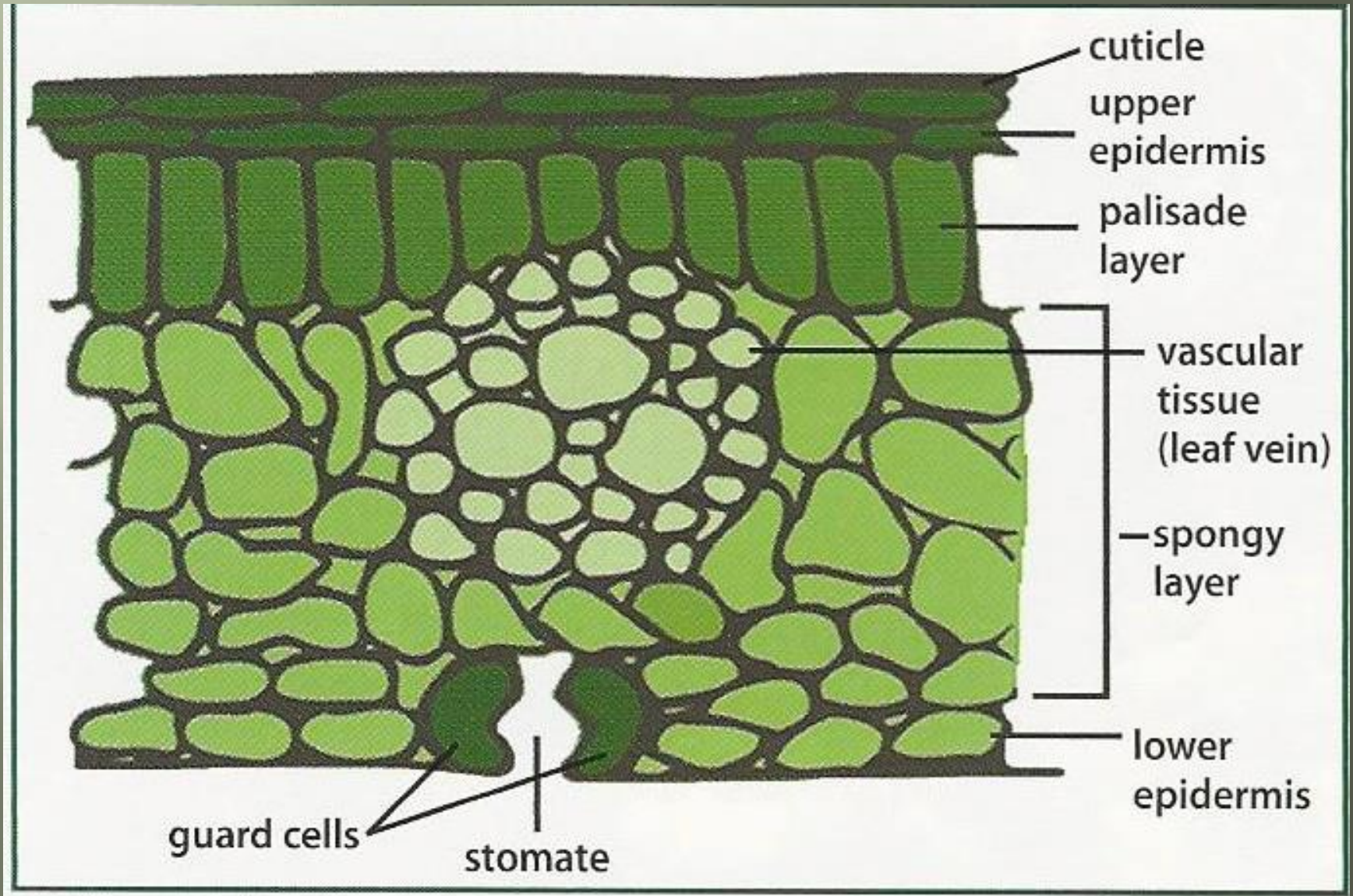


Food Production - Role of Leaves

First Function – Photosynthesis (light creating something) Cells contain Chloroplasts that contain chlorophyll absorb sunlight and cause a chemical reaction

Second Function – Transpiration (loss of water vapor that cool the leaf and draws water and nutrients up through the xylem). The cuticle keeps the leaf from desiccating. Water vapor and gasses exit the leaf through stomata which are controlled by guard cells.

Leaf Cross Section



Protective Systems

- Thick bark
- Thorns
- Leaf Hairs
- Thick cuticles
- Cellular material to resist decay or indigestible for insects
- Production of chemicals that resist feeding insects, pathogen infections, decay
- Production of chemicals that limit competition by other plants

REVIEW

Five Woody Plants Characteristics

- Grow
- Reproduce
- Compartmentalize Damage
- Sequester Carbon
- Defend Themselves

Root Functions

- Anchor tree
- Take in H_2O , O_2 , nutrients from the soil
- Store food and minerals



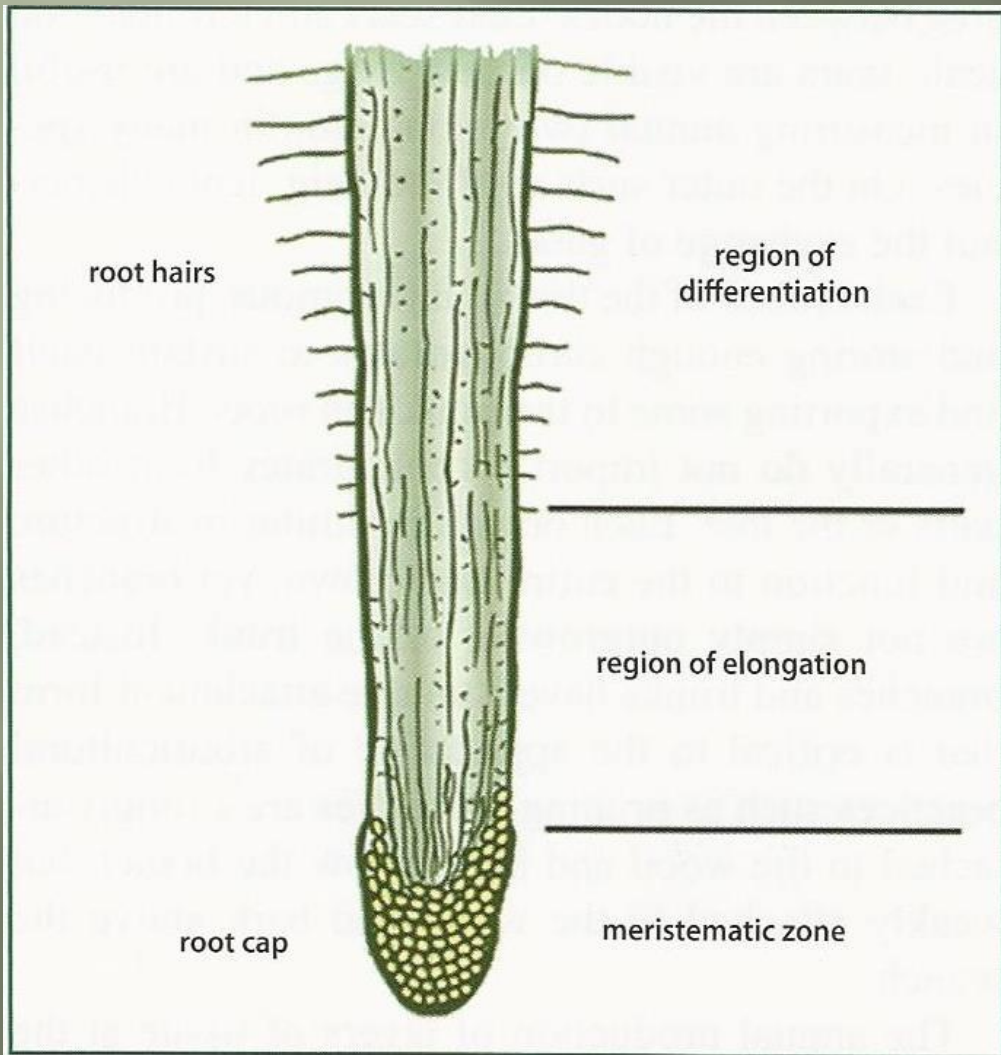
Types of Roots

- Absorbing roots
 - Small, fibrous, primarily at end of woody roots
- Lateral roots
 - Near surface
- Buttressing roots, *crown roots*
 - Near trunk, equalize mechanical stress
- Sinker
 - Growing downward from Lateral Roots
- Tap roots
- Root crown



2008 - 2013
R.I.P

Roots & Root Hairs



Mycorrhizae: symbiotic relationship between roots and fungi



Leaf Pigmentation

Chlorophyll – Green

Anthocyanin – Red

Carotene – Orange

Xanthophyll – Yellow



Leaf, Petiole, Abscission Zone



Excurrent - apical dominance



Excurrent Growth Habit

- Main stem outgrows lateral branches
- Pyramidal shaped tree results
- Auxin creates apical control

Decurrent - lack of apical dominance



Decurrent Growth Habit

- Rounded shape
- Lacks central leader
- Lateral branches grow about as fast as the leader
- Weak apical control









Questions ?