

Plant Structure and Growth



And now for something completely different

Why should we care about plants?

- Do you enjoy breathing?
- Hungry?
- Don't feel well?
- What are you writing on?
- Local uses



Lecture outline

- Plant evolutionary tree
- Plant structure
 - Organs
 - Tissues
 - Cells
- Plant growth



Plant evolutionary tree

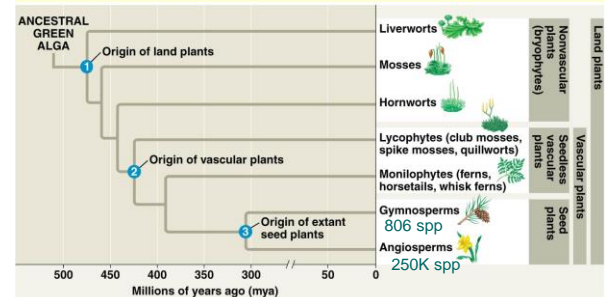


Fig. 29.6

Angiosperms

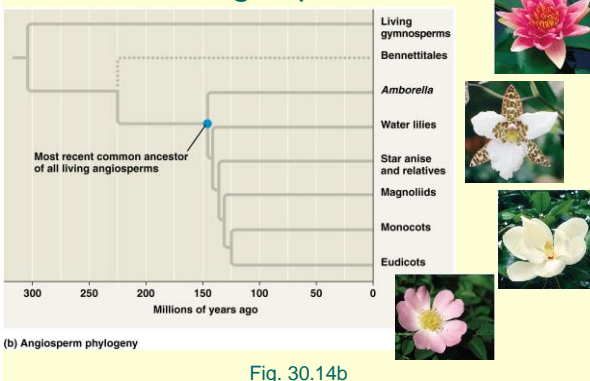
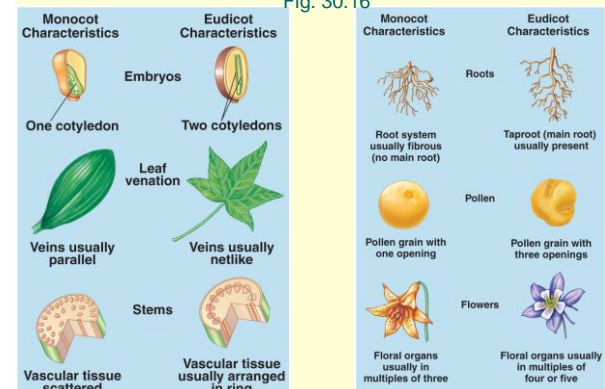


Fig. 30.14b

Cots

- Cotyledon = seed leaf

Fig. 30.16



The beginning, a very good place to start

- Two major systems
 - Their roles?
- Three major organs

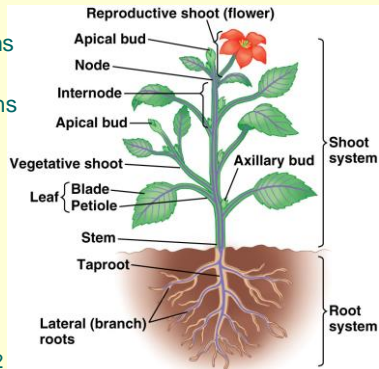


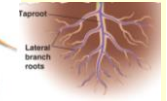
Fig. 35.2

The root system

- Root hairs—role?
- Fibrous roots—role?
- Tap roots—role?
- Adventitious roots—role?



Fig. 35.3



The shoot system

- Stems and leaves
- Vegetative or reproductive
- Apical dominance—the apical buds rule
 - Pruning?

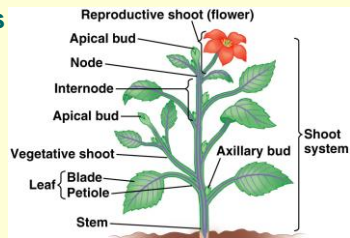


Fig. 35.2

Modified stems

- Stolons—surface
- Rhizomes—underground
- Tubers—enlarged ends of rhizomes*
- Bulbs—enlarged bases of leaves



Roles??

Fig. 35.5

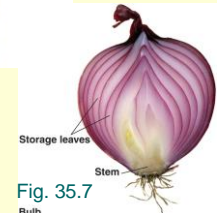


Fig. 35.7

Leaves

- Leaf = blade + petiole
 - Many monocots lack petioles
- Simple vs. compound
 - The bud always knows: one bud = one leaf

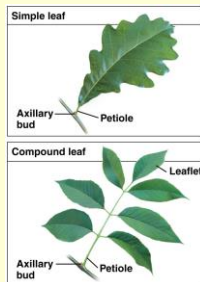


Fig. 35.6

Modified leaves

- Tendrils
- Spines
- Storage
- Reproductive
- Bracts

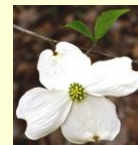


Fig. 35.7

Dogwood photo
© Hilton Pond Center

Modified leaves (2)



Figures from *Smithsonian* article, 2010



Tissue systems

- Leaves, stems, and roots each have three tissue systems

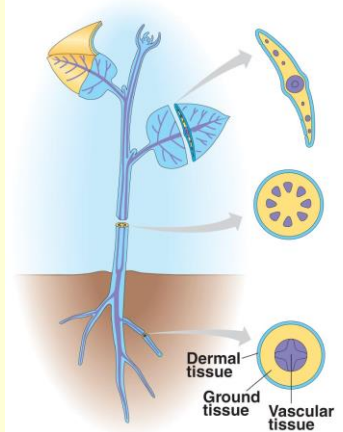
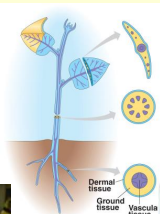


Fig. 35.8

Dermal tissue (1)

- Epidermis
- Root hairs
- Cuticle
- Periderm

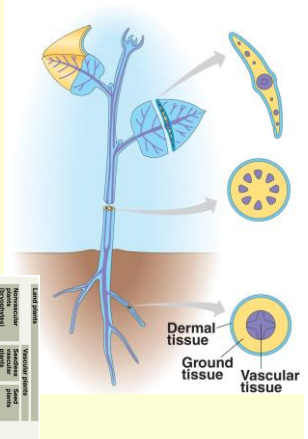
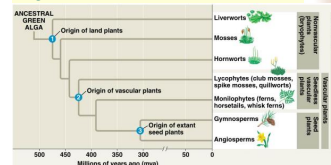


© 2001 Florida.com

Vascular tissue (2)

- Xylem
- Phloem

Fig. 29.5

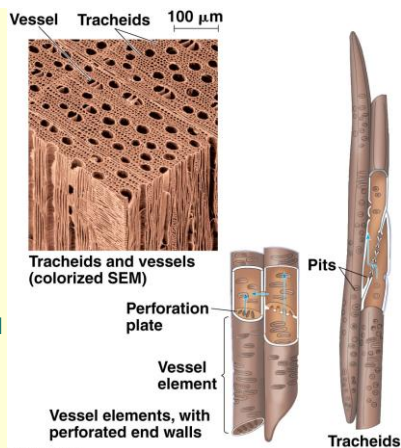


Xylem

- Tracheids
- Vessel elements

Functional = dead

Fig. 35.10



Phloem

- Sieve-tube members
- Companion cells

Functional = alive

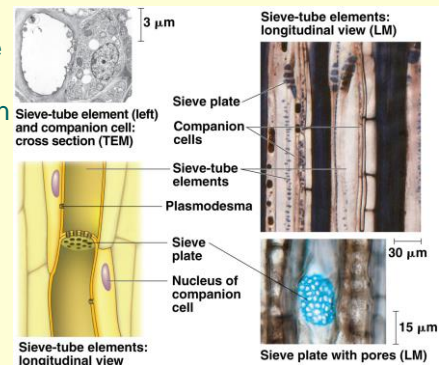
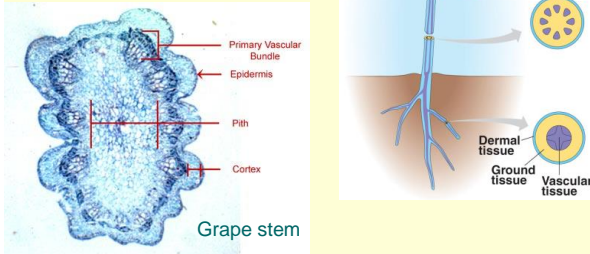


Fig. 35.10

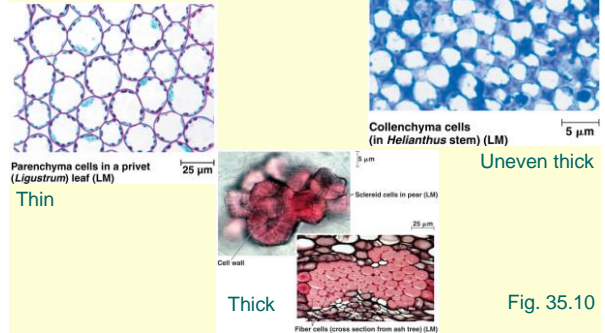
Ground tissue (3)

- Pith (internal to vascular tissue)
- Cortex (external)
- Several functions



Other types of plant cells

- Parenchyma, collenchyma, sclerenchyma
- Roles?



Plant growth overview

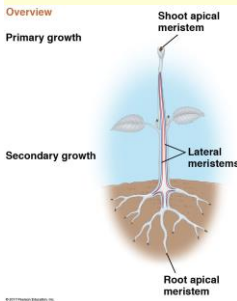


Fig. 35.11

- Most plants have **indeterminate growth**
 - Meaning?
- How is this possible?
 - Perpetually embryonic tissues: **meristems**
- **Apical meristems** give rise to **primary growth**
 - = lengthening
- **Lateral meristems** give rise to **secondary growth**
 - = thickening

Primary growth of roots

- 4 major sections

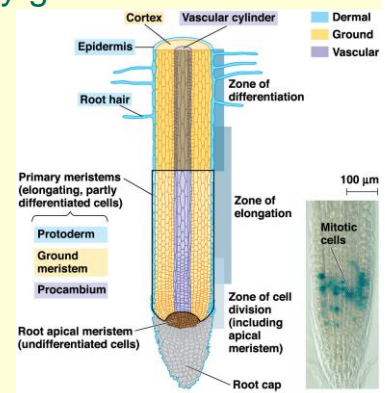


Fig. 35.13

Secondary growth in two types of lateral meristems

Woody plants

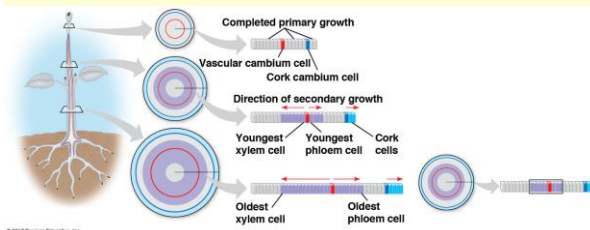


Fig. 35.11

Secondary growth cross-section

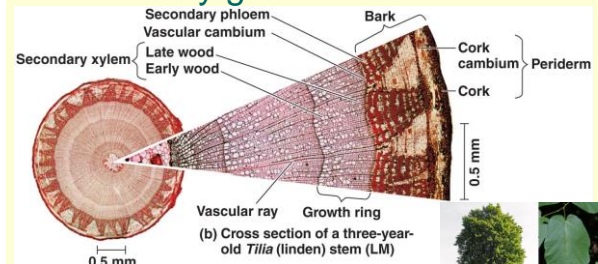


Fig. 35.20

Tree trunks

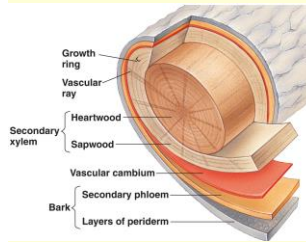


Fig. 35.22



Fig. 35.23