Lec 2. Plant body: form & function

1. Seed plants are the most successful land plants. Why?

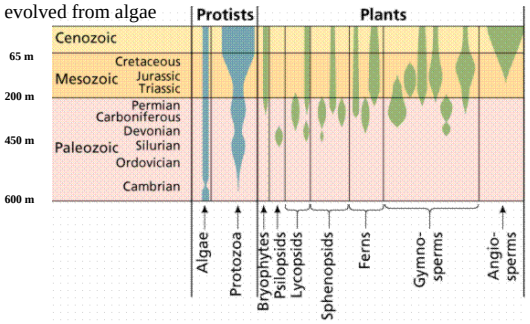
   Main stages of a plant's life cycle.

2. Plants have developed appropriate structures to carry out the functions: leaf, stem, root, flower
3. **Organs** are made of tissues. **Tissues** are made of different cell types
4. How do plants develop organs, tissues and cells?
5. Why do **cell types** differ in structure and function?

   Differential gene expression: DNA → RNA → protein
   Different enzymes/proteins are working

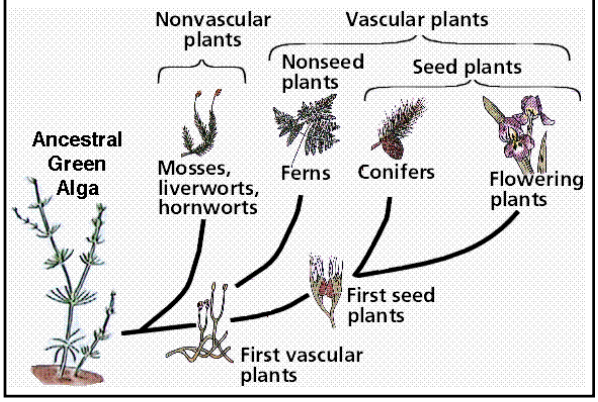
Ref. BSCI 124, lec. 2 & 4

Geologic time: Fossil records indicate that higher plants evolved from algae



The fossil records of some protist and plant groups. The width of the shaded space is an indicator of the number of species. Image from Purves et al., Life: The Science of Biology, 4th Ed.

Land plants evolved from an algal ancestor.

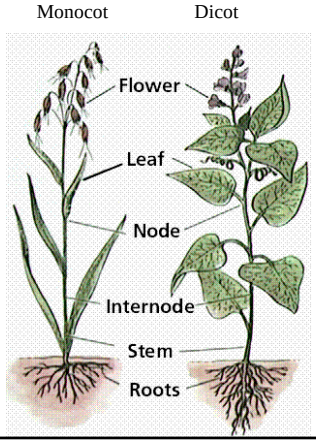


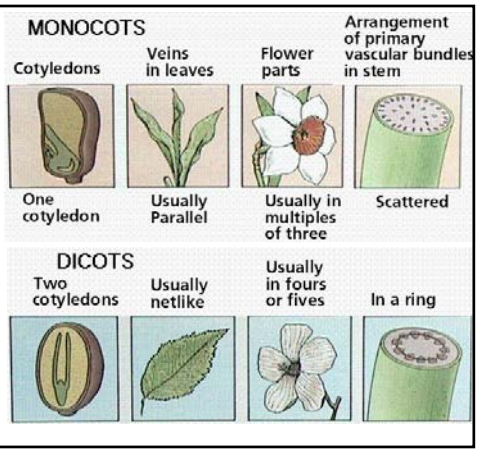
Plants developed adaptations to survive on land

- 1. Surface to prevent drying out.
- 2. Pores for gas exchange
- 3. Support to give structure to plant body
- 4. Plumbing system to distribute nutrients and water.
- 5. Accomplish fertilization without an aqueous environment.
- 6. Development of seed with dormant embryo.

Angiosperms or flowering plants are the most advanced and dominant plants.

1. **Monocot**
2. **Dicot**





Major stages in the life of a plant

Seed - → 1. Seed germination → Seedling

Seedling → 2. Development of the plant body → Vegetative Plant

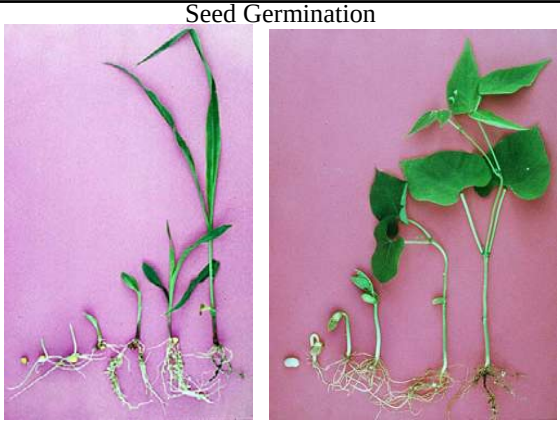
Vegetative Plant → 3. Development of the reproductive organs (flower) → Reproductive plant

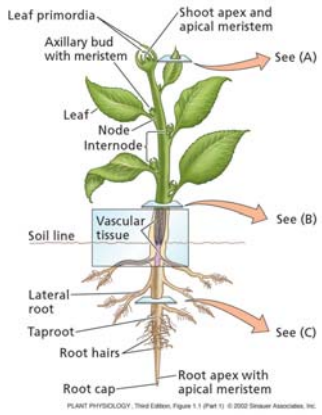
Reproductive plant → 4. Seed formation → Seed -

Heterotrophs

Autotrophs

Seed Germination





Development of the vegetative plant body.

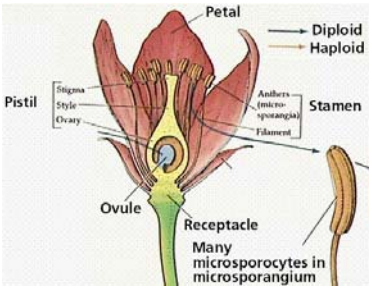
Plants develop appropriate structures to carry out special functions.

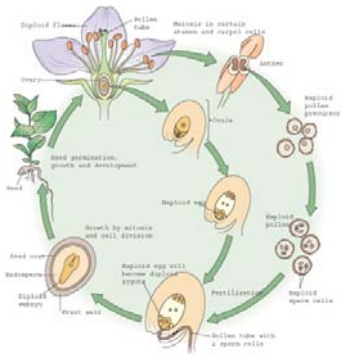
Veg. plant body is made of 3 organs:

- leaf
- Stem
- root

Reproductive development involves formation of flowers

1. *Sepal*
2. *Petal*
3. *Stamen: male organ*
4. *Pistil: female organ*





Reproductive development involves formation of flowers

Stamen: male organ

Pistil: female organ

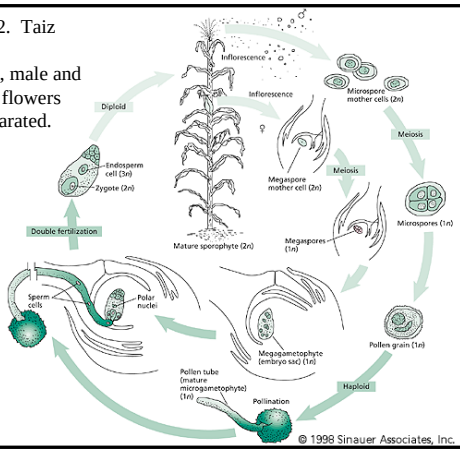
Pollination

Fertilization

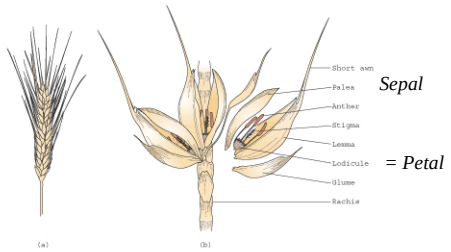
Insect or bird pollinated flowers are colored and fragrant.

Fig. 1-2. Taiz

In corn, male and female flowers are separated.



Grass Flower: Wheat



Sepal

= Petal

Wheat spikelet

Wind pollinated flowers are not showy

Reproductive Organs

Flower: produces egg and sperm
promote pollination and fertilization

4 organs:

- Sepals
- Petals
- Stamens
- pistils

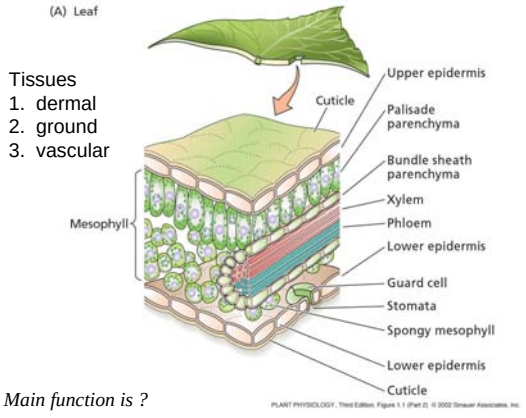
Fruit: protects embryo from harsh environment,
protects embryo from animals
promotes seed dispersion
? Difference between fruit and seed?

1. **A plant body is made up of cells, tissues and organs**.

ORGANS:
Veg. body is made up of three organs: function?
leaf,
stem
root
Reproductive organs are:
flower
fruit

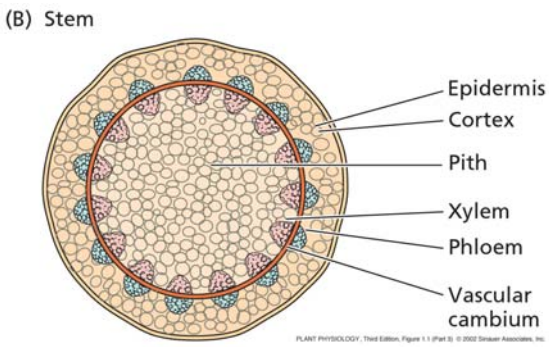
Tissues: Each organ is made of several tissues.
A tissue has a particular function.
1. dermal
2. ground
3. vascular
[4. Meristem]

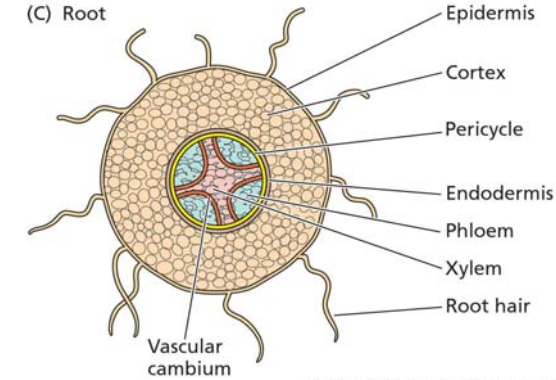
Cell types



Tissues
1. dermal
2. ground
3. vascular

Main function is ?





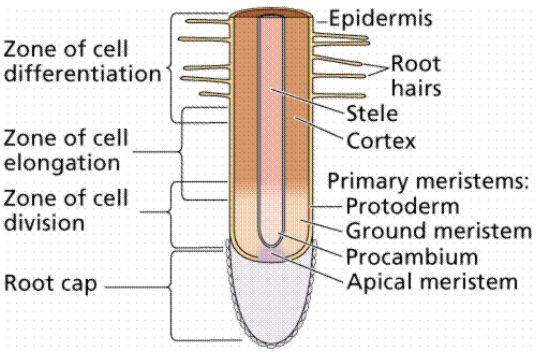
Cell types: A tissue consists of one or more cell types.

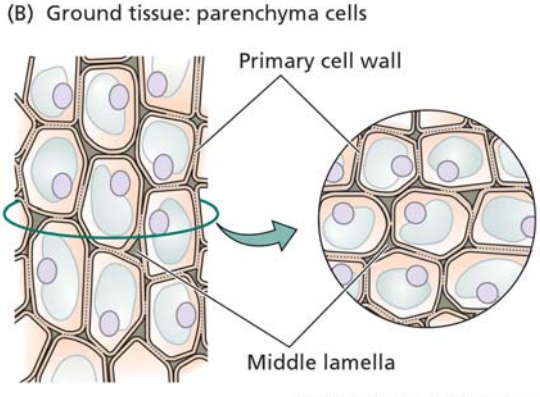
1. Dermal tissue includes the epidermis, guard cell (leaf)
2. Ground tissue: includes cortex, mesophyll parenchyma
3. Vascular tissue includes xylem tracheids,
   phloem sieve tube, companion cells

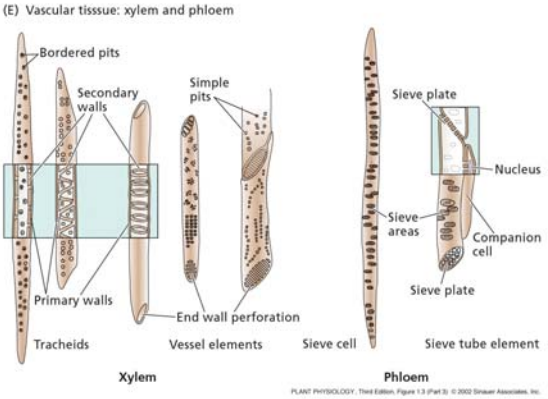
Cells are grouped in tissues and several tissues make up an organ.

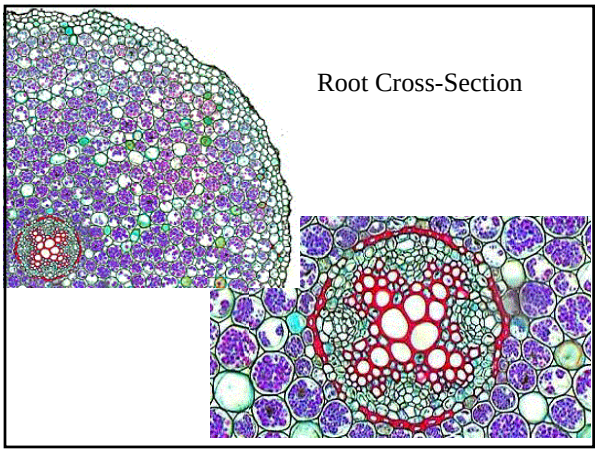
The ability of plants to grow and develop depends on the ability of individual cells to divide, differentiate and to carry out their intended functions.

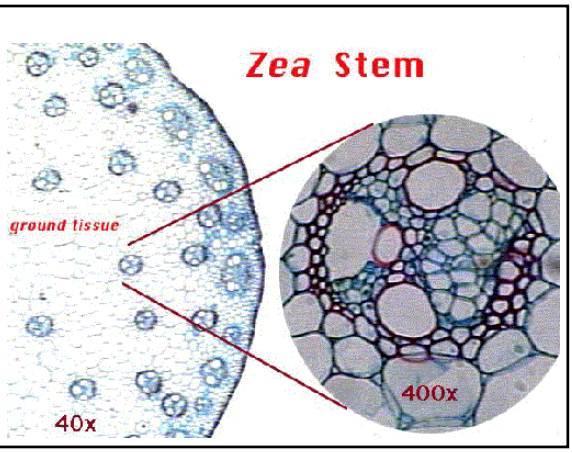
LS of Root shows different growth zones











How do plants develop organs & cell types?

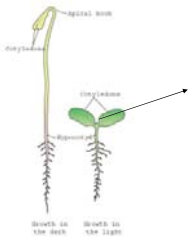
Plants development is characterized by permanent embryogeny

Unlike animals, plants can grow indefinitely at the growing tips.

- shoot apical meristem
- root apical meristem

Growth and Development includes:

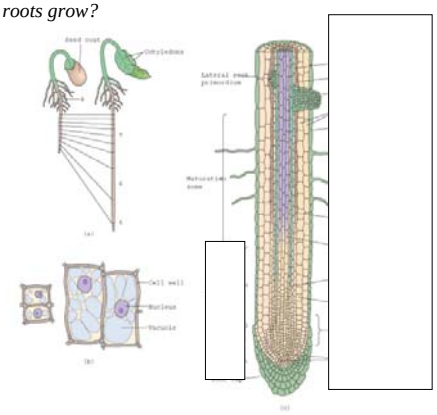
- **Cell Division**
- **Enlargement (or Elongation)**
- **Differentiation (or specialization) ---> cell types**

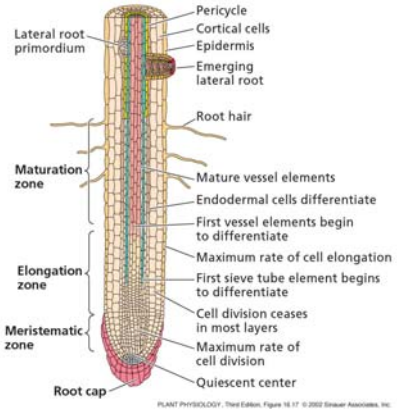


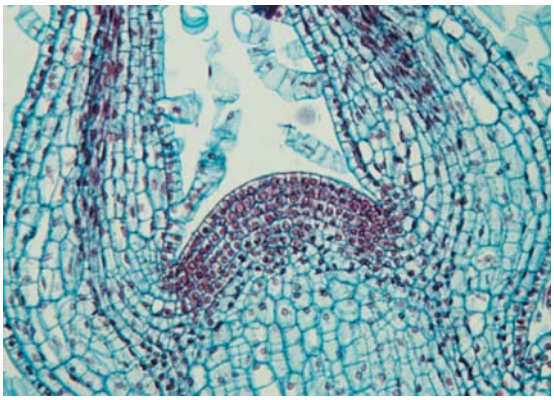
Meristems: cells can continuously divide

- Shoot apical meristem --->leaf and stem
- Root apical meristem --> root
- Cambium ---> increase girth of stem

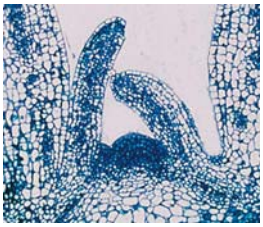
How do roots grow?



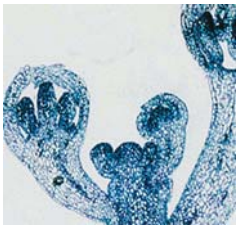




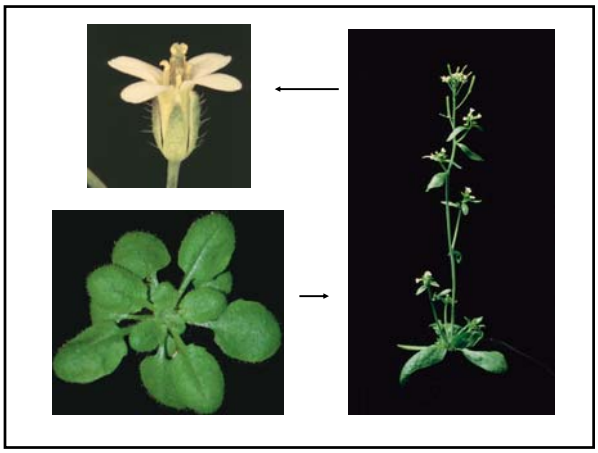
16-13. Shoot apical meristem



Shoot apical meristem



Floral apical meristem



Recap

Name these foods:

Organ?

Carrot

Spinach

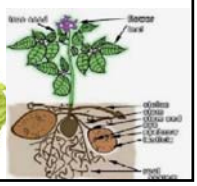
Sugar cane

Tomato

Brocolli

Corn on the cob

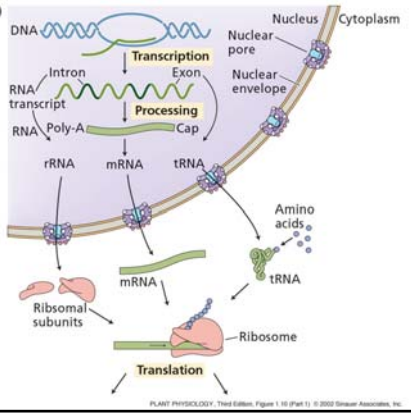
Tissues of a root



Why do cell types look and behave differently?

Why do cells differ in form and function?

1-10. Differential Gene expression



1-4. Plant cell