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

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

MONOCOTS
- Cotyledons: One
- Venation: Usually parallel
- Flower parts: Usually in multiples of three
- Arrangement of primary vascular bundles: Scattered

DICOTS
- Cotyledons: Two
- Venation: Usually net-like
- Flower parts: Usually in fours or fives
- Arrangement of primary vascular bundles: In a ring
**Major stages in the life of a plant**

1. Seed germination
2. Development of the plant body
3. Development of the reproductive organs (flower)
4. Seed formation

**Reproductive plant**

- Heterotrophs
- Autotrophs

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**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

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**Reproductive development involves formation of flowers**

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

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**Pollination**

- Insect or bird pollinated flowers are colored and fragrant.

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**Fig. 1-2. Taiz**

In corn, male and female flowers are separated.
1. A plant body is made up of cells, tissues and organs.

**ORGANS:**
- Vegetative body is made up of three organs: 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**

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**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?
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.
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
- Broccoli
- 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

1. Tonoplast
2. Vacuole
3. Peroxisome
4. Nuclear envelope
5. Chromatin
6. Mitochondrion
7. Ribosomes
8. Rough endoplasmic reticulum
9. Smooth endoplasmic reticulum
10. Golgi body
11. Chloroplast
12. Intercellular air space