

Plant Form and Function and Reproduction

Chapter 17 and 18

Organization of a Vascular Plant

- All parts have outer covering of protective tissue and inner matrix of tissue with embedded vascular tissue that conducts water, nutrients, and food.
 - ❖ Organized along vertical axis
 - Root
 - Shoot
 - Stem
 - Leaves

Organization of a Vascular Plant

- Meristems - Growth zones of unspecialized cells whose main function is to divide.
 - ❖ Primary growth initiated at tips of apical meristems.
 - ❖ Secondary growth involves activity of lateral meristems.

Plant Body

Plant Tissue Types

- Ground Tissue - contains vascular tissue.
- Dermal Tissue - outer protective covering.
- Vascular Tissue - conducts water and dissolved materials.

Ground Tissue

- Parenchyma cells
 - ❖ Alive at maturity with functional cytoplasm and a nucleus.
- Collenchyma cells
 - ❖ Living at maturity and form continuous cylinders beneath epidermis.

Ground Tissue

- Sclerenchyma cells
 - ❖ Tough, thick cell walls, and do not contain living cytoplasm when mature.

Dermal Tissue

- Often covered with waxy cuticle.
- Guard Cells - Paired cells with openings (stomata) beneath.
- Root Hairs - Tubular extensions of single epidermal cells that keep root in intimate contact with soil particles.

Vascular Tissue

- Xylem - Principle water-conducting tissue.
 - ❖ Tracheids
 - ❖ Vessel Members

Vascular Tissue

- Phloem - Principle nutrient-conducting tissue.
 - ❖ Sieve Cells
 - ❖ Sieve-Tube Members
 - Sieve Tubes
 - Companion Cells

Leaves

- Mesophyll:
 - ❖ Palisade
 - ❖ Spongy

Stems

- Primary Growth
 - ❖ Primary growth of shoot, leaves cluster around apical meristem unfolding and growing as stem elongates.
 - Bud develops in axil of each leaf.
 - Hormone moving downward from the terminal bud continuously suppresses lateral bud expansion.

Stems: vascular tissue

Stems

- Primary Growth
 - ❖ Strands of vascular tissue are arranged around outside of stem, common in dicots, or scattered throughout, common in monocots.
 - Pith
 - Cortex

Stems

- Secondary Growth
 - ❖ Initiated by differentiation of vascular cambium.
 - Thin cylinder of actively dividing cells located between bark and main woody stems in plants.
 - ❖ Cork Cambium develops in stem's outer layers.
 - Cork cells

Vascular Cambium

Root Structure

Essential Plant Nutrients

- Nitrogen - Proteins and nucleic acids.
- Potassium - Regulate turgor pressure.
- Calcium - Component of middle lamellae.
- Magnesium - Part of chlorophyll molecule.
- Phosphorus - Nucleic Acids and ATP.
- Sulfur - Key component of Cysteine.

Seedless Vascular Plants

- Most abundant of the four phyla of seedless vascular plants contain ferns with about 12,000 living species.
 - ❖ Have both gametophyte and sporophyte individuals, each independent and self-sufficient.
 - Gametophyte produces eggs and sperm.
 - Sporophyte bears and releases haploid spores.

Seed Plants

- Seed - Embryo cover that offers protection of embryonic plant at its most vulnerable stage.
 - ❖ Male and Female gametophytes
 - Male - microgametophytes (pollen grains) arise from microspores.
 - Female - megametophytes contain eggs and develop from megaspores produced within ovule.
 - Pollination - transfer of pollen.

Seed Plants

- Five living phyla of seed plants:
 - ❖ Four are gymnosperms - ovules not completely enclosed by sporophyte tissue at time of pollination.
 - ❖ Fifth is angiosperms - ovules completely enclosed by vessel of sporophyte tissue (carpel) at time of pollination.

Seed Structure Seed Plants

- Adaptive value of seeds:
 - ❖ Dispersal
 - Facilitate migration and dispersal
 - ❖ Dormancy
 - Wait for favorable conditions
 - ❖ Germination
 - Synchronization with environment
 - ❖ Nourishment
 - Energy source for young plants

Gymnosperm Phyla

- Coniferophyta (Conifers)
 - ❖ Trees that produce seeds in cones.
 - Most familiar of four gymnosperm phyla.
 - Seeds develop on scales within cones and are exposed at time of pollination.
- Cycadophyta (Cycads)
- Ginkgophyta (Ginkos)
- Gnetophyta (Gnetophytes)

Rise of Angiosperms

- Comprise 90% of all living plants.
 - ❖ Use roots to anchor plants in one place to obtain nutrients.
 - ❖ Produce tiny male gametes that are easily transported.
- Flower - reproductive organs that employ bright colors to attract pollinators and nectar to induce entrance into the flower to contact pollen grains.

Angiosperm Flower

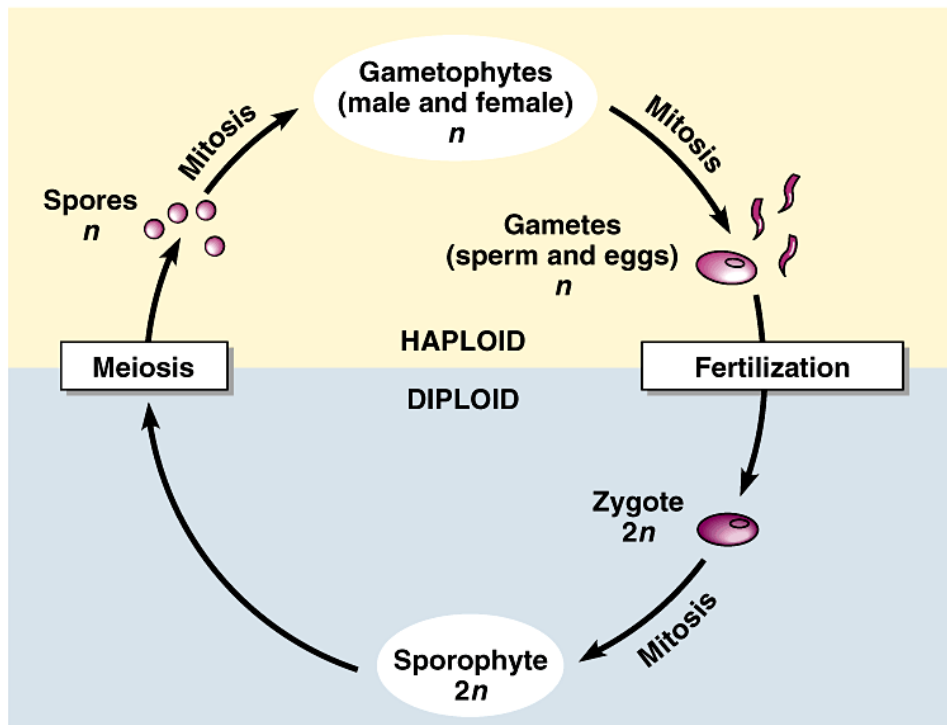
Why Different Kinds of Flowers

- Different pollinators are attracted to specific types of flowers.
 - ❖ Bees most numerous insect pollinators.
 - Becomes coated with pollen while inside the flower.
 - ❖ Butterflies
 - ❖ Moths
 - ❖ Hummingbirds

Seed Dispersal - Fruits

- Fruit - mature, ripened ovary containing fertilized seeds, surrounded by a carpel.
 - ❖ Fleshy fruits encourage predation.
 - Berries - Many seeded forms on inner carpel wall. (Grapes, Tomatoes)
 - Drupes - Stony inner layer adhering to single seed. (Peaches, Olives)
 - Pomes - Fleshy portion comes from petals and sepals. (Apples, Pears)

Generalized Plant Life Cycle Alternation of generations



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