LEAVES:

- **Function:** Photosynthesis (food production for the whole plant).

- **Transpiration**

- **Blade:** Flat expanded area

- **Petiole:** stalk that connects leaf blade to stem, and transports materials
(a) Simple versus Compound

- Compound: palmate
- Compound: pinnate
- Simple

- Compound: doubly pinnate

(b) Shape

- Lanceolate
- Triangular
- Cordate (heart-shaped)
- Oval
Simple Leaf

Compound Leaf

Simple Leaf

Blade

Petiole

Pinnate Compound

Axillary Bud

Leaflets
The Leaf Arrangement

Alternate Leaf Arrangement

Opposite Leaf Arrangement

In alternate arrangement leaves are alternate on opposite sides of the stem.

Palmate Compound

Leaflets
(c) Margin or Leaf Edge

- Undulate
- Serrate
- Lobed
- Entire

(d) Venation

- Parallel
- Pinnately net-veined
- Palmately net-veined
LEAF VENATION

Parallel Venation  Pinnately Netted  Palmately Netted
(b) Netted venation.

(c) Parallel venation.
Leaf Cross Section

- Upper Epidermis
- Palisade Cell
- Phloem
- Chloroplasts
- Xylem Tissue
- Lower Epidermis
- Stomata
- Supporting fibers
- Vein
- Spongy Cell

Section of the leaf enlarged at the left
Pore closed
Pore open

Guard Cells

Typical Dicot Leaf
Modified leaves

(a) Spines
(b) Tendrils
(c) Window leaves
(d) Bracts
Modified leaves

Dune grass leaf with highly developed sclerenchyma
Modified leaves

Water lily leaf with highly developed spongy parenchyma
The leaves have been completely modified into cactuses thorns.
Northern Red Oak

White Oak

Pignut Hickory

Flowering Dogwood
Photosynthesis

1. Definition
PHOTO = produced by light
SYNTHESES = manufacturing.

PHOTOSYNTHESIS is the process whereby plants, algae and some bacteria, use the energy of the sun to synthesize organic compounds (sugars) from inorganic compounds (CO₂ and water).
2. General Equation of Photosynthesis.

Carbon Dioxide + Water + Light → Glucose + O2

CO₂ + H₂O + Light → C₆H₁₂O₆ + O₂ + H₂O

pigments, enzymes
3. Where?
Chlorophyll a is the primary photosynthetic pigment that drives photosynthesis.

Accessory pigments absorb at different wavelengths, extending the range of light useful for photosynthesis.
WHY IS PHOTOSYNTHESIS SO IMPORTANT?

• PHOTOSYNTHESIS is one of the most important biological processes on earth!
  • Provides the oxygen we breathe
  • Consumes much of the CO$_2$
  • Food
  • Energy
  • Fibers and materials