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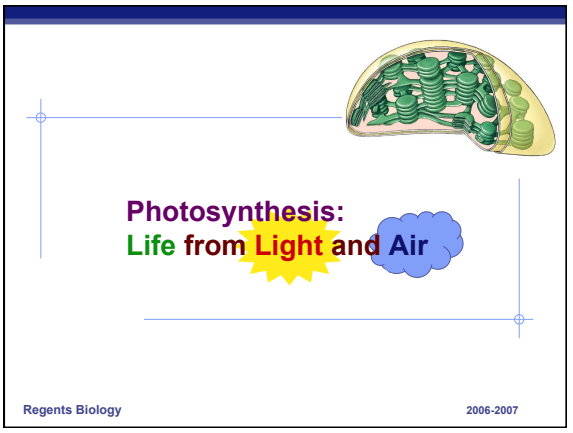
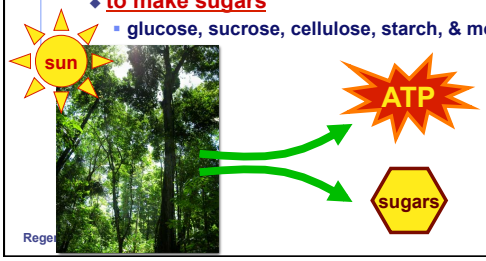


Plants are energy producers

- Like animals, plants need energy to live
  - unlike animals, plants don't need to eat food to make that energy
- Plants make both FOOD & ENERGY
  - animals are consumers
  - plants are producers

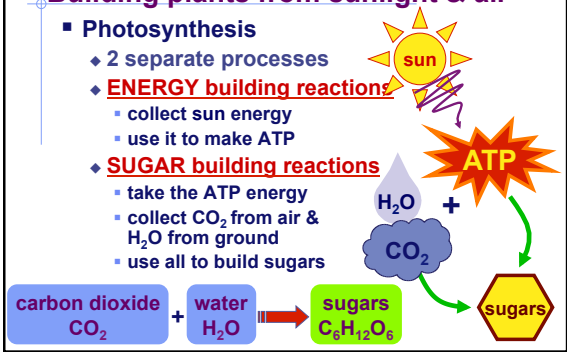
How do plants make energy & food?

- Plants use the energy from the sun
  - to make ATP energy
  - to make sugars
    - glucose, sucrose, cellulose, starch, & more



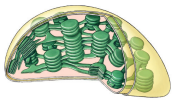
Building plants from sunlight & air

- Photosynthesis
  - 2 separate processes
  - ENERGY building reactions
    - collect sun energy
    - use it to make ATP
  - SUGAR building reactions
    - take the ATP energy
    - collect CO_2 from air & H_2O from ground
    - use all to build sugars



Using light & air to grow plants

- Photosynthesis
  - using sun's energy to make ATP
  - using CO_2 & water to make sugar
  - in chloroplasts
  - allows plants to grow
  - makes a waste product
    - oxygen (O_2)



(ATP) = used to build the sugar

carbon dioxide + water + sun energy → glucose + oxygen

$6CO_2 + 6H_2O + \text{sun energy} \rightarrow C_6H_{12}O_6 + 6O_2$

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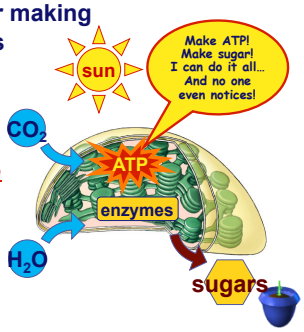
What do plants need to grow?

- The "factory" for making energy & sugars
  - chloroplast
- Fuels
  - sunlight
  - carbon dioxide
  - water
- The Helpers
  - enzymes



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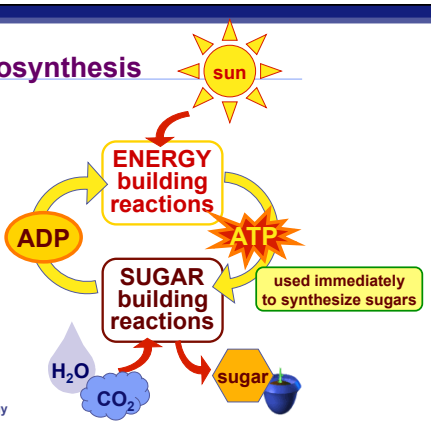
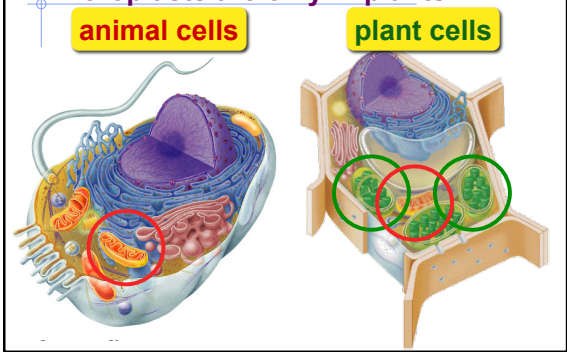
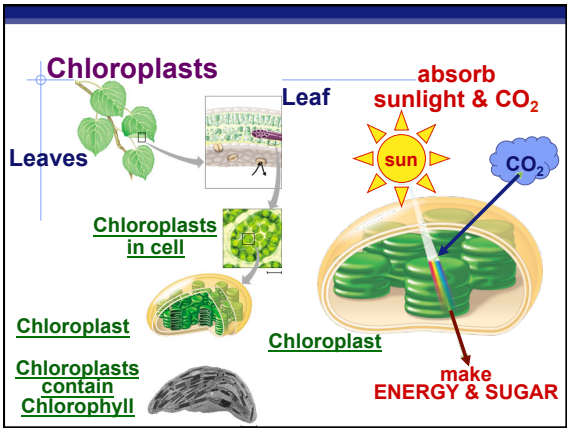
Photosynthesis



Chloroplasts are only in plants

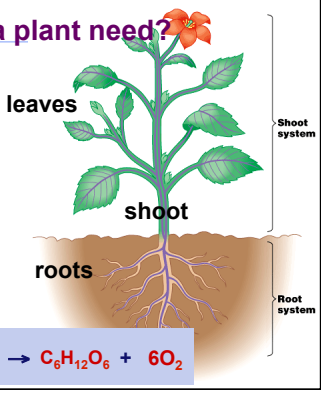


Chloroplasts



So what does a plant need?

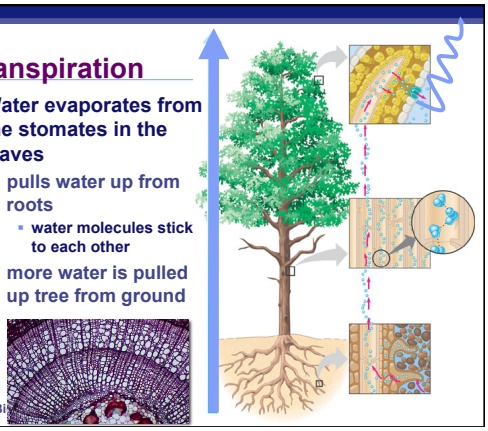
- Bring In
  - light
  - CO_2
  - H_2O
- Let Out
  - O_2
- Move Around
  - sugars



$6CO_2 + 6H_2O + \text{light energy} \rightarrow C_6H_{12}O_6 + 6O_2$

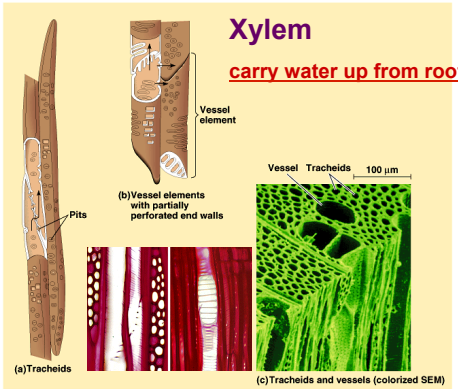
Transpiration

- Water evaporates from the stomates in the leaves
  - pulls water up from roots
    - water molecules stick to each other
  - more water is pulled up tree from ground



Xylem

carry water up from roots



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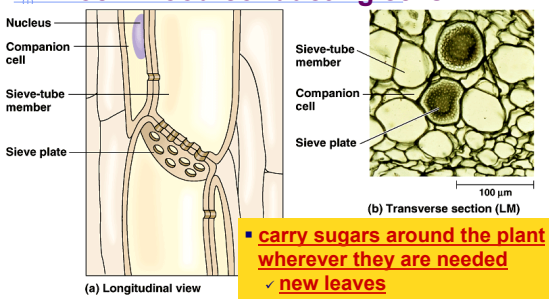
Phloem: food-conducting cells



- carry sugars around the plant wherever they are needed
  - ✓ new leaves
  - ✓ fruit & seeds
  - ✓ roots

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How are they connected?

Respiration

glucose + oxygen → carbon dioxide + water + energy

$C_6H_{12}O_6 + 6O_2 \rightarrow 6CO_2 + 6H_2O +$ ATP

Photosynthesis

carbon dioxide + water + sun energy → glucose + oxygen

$6CO_2 + 6H_2O +$ light energy $\rightarrow C_6H_{12}O_6 + 6O_2$

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Energy cycle