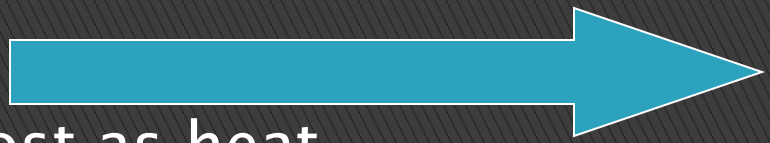
Nutrient Cycles

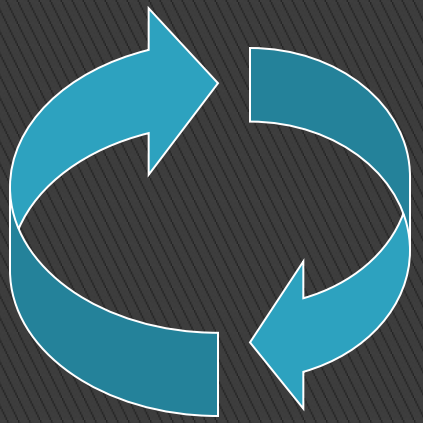
Water
Carbon
Nitrogen

Nutrient Cycles

- Energy transfer through an ecosystem is ONE WAY
  - Most energy is lost as heat



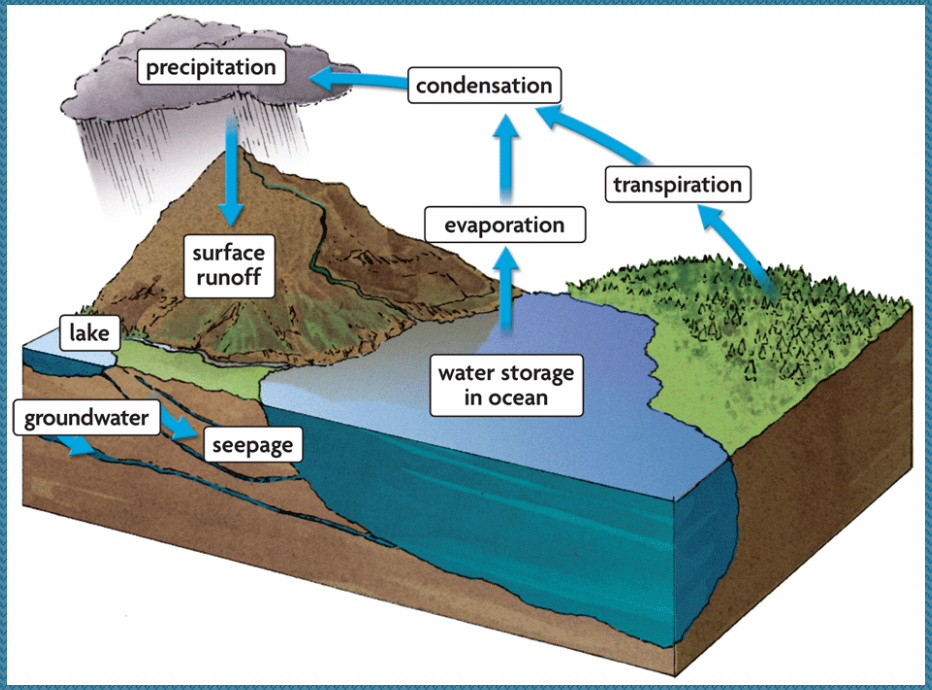
- Matter such as nitrogen, water and carbon are able to cycle through an ecosystem and be reused



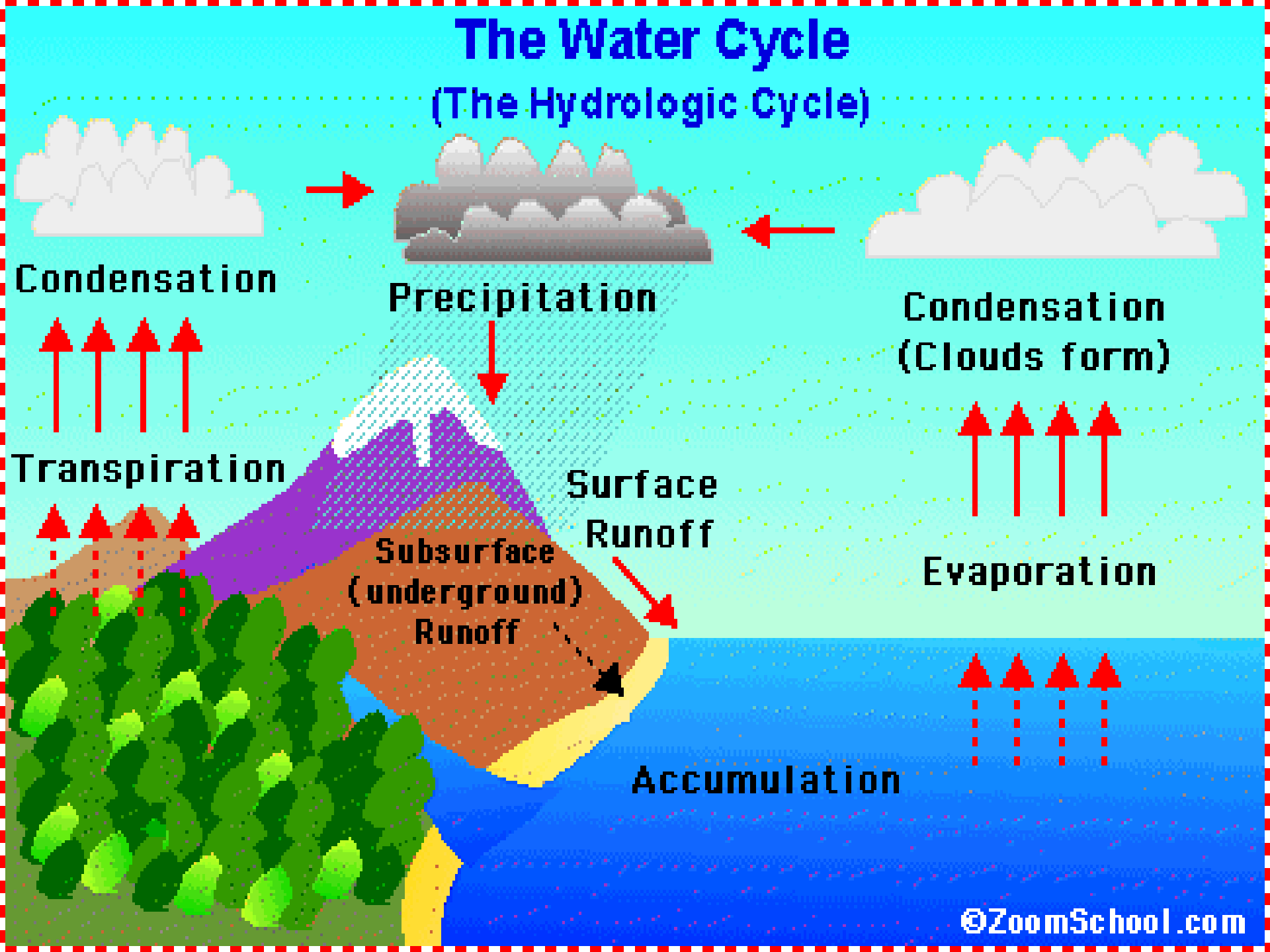
Nutrient Cycles

- Matter changes form, but it does not disappear, therefore the total amount of matter remains the same. This is known as The Law of Conservation of Matter.
  - Matter can change from a solid to liquid to gas and back again.
    - Example: Water

The Water Cycle



Water on earth moves in a continuous cycle


The Water Cycle
(The Hydrologic Cycle)
Condensation
Precipitation
Condensation
(Clouds form)
Transpiration
Surface
Runoff
Subsurface
(underground)
Runoff
Evaporation
Accumulation
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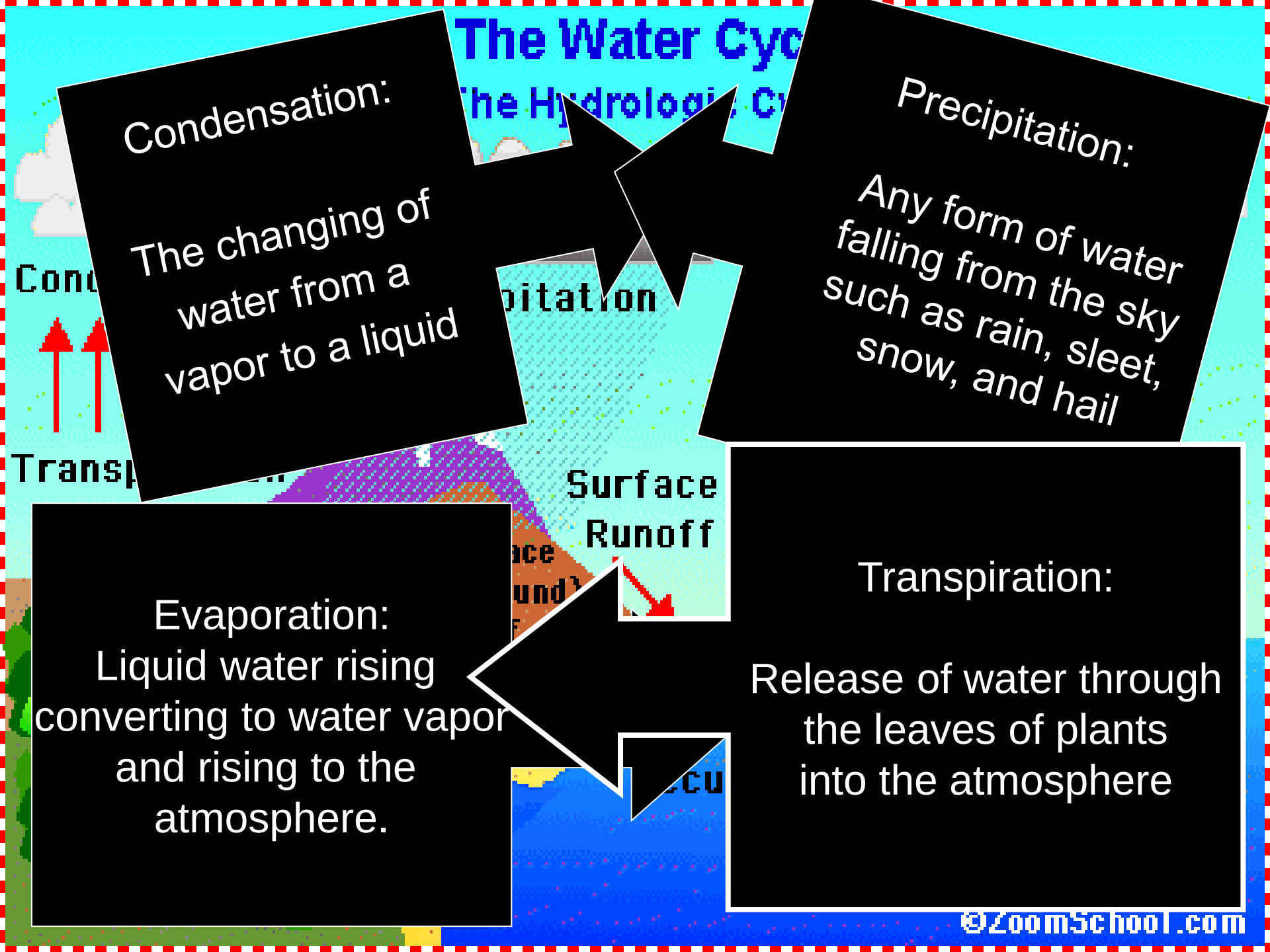
The Water Cyc
Surface
Runoff
Condensation:
The changing of water from a vapor to a liquid
Precipitation:
Any form of water falling from the sky such as rain, sleet, snow, and hail
Evaporation:
Liquid water rising converting to water vapor and rising to the atmosphere.
Transpiration:
Release of water through the leaves of plants into the atmosphere
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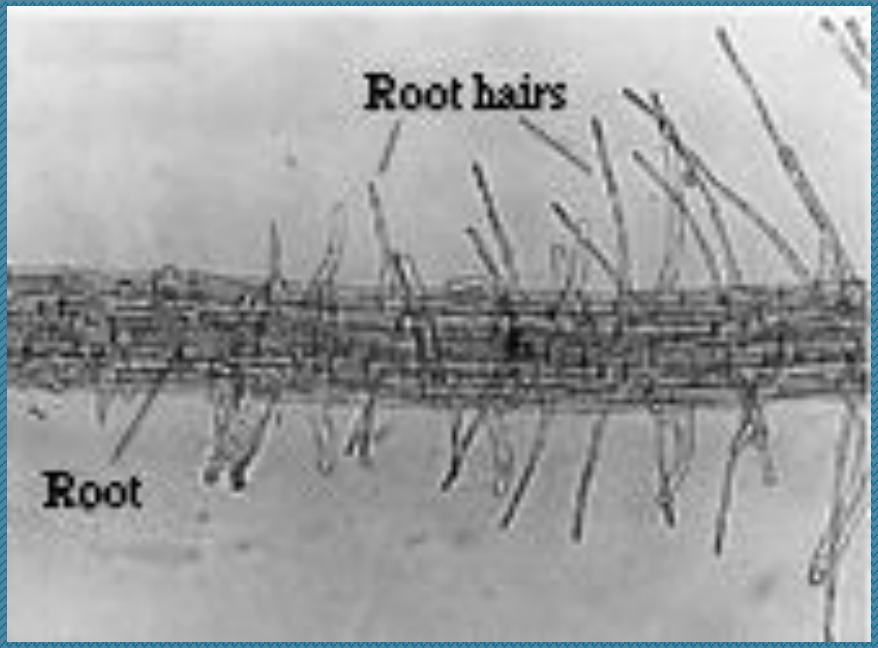
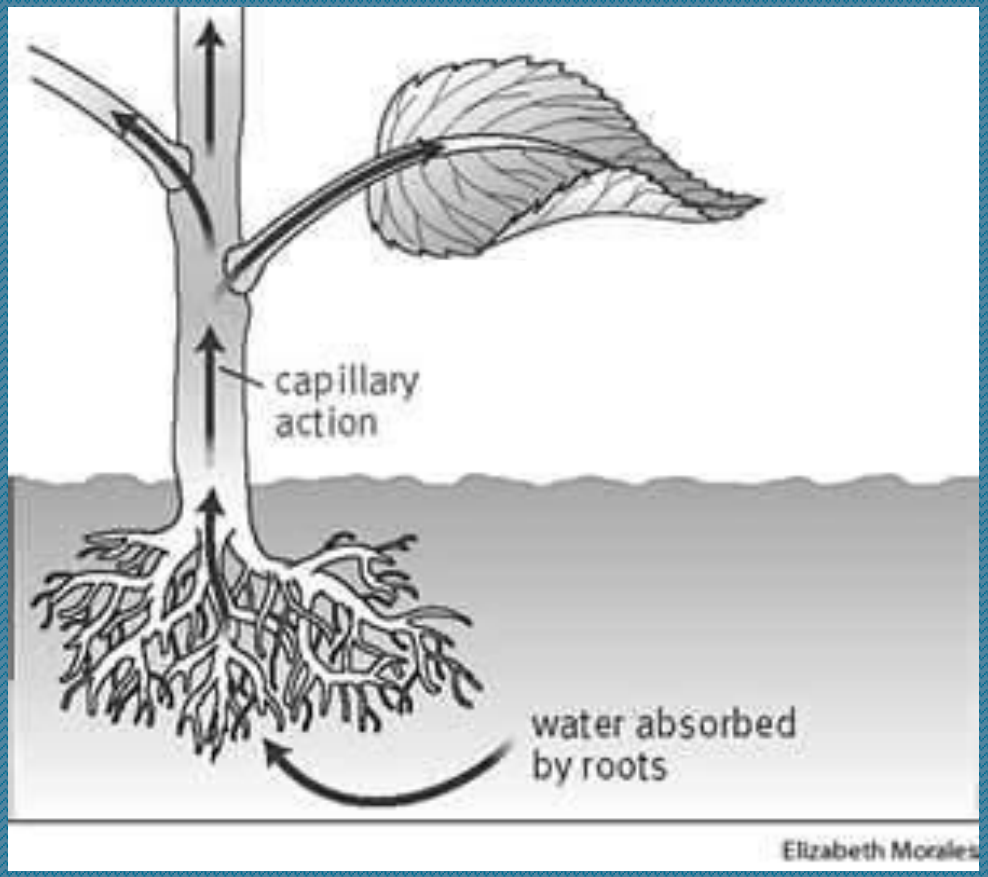
Transpiration

- Water is first absorbed by the root hairs of the plant



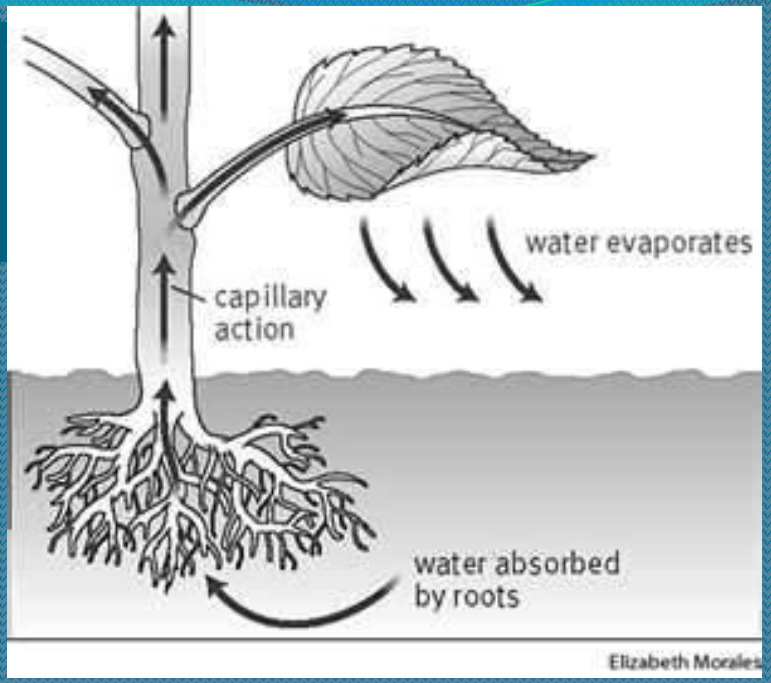
Transpiration

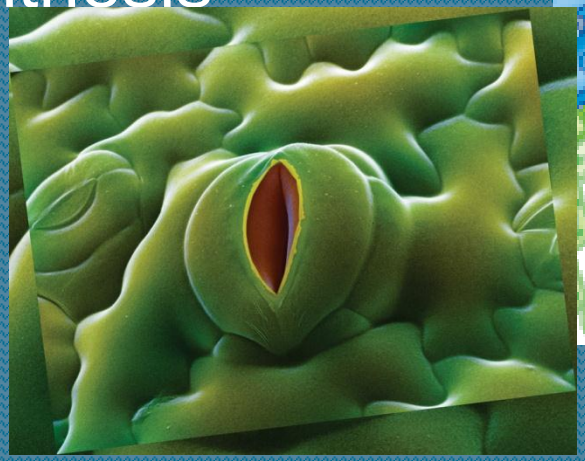
- From the roots, water travels up the main stem of the plant and delivers water to the leaves for use in photosynthesis

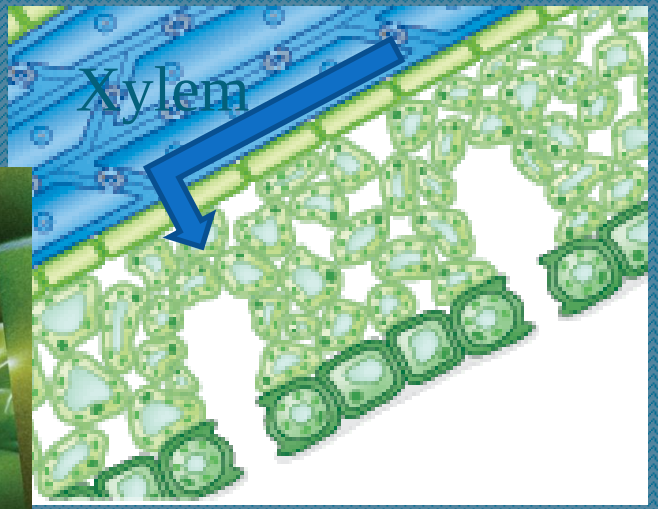


Transpiration

- Water exits the leaves through openings in the leaves called stomata.
- Why does water leave when it is needed for the photosynthesis reaction?







Factors Affecting Transpiration

- 1. **Humidity**
  - What is humidity?
    - Refers to the amount of moisture in the air.
  - How does humidity affect transpiration?

↑ humidity ↓transpiration

Factors Affecting Transpiration

- 2. **Temperature**
  - How does temperature affect transpiration?

- ↑temp.↑transpiration

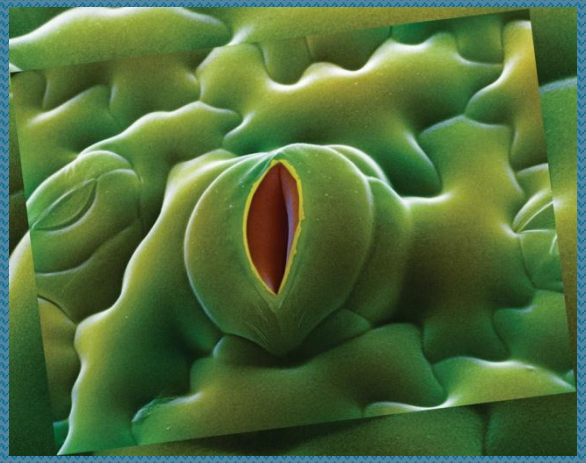
Factors Affecting Transpiration

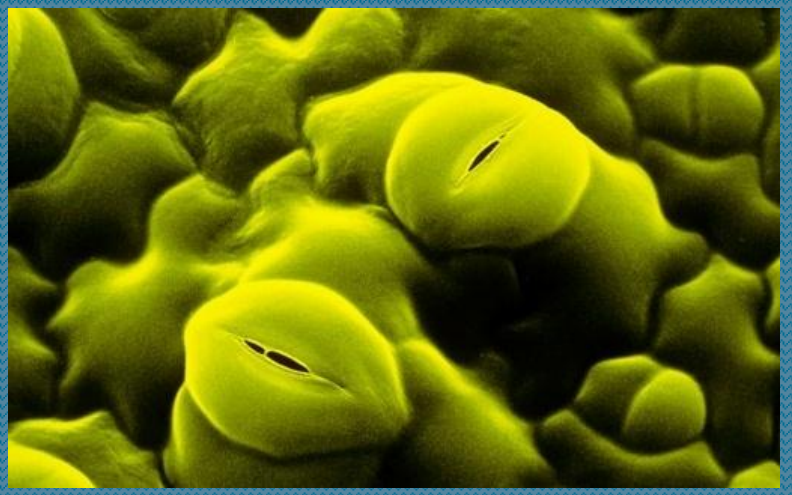
3. **Wind**

- removes water vapor that is in the area immediate to the plant.
  - Water moves from higher to lower concentration, so…↑wind ↑transpiration

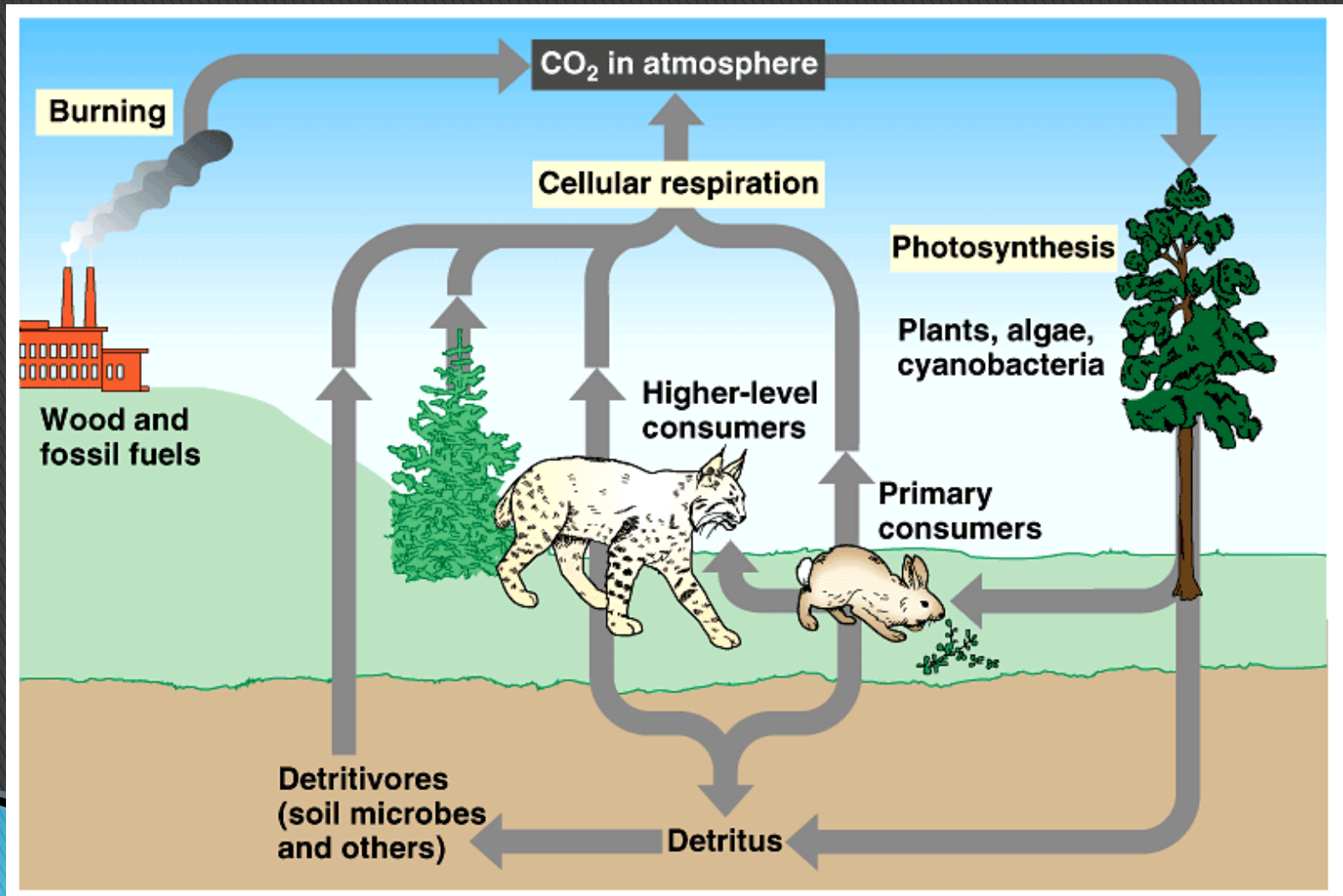
Factors Affecting Transpiration

- Stomata can open to release water vapor or close to conserve it.
- Under what circumstances would the stomata close?
  - Hot temperature, low humidity, high winds.



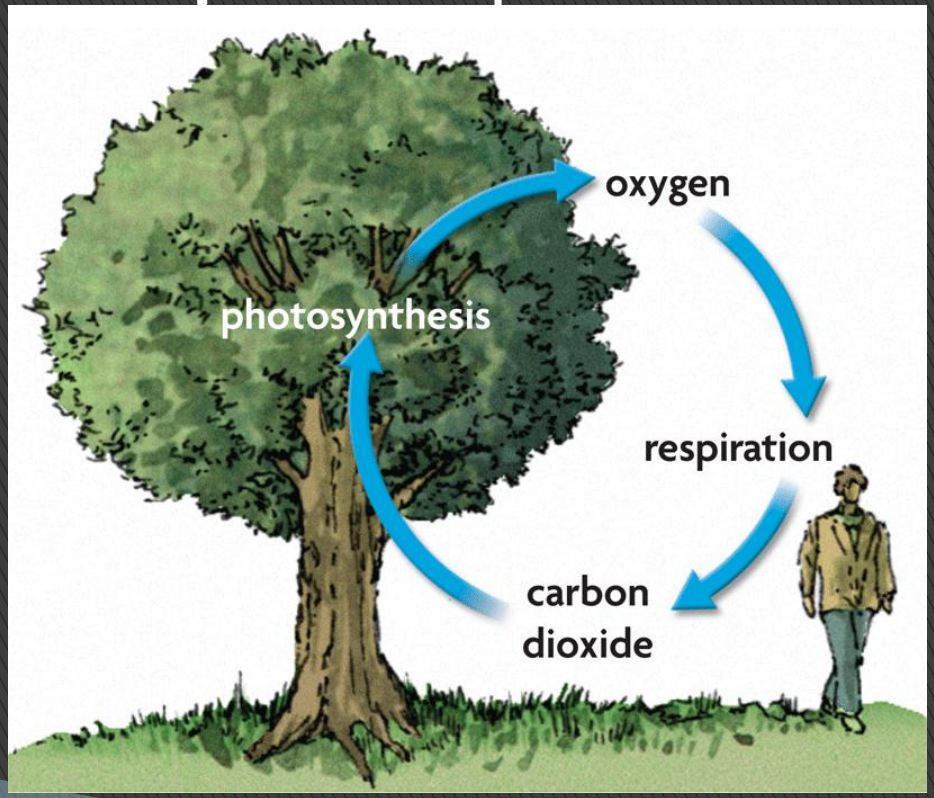


THE CARBON CYCLE



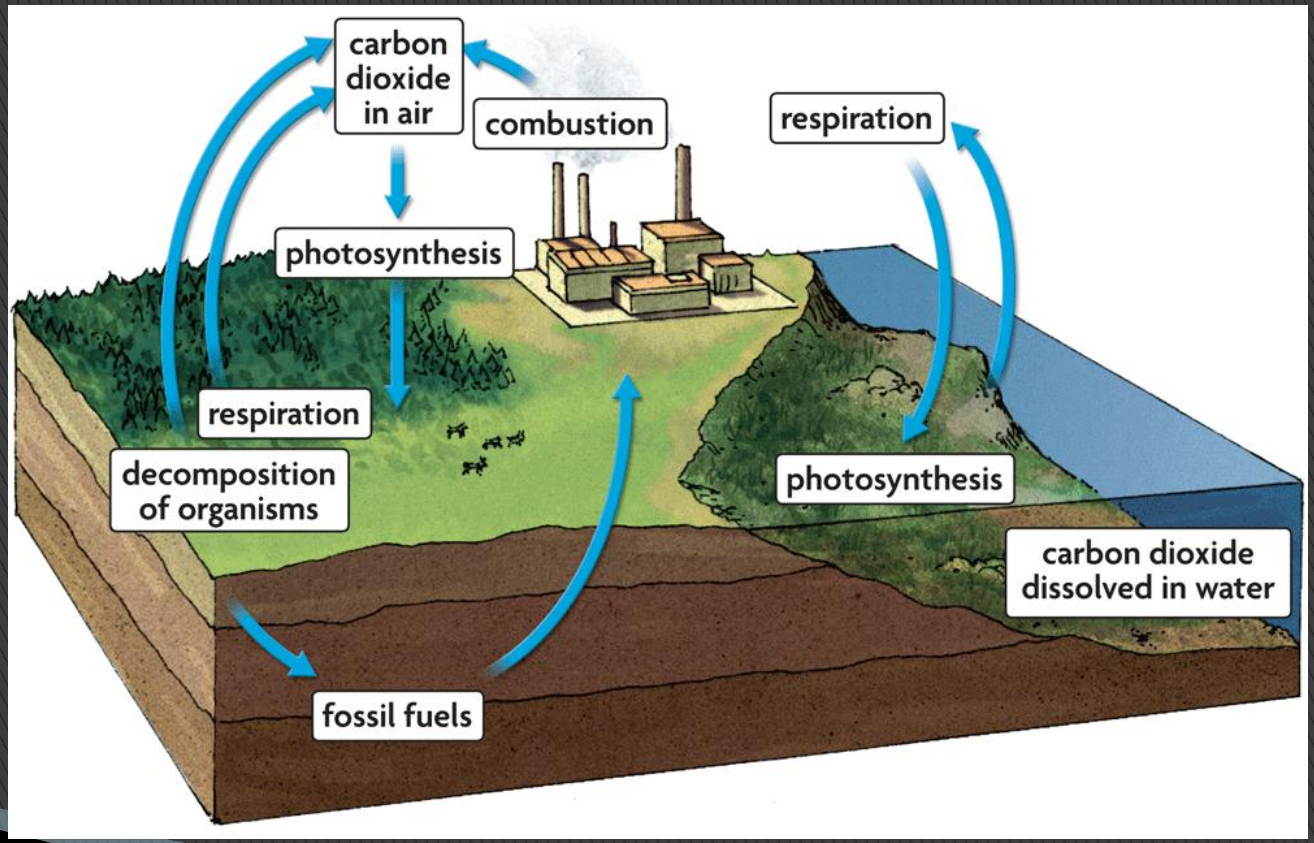
Carbon:

- The basic constituent of all organic compounds
- Lipids, carbohydrates, DNA, Etc.
- **Photosynthesis and Respiration** provide a link between the atmosphere and terrestrial environments.



In Atmosphere:

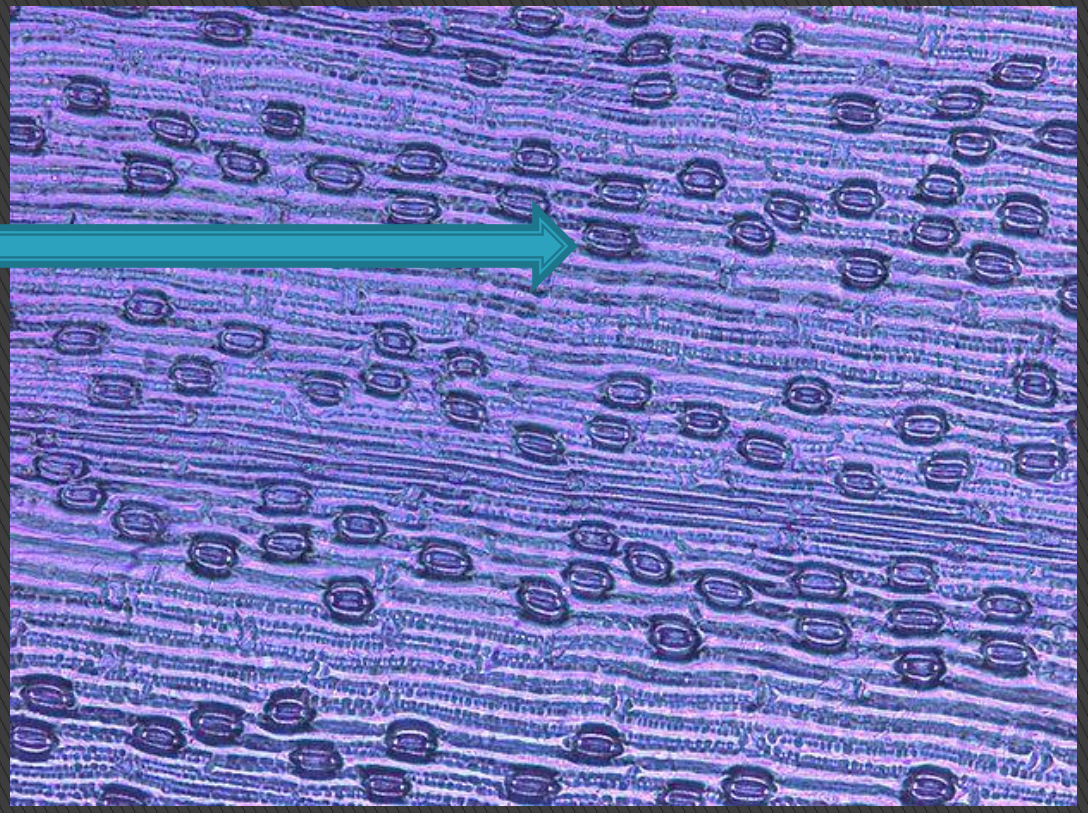
→ Amount of CO_2=0.03%



Link between Atmosphere and Terrestrial:

Plants acquire CO_2 thru stomata in their leaves and incorporate it in to organic molecules of their own biomass → **photosynthesis**

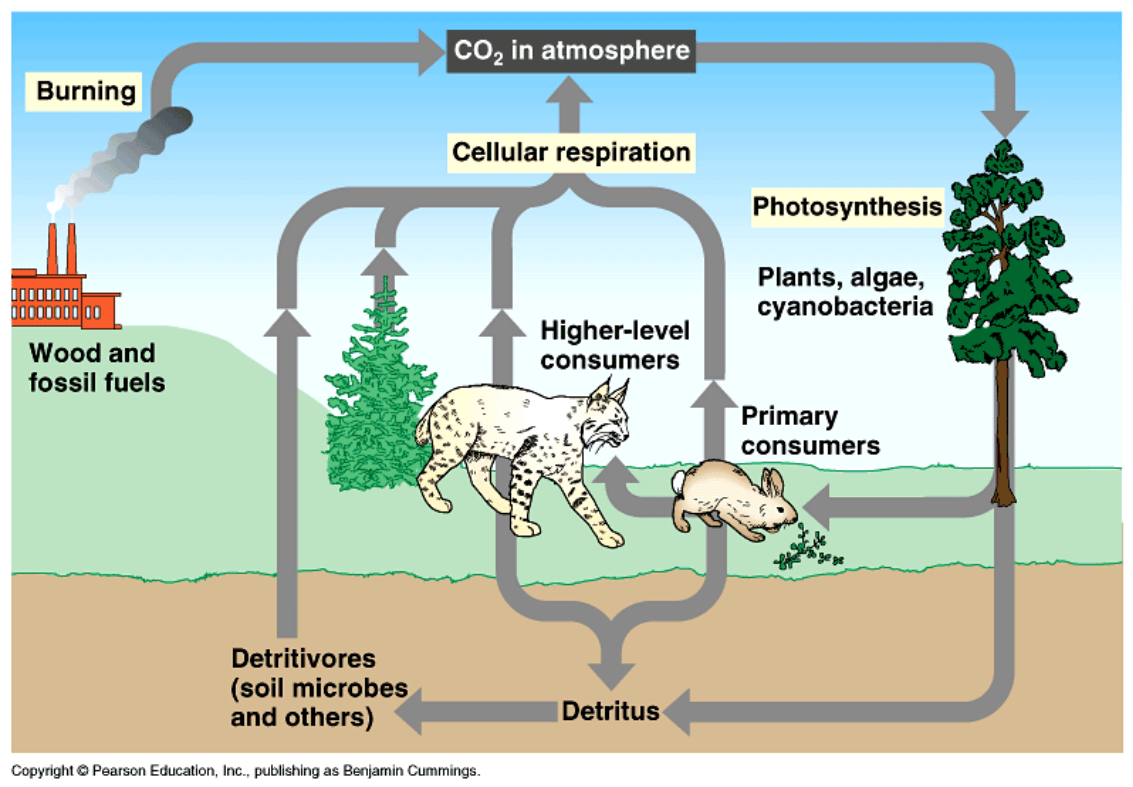
Stomata



Link between Atmosphere and Terrestrial:

→ Some of this organic material becomes a carbon source for consumers

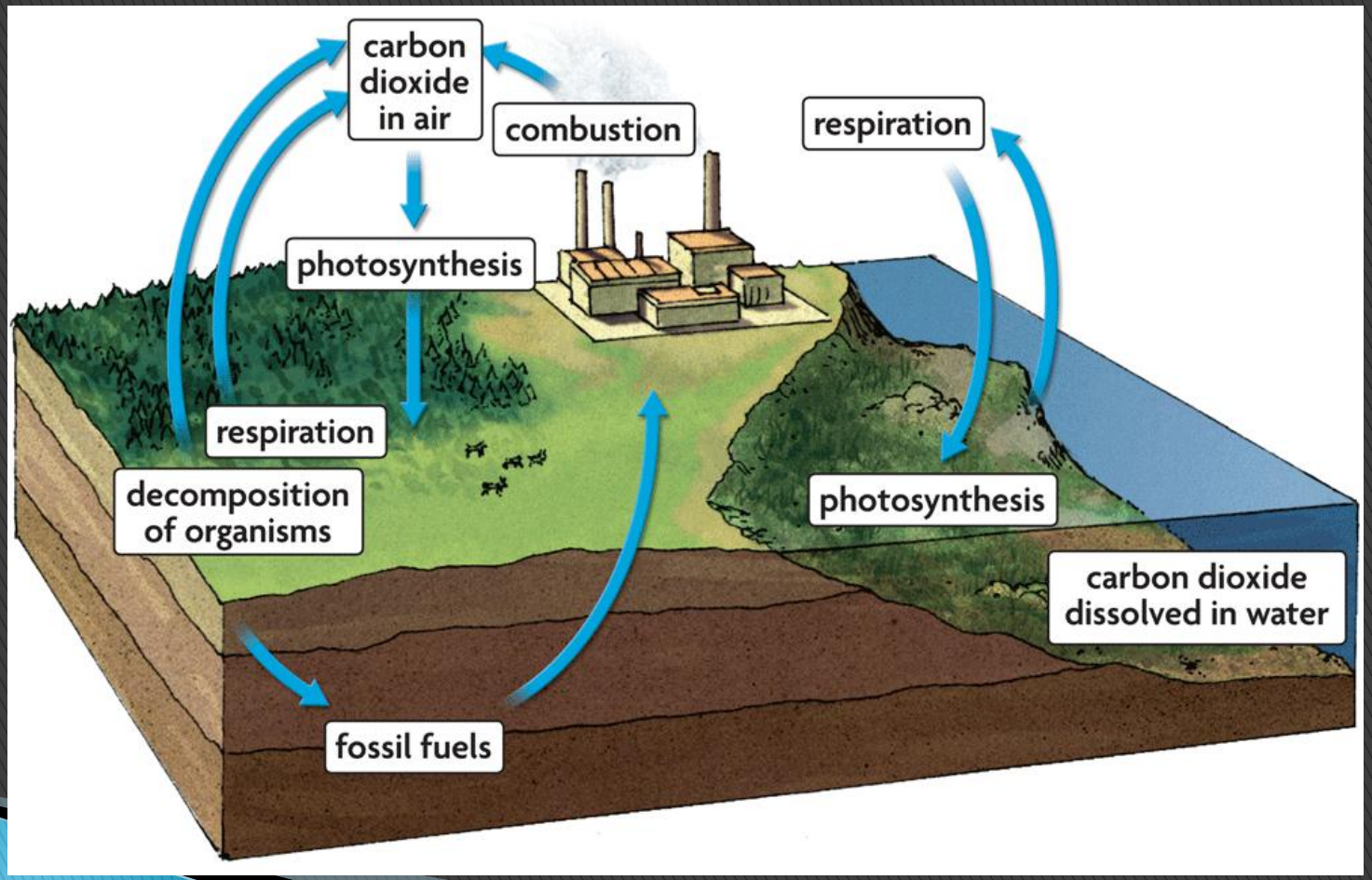
→ Carbon is cycled quickly because of high demand from plants



Link between Atmosphere and Terrestrial:

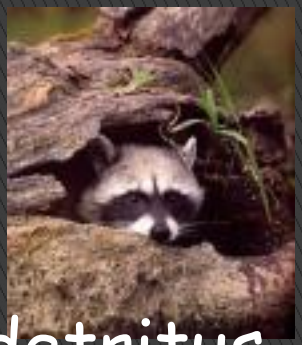
- All organisms return CO_2 to the atmosphere through respiration
- Decomposition recycles carbon to the soil and back to atmosphere via cellular respiration in bacteria
- Fires oxidize organic material to CO_2 (burning)

Carbon is stored in the oceans

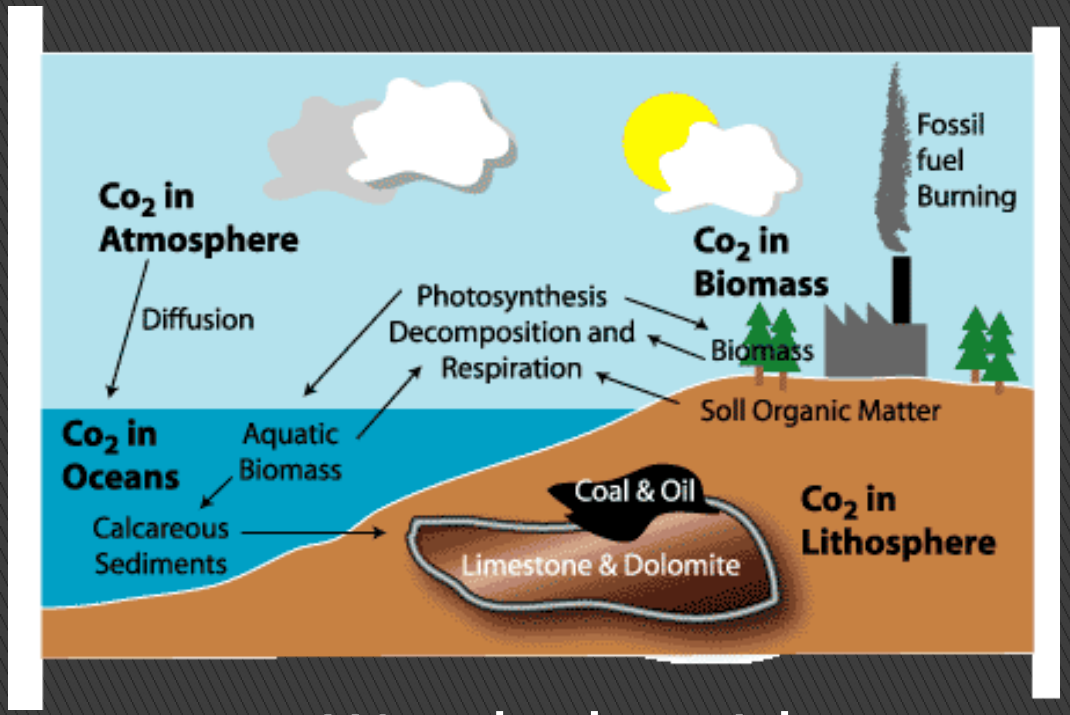


Carbon is also stored on land:

- Carbon is accumulated in wood and other durable organic material



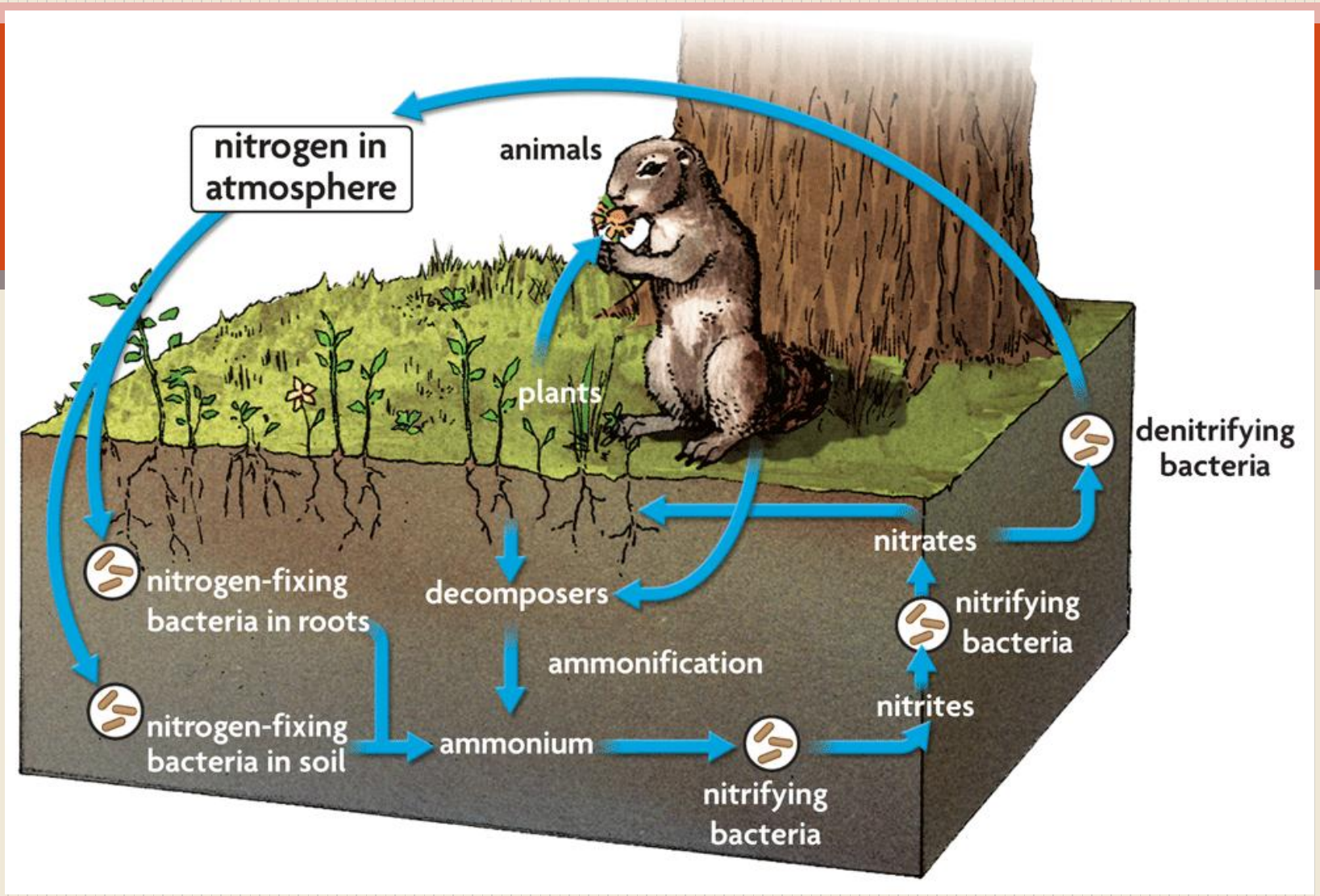
- Organic detritus, under intense pressure, changes into coal and petroleum in rock.



- Watch the video on the carbon cycle

bio_ch13_s5_v02.flv

The Nitrogen Cycle



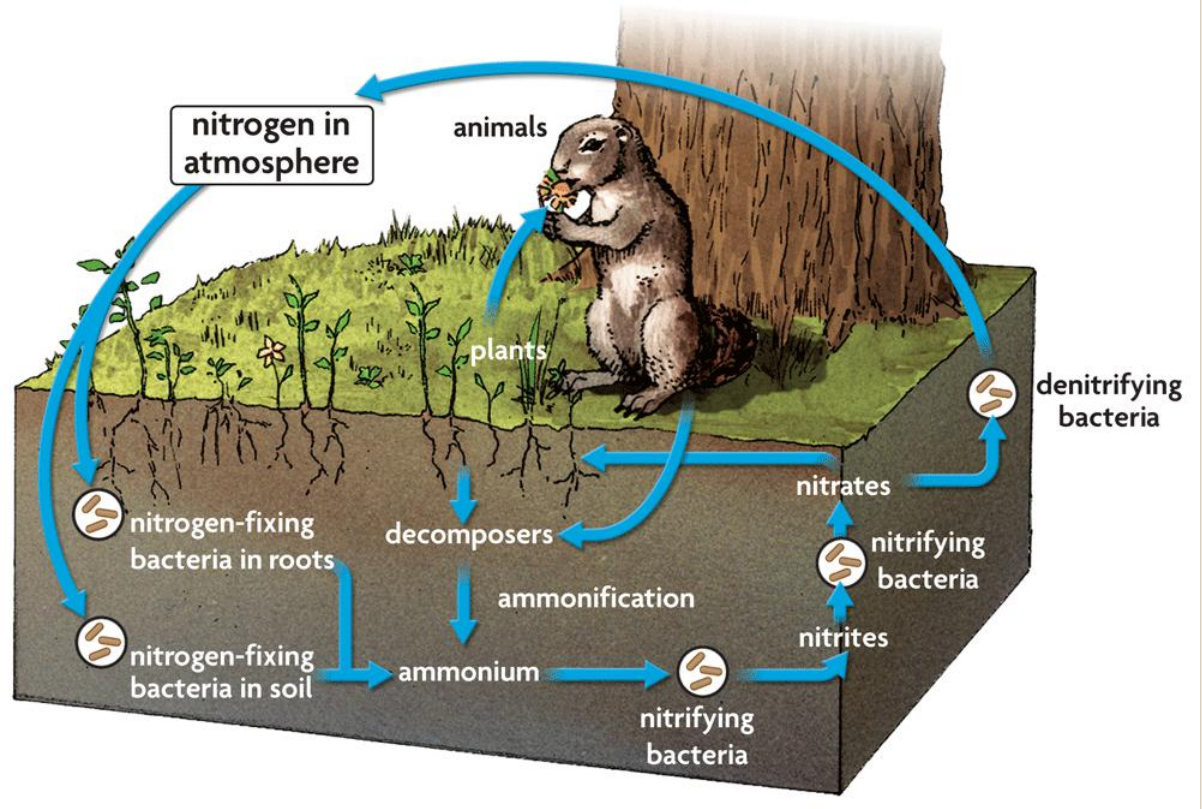
The Nitrogen Cycle

- Nitrogen gas (N_2) makes up 79% of our atmosphere
- Most organisms CAN NOT obtain nitrogen through the atmosphere!
- Nitrogen is an atom needed by plants and animals to make proteins and DNA
  - It ranks fourth behind oxygen, carbon, and hydrogen as the most common chemical element in living tissues.
- So how do plants and animals obtain the necessary nitrogen?

The Nitrogen Cycle

Since animals cannot get nitrogen directly from the atmosphere they must eat it through plants.

Plants get their nitrogen through nitrogen-fixing bacteria that live in the soil



The Nitrogen Cycle

- What is the source of nitrogen for animal?
  - Plant matter
- What is the source of nitrogen for plants?
  - Decomposers, bacteria
- What is the source of nitrogen for decomposers?
  - Once-living matter
- Which organisms act as a bridge between the nitrogen in the atmosphere and the organisms of the biosphere?
  - bacteria
- How does fixed nitrogen (nitrate) get back into the atmosphere (nitrogen gas)?
  - Denitrifying bacteria

The Nitrogen Cycle

- Use the graphic organizer in your notes to help simplify the nitrogen cycle.