

MCAS Review

Ms. Renear

Topic 1

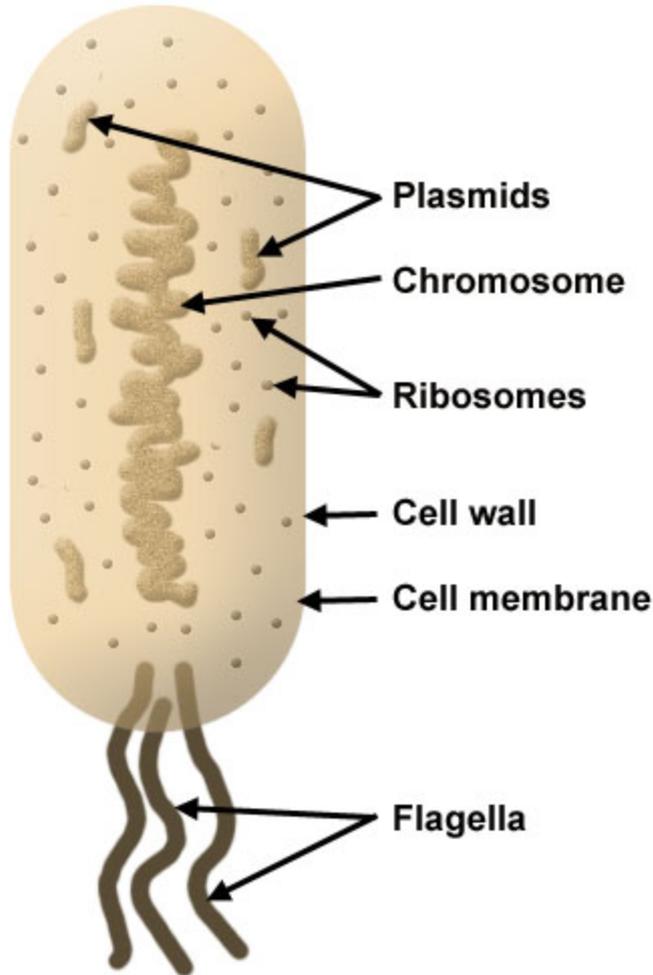
BIODIVERSITY

| Kingdom | Prokaryote vs Eukaryote | Mode of Nutrition | Cell Number | Cell Reproduction |
|-----------------|-------------------------|-------------------|-------------|-------------------|
| Eubacteria | | | | |
| Archaeobacteria | | | | |
| Protists | | | | |
| Fungi | | | | |
| Plantae | | | | |
| Animalia | | | | |

Major Characteristics

- **Eubacteria** – prokaryotic, unicellular and **peptidoglycan in cell walls**
- **Archaeobacteria** - prokaryotic, unicellular and **NO** peptidoglycan in cell walls
 - Live in extreme environments
 - Salty, hot and acidic

Bacteria do not have a nucleus!!!



**ALL BACTERIA
ARE
PROKARYOTES
!!!!!!**

- **Protists** – the garbage group
- Know the amoeba, paramecium and euglena
- **Unicellular** but have a **NUCLEUS**

9.38

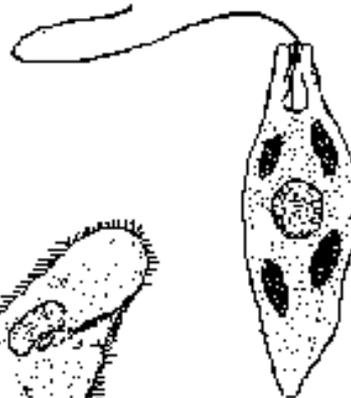
Amoeba



Paramecium



Euglena



- **Fungi** – heterotrophic + cell walls of **chitin**
- **Mushrooms, molds and yeast**



- **Plants** – chloroplast, cell walls (cellulose) PHOTOSYNTHESIS!!!!!!
- **Animalia** – heterotrophs, **no** cell walls

Classification

- Domain
- Kingdom
- Phylum
- Class
- Order
- Family
- Genus
- Species

Three Domains

- **Bacteria**
 - Kingdom Eubacteria
- **Archaea**
 - Kingdom Arachabacteria
- **Eukarya**
 - Kingdom Protista
 - Kingdom Fungi
 - Kingdom Plantae
 - Kingdom Animalia

Topic 2

CHEMISTRY OF LIFE

6 Most Common Elements in Living Things

SPONCH

| | Elements | Monomer | Function | Example |
|--|----------|---------|----------|---------|
| | | | | |
| | | | | |
| | | | | |
| | | | | |

Proteins

- **Hair + Nails** – keratin
- **Skin** – collagen
- **Antibodies** – fight viruses
- **Muscles** – actin and myosin
- **Enzymes** – end in –ase (control rate of reactions in cell)

Enzymes

- Most are proteins
- End in **–ase**
- **How do they work?**

<http://www.youtube.com/watch?v=CZD5xsOKres&feature=related>

Enzymes

- Remember
 - Not used up
 - Can be used again
 - Lower energy needed to get a reaction going
 - Have an active site (specific to its substrate)
 - Can be denatured by high temp + pH

Topic 3

ECOLOGY

- Species
- Population
- Community
- Ecosystem
- Biome
- Biosphere

Population

- Group of the same species living in the same area
- What effects population size?
 1. Birth rate
 2. Death rate
 3. Immigration (into)
 4. Emigration (out)

Species

- A group of similar organisms living in the same area capable of mating and producing fertile offspring

Biodiversity

- All the different species in an area

How are populations changed by:

- Natural causes?
- Human Activity?
- Invasive, non-native species?



Photo by Simon vonMechelen



Asian Long Horned Beetle



NOT WANTED



Zebra Mussel Outlaws

Threats to the West ~ Why Be Concerned?

Zebra mussels cause devastating impacts on municipal water systems, recreation and fisheries. Currently, they are widespread in Eastern USA and as far west as Oklahoma. We don't want these outlaws in California where they would rapidly reproduce and cause millions of dollars in damage to our water resources and recreation. We need your help to stop these mussels from entering our lakes, rivers and streams.

HOW COULD THESE OUTLAWS 'RIDE' HERE?



Attach to boat hulls and motors.

On infested recreational boats and commercial boat haulers from infested waters like the Mississippi River and Great Lakes.

HOW CAN WE ARREST THE SPREAD?

Learn how to identify zebra mussels (see sidebar).

Remove all aquatic plants and animals from boat, motor, trailer, and equipment.

Drain water from livewells, bilge, and motor.

Dispose of unwanted live minnows and worms in the trash.

Rinse boat and equipment with high pressure or hot water, especially if moored for more than a day, OR

Dry everything for at least 5 days.

Never launch watercraft with a suspected infestation.

Report sightings on watercraft or in a lake or river – note location, place mussel in a sealed container with rubbing (isopropyl) alcohol, and call the Zebra Mussel Watch Hotline, 1-888-840-8917.



Found only in freshwater. Small barnacle-like clams with dark and light colored stripes.



Cost millions of dollars each year to control in power plants and water delivery systems.



Cover crayfish and clams, and outcompete native species for food and habitat.

VOLUNTEER FOR A POSSE

Early detection is key to preventing and mitigating impacts of zebra mussels. If you would like to help as a volunteer monitor to protect your lake or river, please contact:

Zebra Mussel Watch Program
1 (888) 840-8917 (toll free)
mussel@water.ca.gov



Asian Longhorned Beetle

WHAT TO LOOK FOR:



Wanted dead, not alive
INVADING SPECIES

Northern Snakehead, *Channa argus*



Aliases: *Unknown*

Trophic levels

- Autotrophs = **producers**
- Heterotrophs = **consumers**

- Primary consumer
- Secondary consumer
- Top level consumer
- Decomposer



Carnivore



Carnivore



Carnivore



Herbivore



Plant

Quaternary consumers

Tertiary consumers

Secondary consumers

Primary consumers

Primary producers



Carnivore



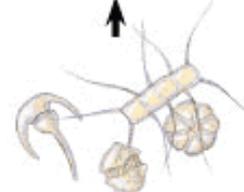
Carnivore



Carnivore



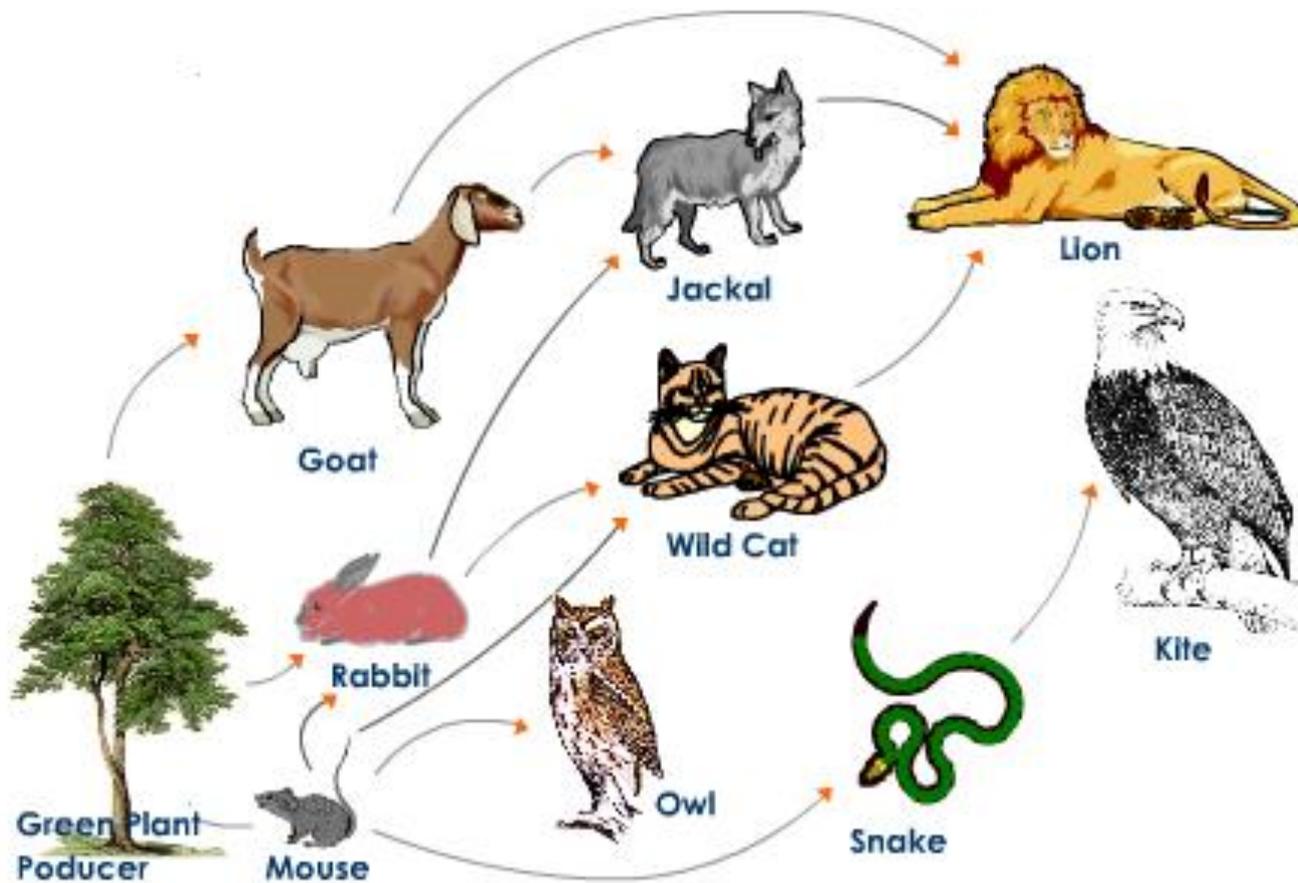
Zooplankton



Phytoplankton

A terrestrial food chain

A marine food chain

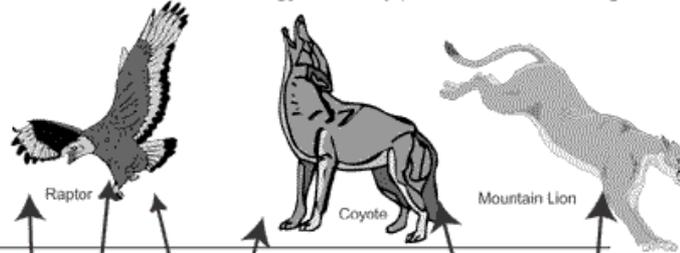


Food Web in a Forest

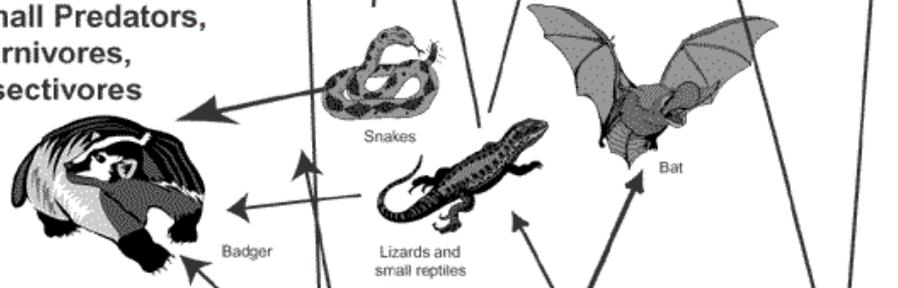
Food Web in the Sagebrush-Steppe Ecosystem

A food web is a model that shows how energy is passed in the form of food from one organism to another. The arrows between the organisms show the direction of energy flow. They point from what is being eaten to what is eating it.

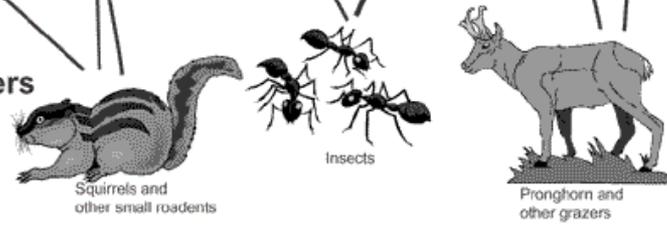
Larger Predators



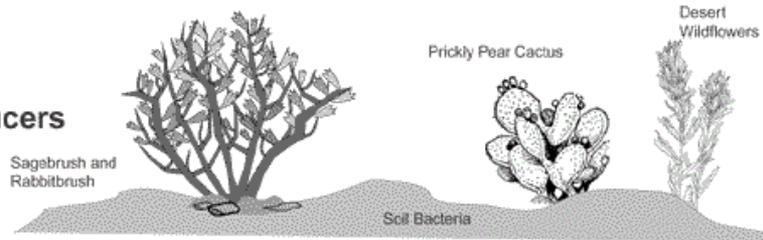
Small Predators, Carnivores, Insectivores

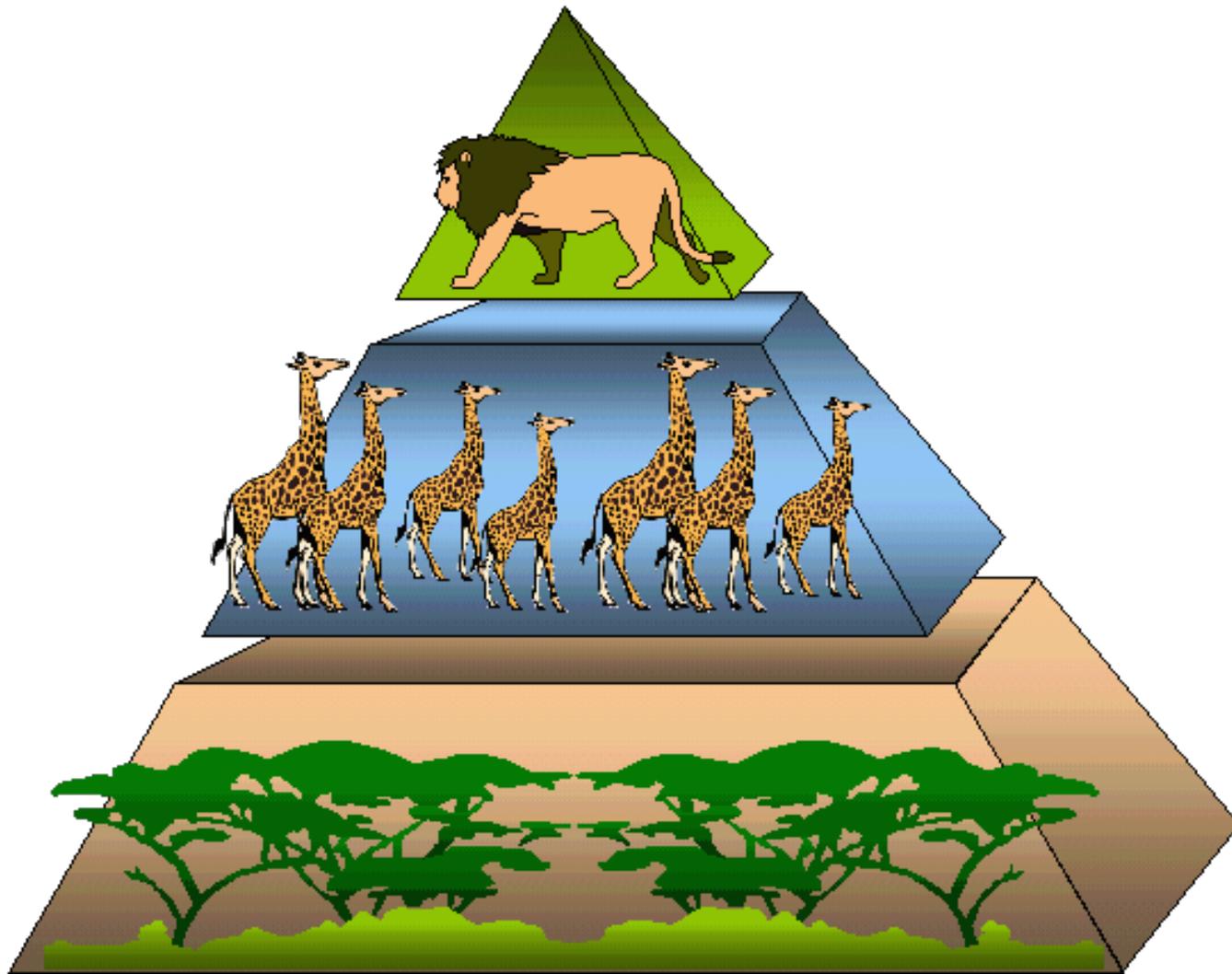


Plant Eaters Primary Consumers



Primary Producers





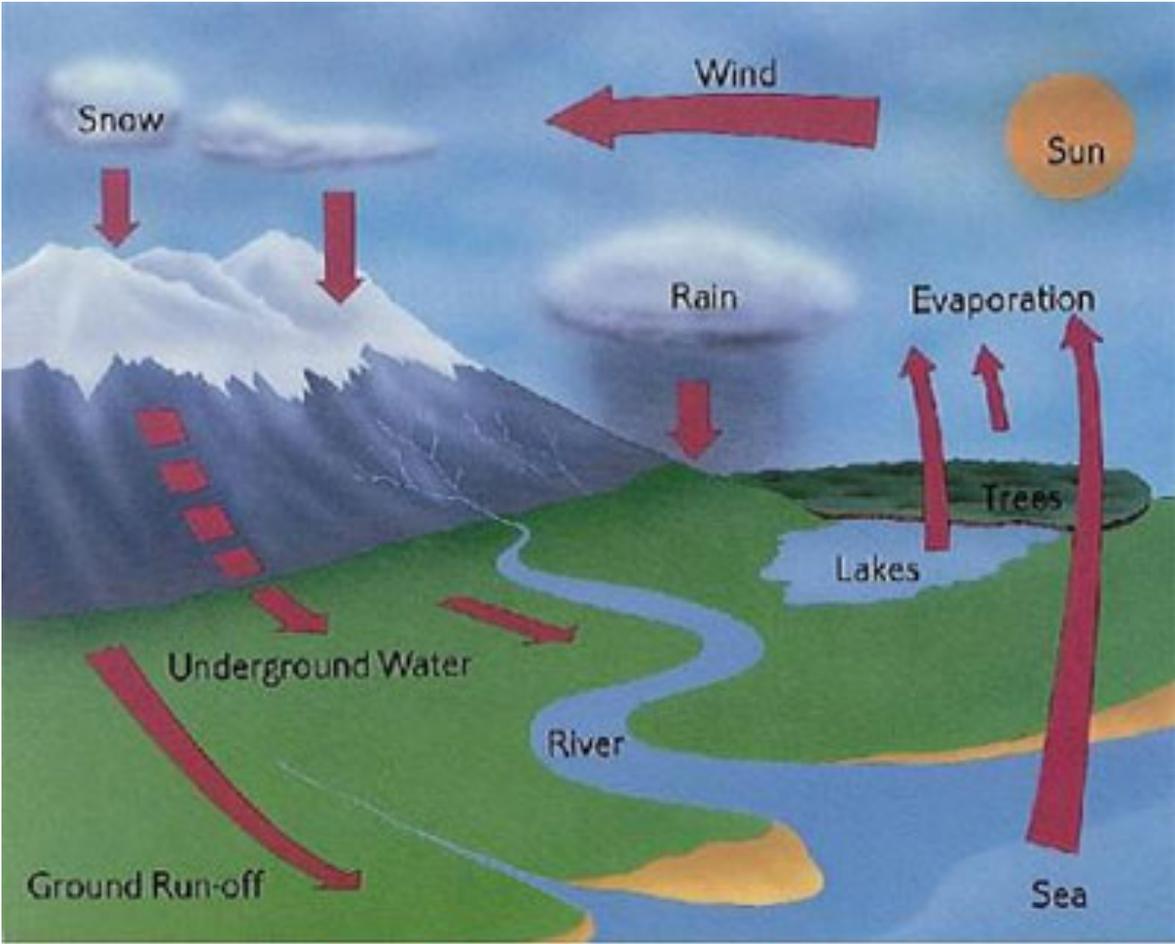
Symbiosis

- 2 species living in close association
 1. Parasitism
 2. Mutualism
 3. Commensalism
 4. Competition
 5. Predation

Biogeochemical cycles

- Water cycle
- Carbon cycle
- Nitrogen cycle

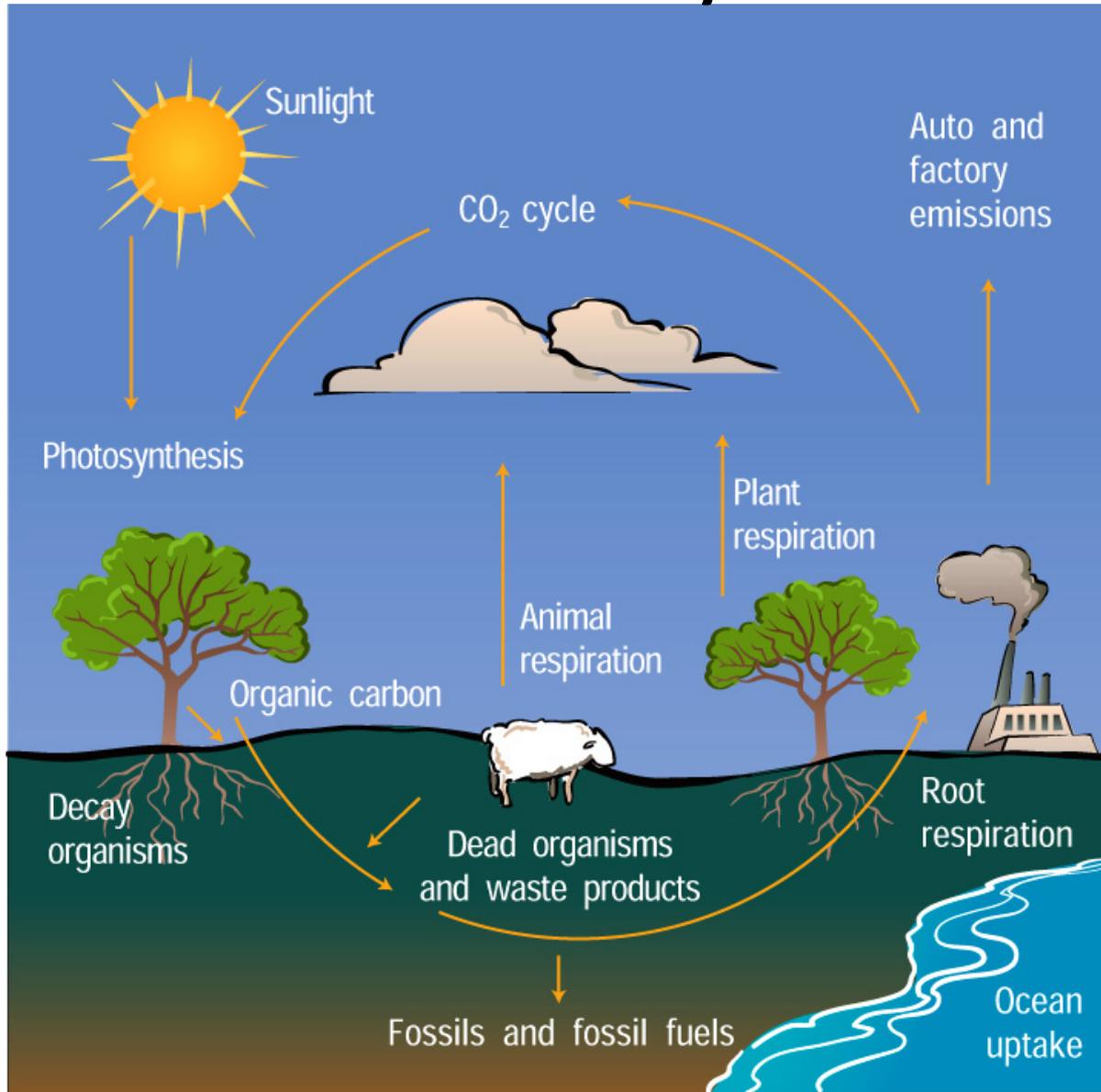
The Water Cycle



The Water Cycle

1. Evaporation
2. Condensation
3. Precipitation
4. Transpiration (plants lose water)

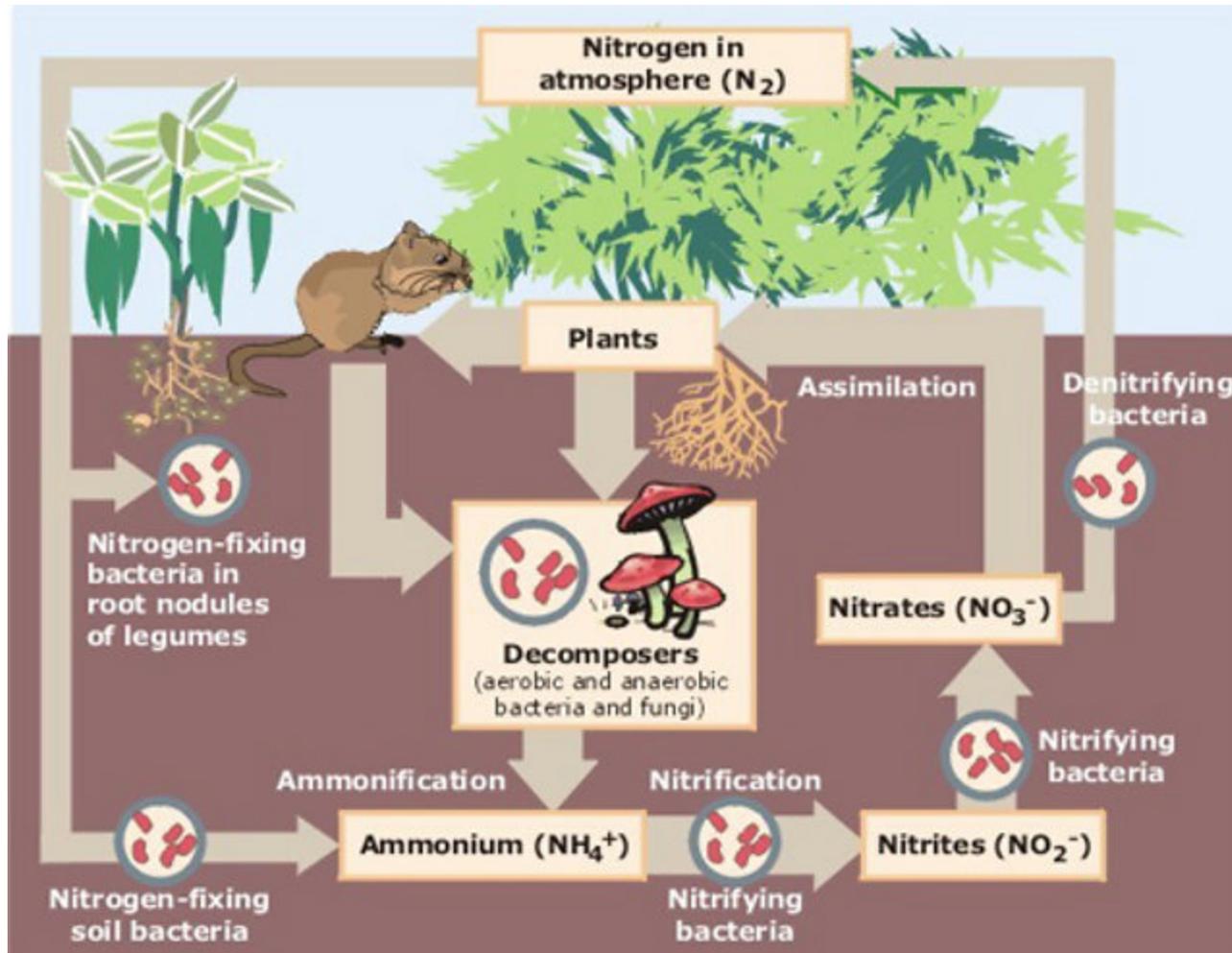
The Carbon Cycle



The Carbon Cycle

1. Photosynthesis
2. Cellular Respiration
3. Decomposition
4. Combustion

The Nitrogen Cycle



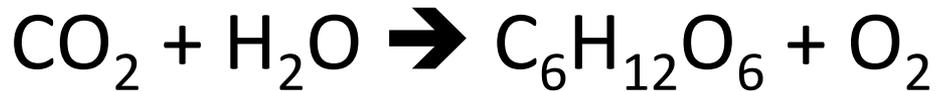
The Nitrogen Cycle

1. Nitrogen Fixation (N_2 out of atmosphere)
2. Nitrification
3. Ammonification
4. Denitrification (N_2 gas back to air)

All processes carried out by **BACTERIA**.

Photosynthesis

Carbon dioxide + water → sugar + oxygen



Who?

Plants and algae.

Where?

chloroplast

Cellular Respiration

- Sugar + oxygen → carbon dioxide + water
- $C_6H_{12}O_6 + O_2 \rightarrow CO_2 + H_2O$
- **Who?**
 - plants + animals
- **Where?**
 - mitochondria

Topic 9

HUMAN SYSTEMS

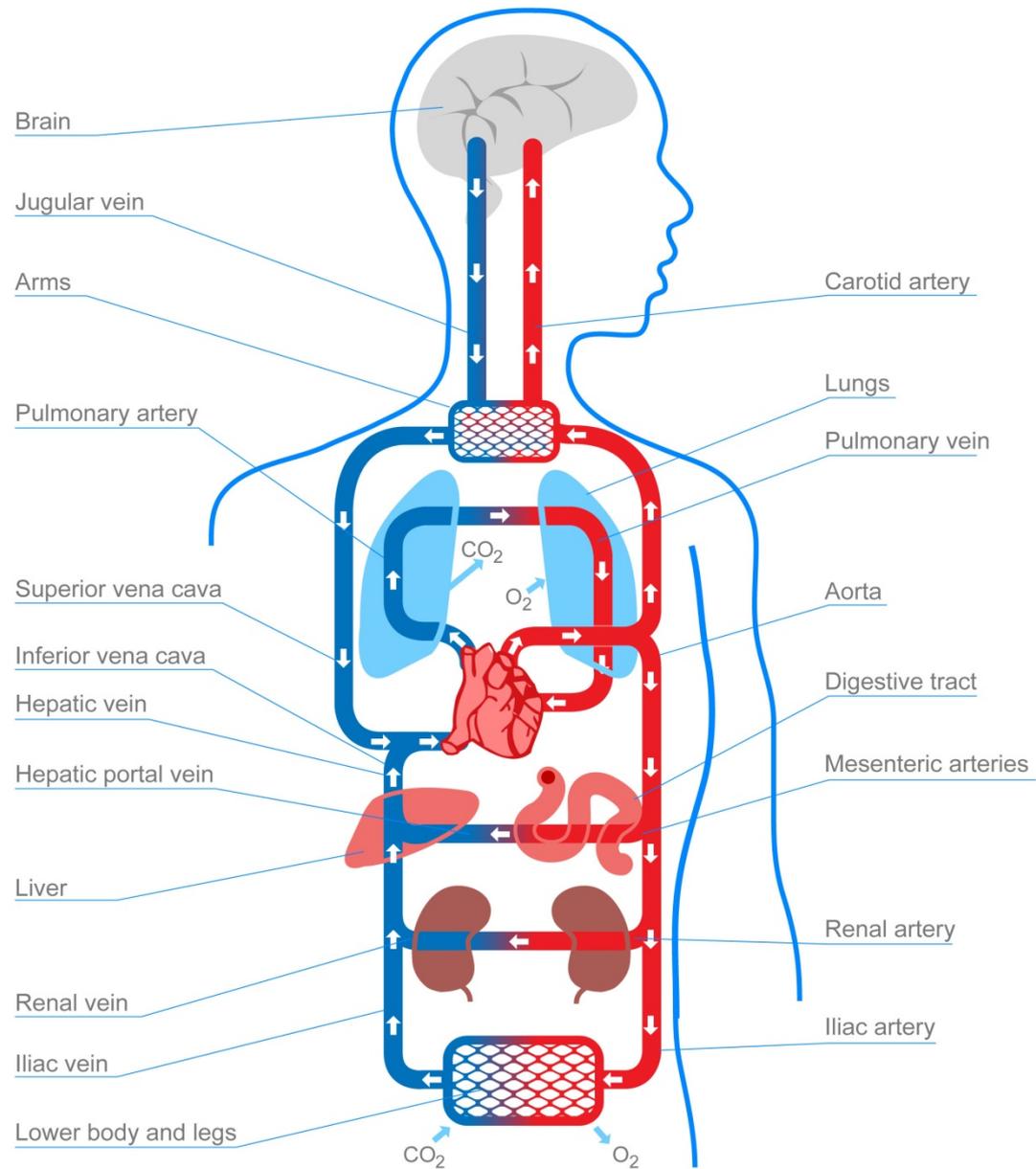
- Atoms
- molecules
- Organelles
- Cells
- Tissues
- Organs
- Organ systems

Circulatory System

- Heart
- Veins – carry blood to heart (O_2 poor)
- Arteries – carry blood away from heart (O_2 rich)
- Capillaries – connect veins + arteries
- Blood
 - Cells (Red, white, platelets)
 - Plasma (watery fluid)



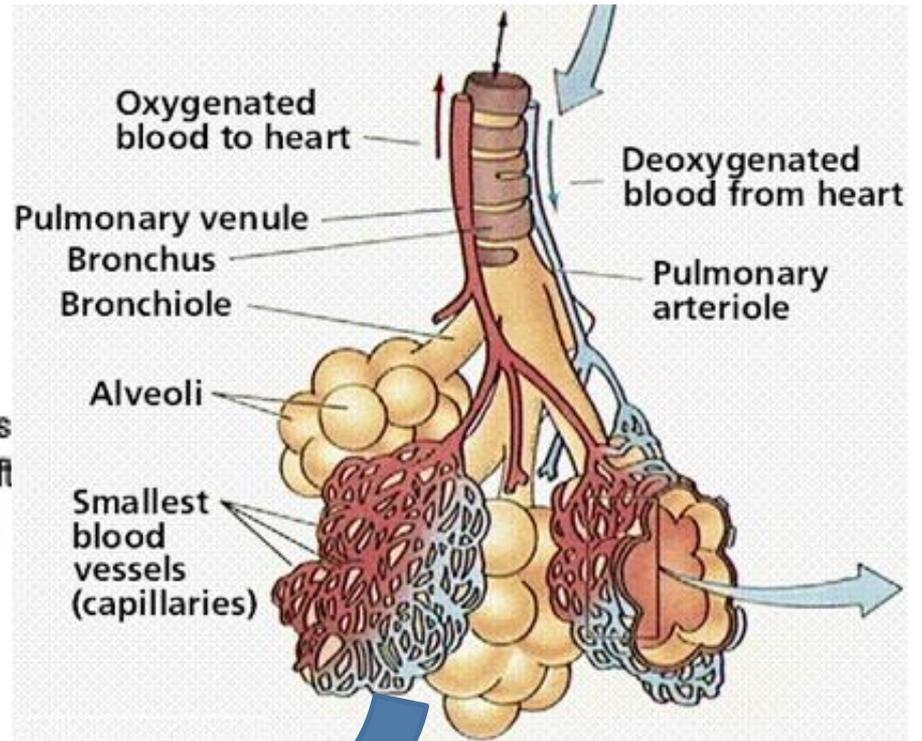
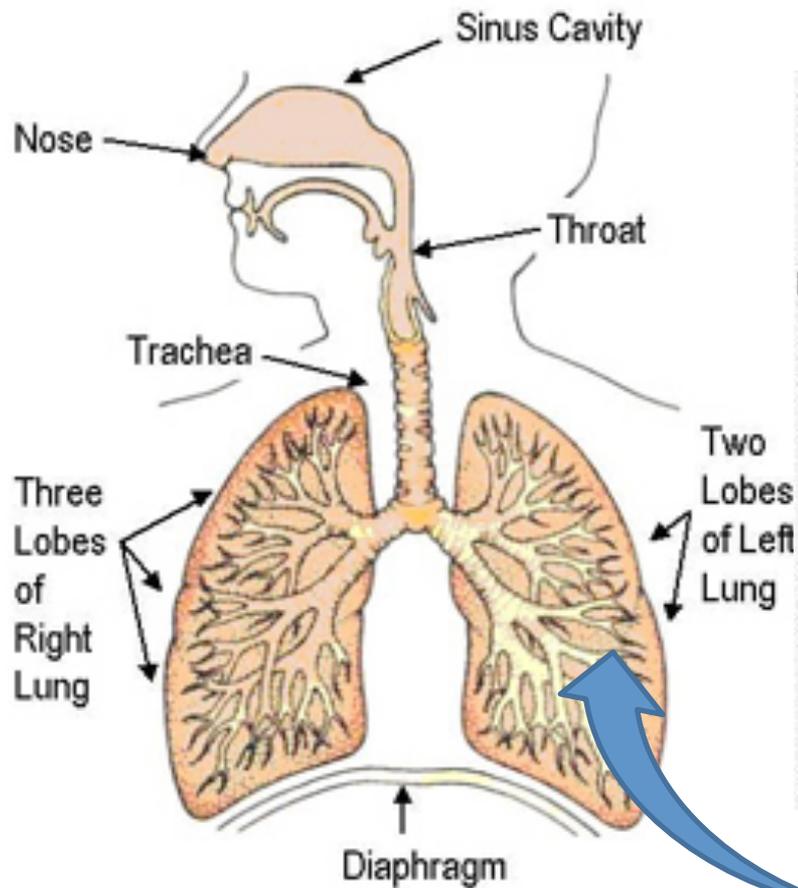
THE CIRCULATORY SYSTEM



Respiratory System

- Trachea → bronchi → lungs (alveoli)
- Diffusion at alveoli + capillary ($O_2 \leftrightarrow CO_2$)

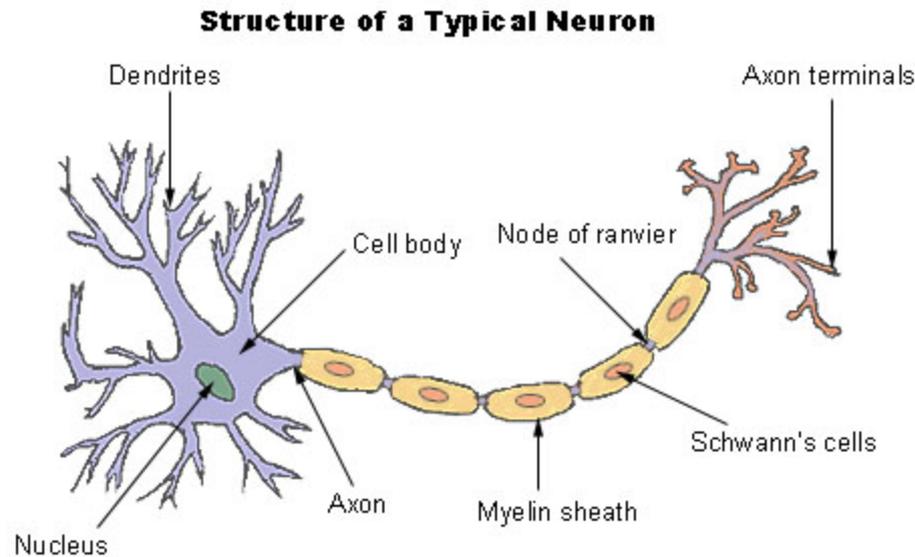




<http://www.youtube.com/watch?v=HiT621PrrO0>

Nervous System

- Neurons (nerve cells)
 - Dendrites → cell body → axon → terminal knobs
- Electrical impulses



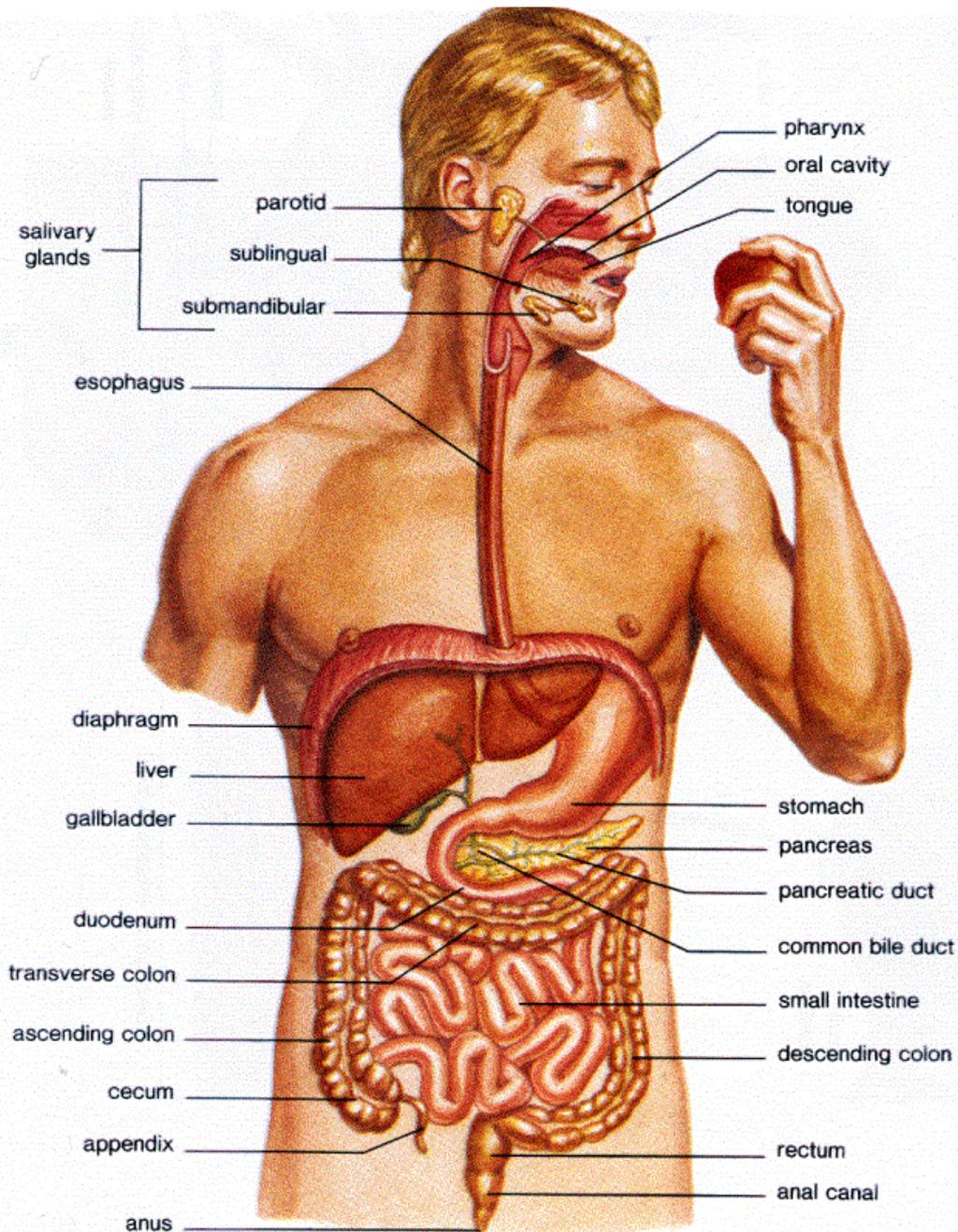


Digestive System



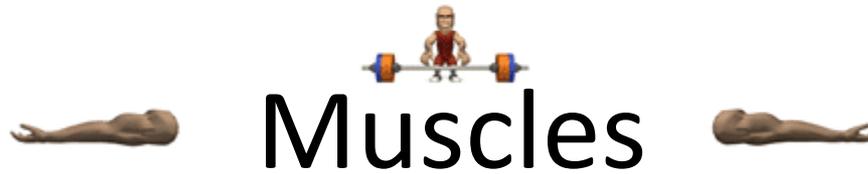
- Mouth (salivary amylase)
- Esophagus (peristalsis)
- Stomach (proteins)
- Small intestines (all nutrients digested + absorbed here)
- Large intestines (just water absorbed)





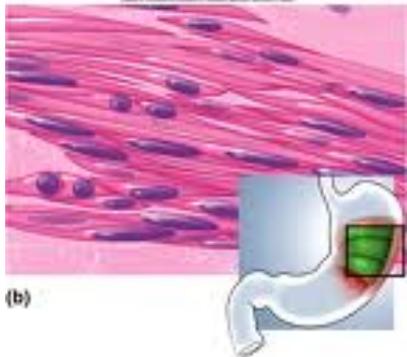
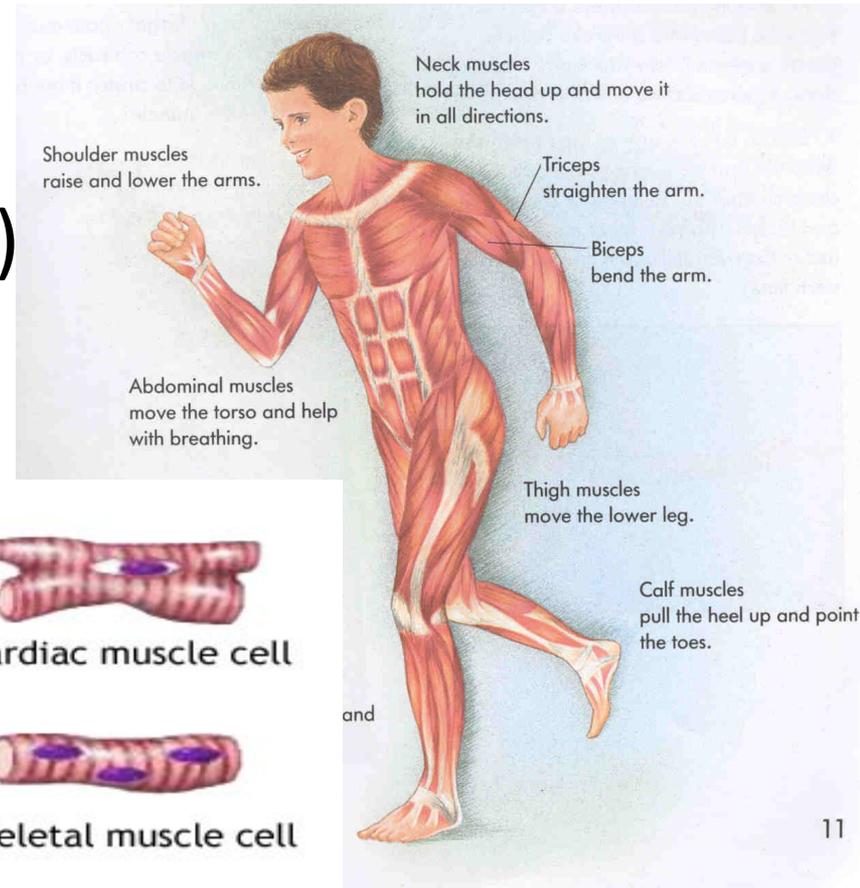
The Digestive System

- <http://www.youtube.com/watch?v=Z7xKYNz9AS0&feature=related>

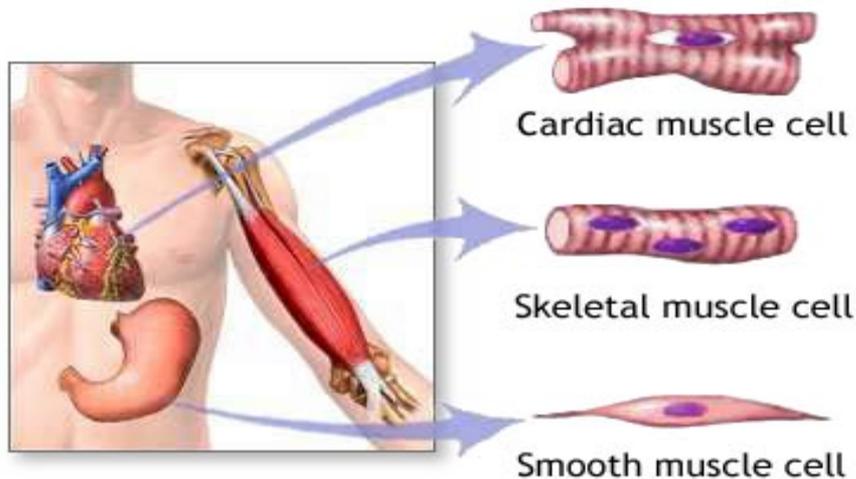


Muscles

1. Skeletal (VOLUNTARY)
2. Smooth (INVOLUNTARY)
3. cardiac (INVOLUNTARY)



(b)



Skin

- Protects you from bacteria + viruses
- Sweat glands – keep you cool
- Hair + finger nails



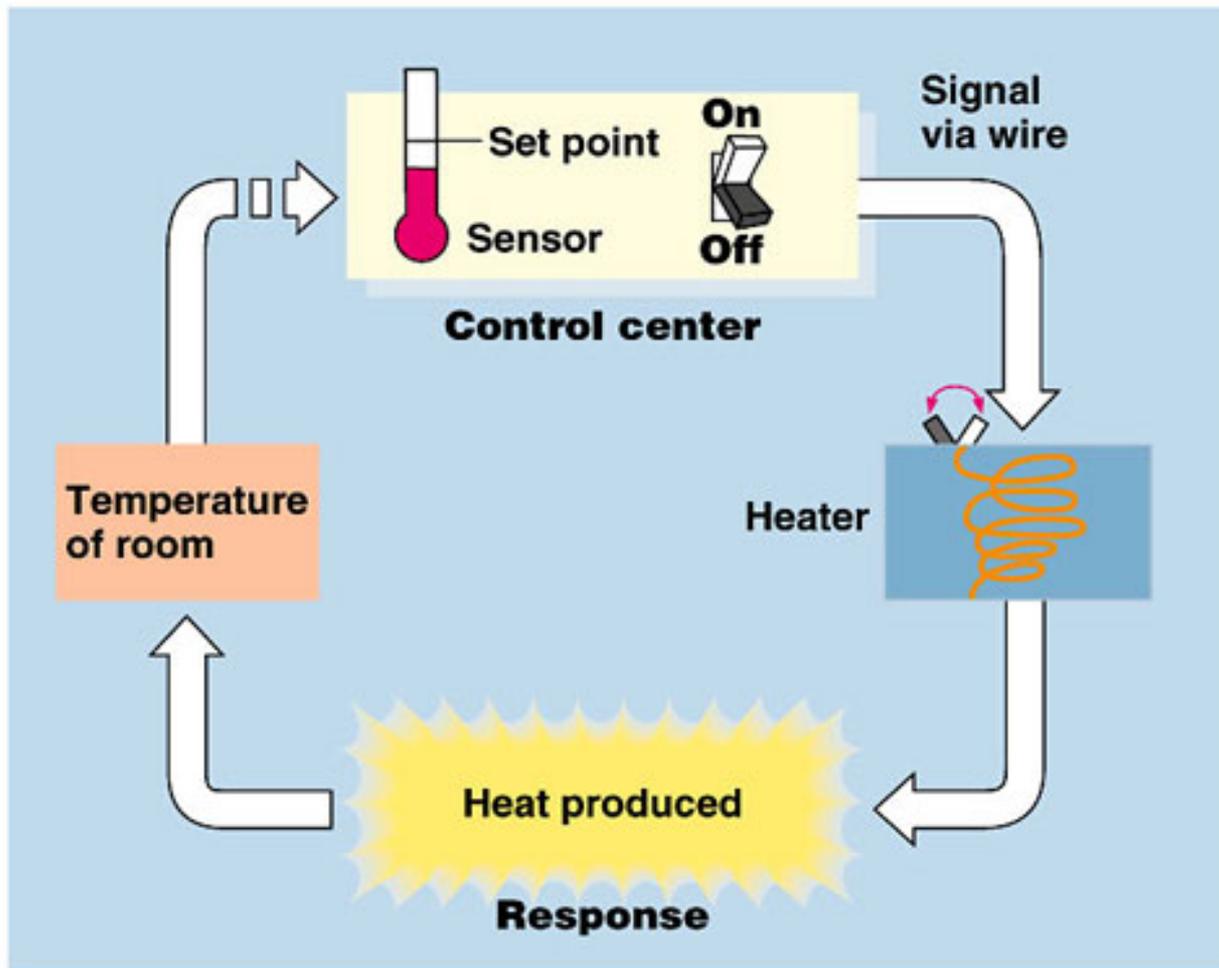
Skeletal system



- Bones
 - Protect (skull + ribs)
 - Attachment for muscles
 - Make blood cells 😊

Homeostasis

- Maintaining a stable internal environment
- Keeping it the same



(a) Control of room temperature

Virus attack

- Our immune system to the rescue! 😊

<http://www.npr.org/templates/story/story.php?storyId=114075029>



Topic 4

Cell Structure and Function

Organelles

- **Nucleus** = controls cell activities (**DNA**)
- **Mitochondria** = makes cell energy (**ATP**)
- **Chloroplast** = site of photosynthesis (**glucose**)
- **Lysosome** = digestive food for cell
- **Ribosome** = where proteins are made
- **Golgi body** = packages proteins
- **Vacuole** = stores water and wastes for cell

Organelles

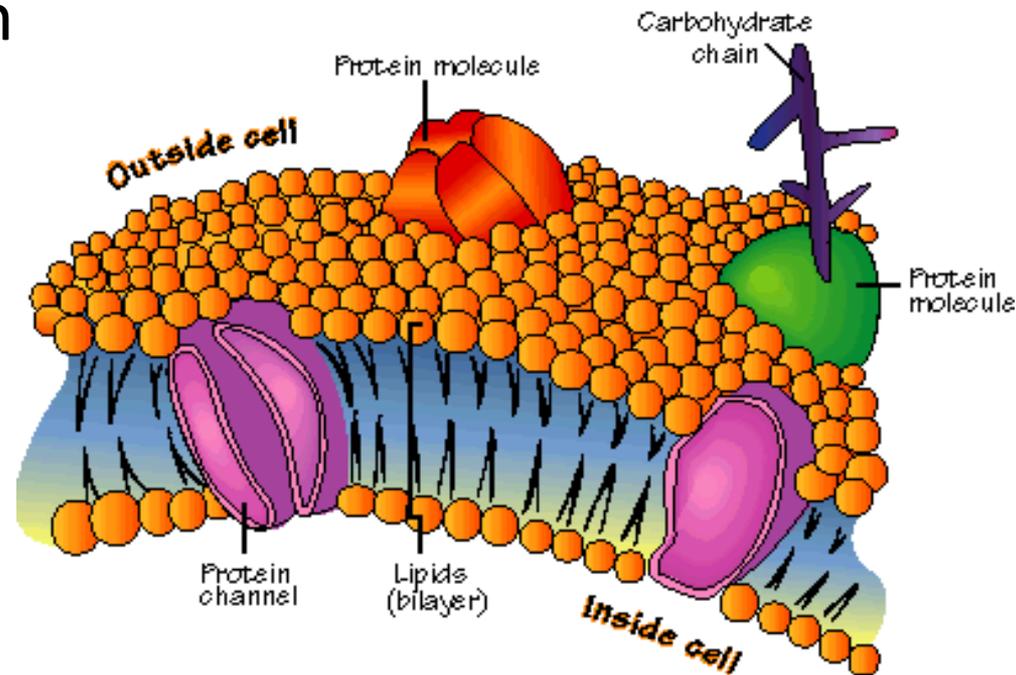
- **Cilia** = short hairs used for movement
- **Flagellum** = long whip used for movement
- **Cell wall** = protect cell (outside cell membrane)
- **Pseudopod** = fake foot, how a amoeba moves

[http://video.google.com/videoplay?
docid=5746307043178444653#](http://video.google.com/videoplay?docid=5746307043178444653#)

Organelles

- **Cytoskeleton** = framework that supports cell
- **Cell membrane** = regulates what goes in + out
- **Centrioles** = move + sorts chromosomes in mitosis

- The structure of the cell membrane:
 1. A phospholipid bilayer
 2. Protein



Plant vs. Animal cell

Plant Cell

- Chloroplast
- Cell wall (cellulose)
- No centrioles
- Cell plate (mitosis)
- Square shape

Animal Cell

- No cell wall
- Centrioles
- Round shape

Main Types of Cells

Prokaryote

- Simple
- Small(er)
- No nucleus
- No membrane bound organelles
- Small ribosomes
- Unicellular

Eukaryote

- Complex
- Large
- Nucleus
- Membrane bound organelles
- Large ribosomes
- Many multicellular
 - Except PROTISTS

Cellular Transport

Passive Transport

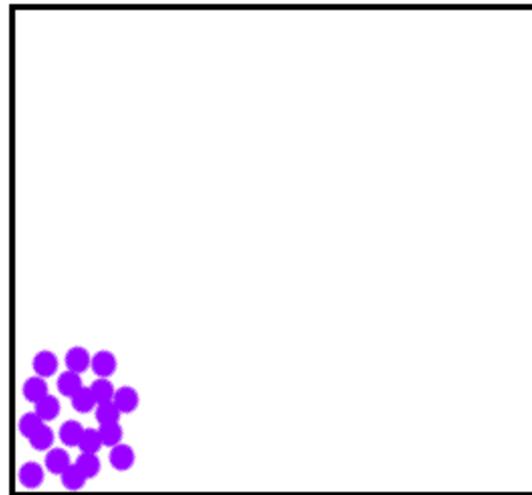
- Diffusion
- Osmosis
- Facilitated Diffusion

Active Transport

- Endocytosis (in)
- Exocytosis (out)

Diffusion

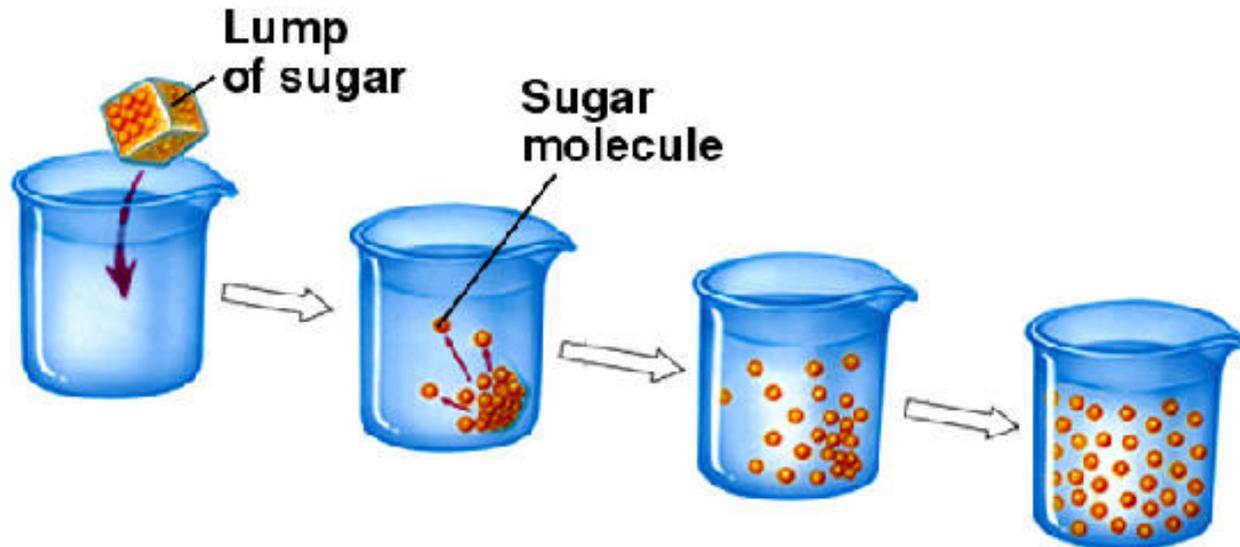
- Involves the movement of small particles from areas of HIGH concentration to areas of LOW concentration
- DOES NOT REQUIRE ATP!
- Examples:



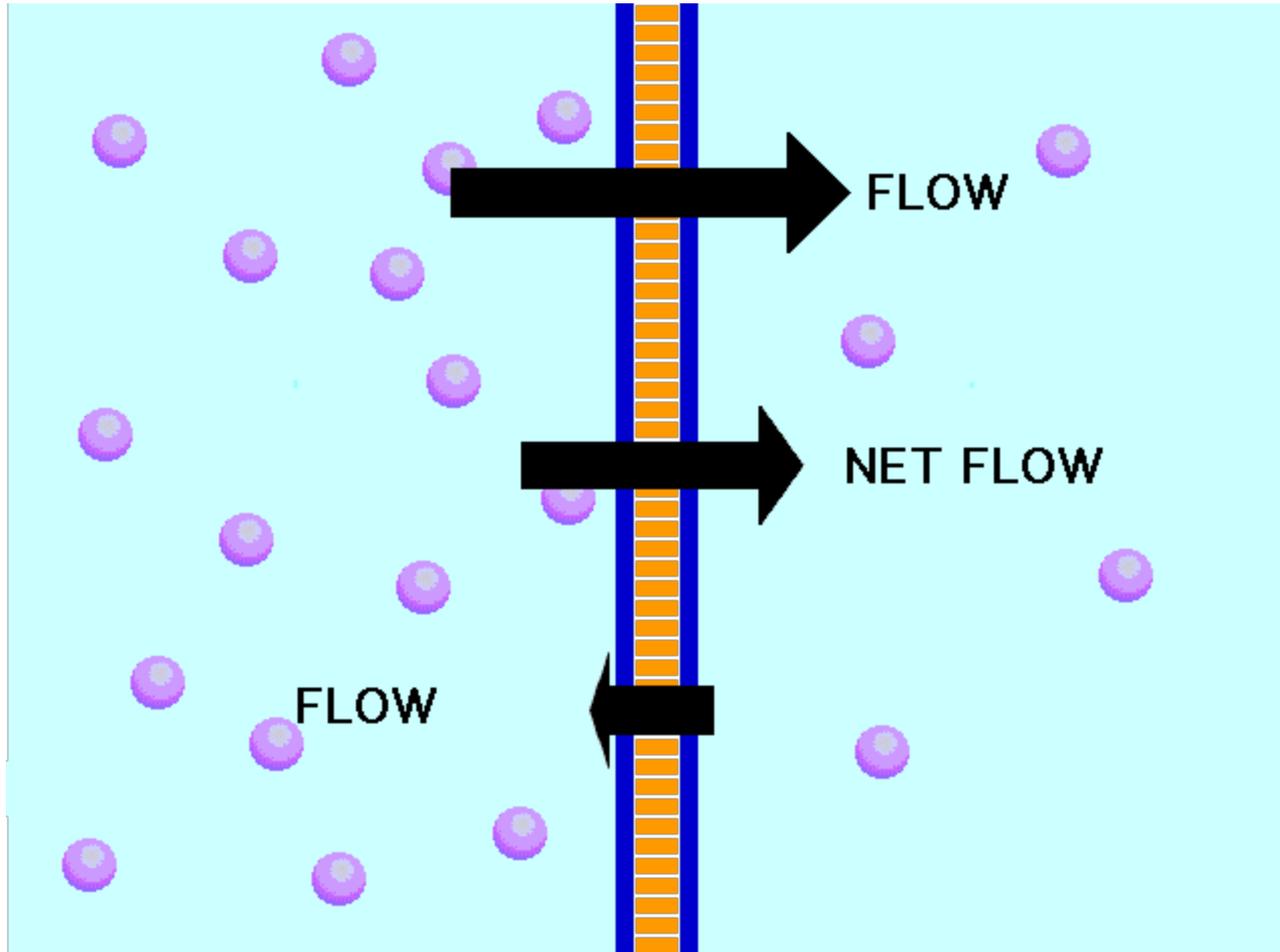
More Diffusion Examples

Copyright © The McGraw-Hill Companies, Inc. Permission required for reproduction or display.

Diffusion



Diffusion can occur across a membrane



3 Types of Osmotic Solutions

- Each depends on the amount of solutes dissolved

1. ISOTONIC

has the same amount of solutes as another solution

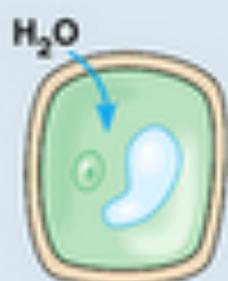
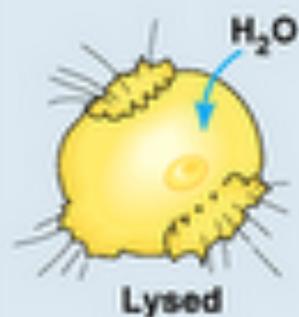
2. HYPERTONIC

has MORE solutes than another solution

3. HYPOTONIC

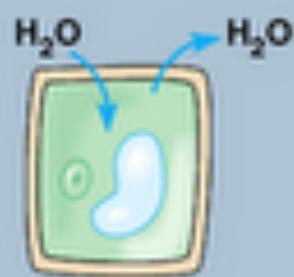
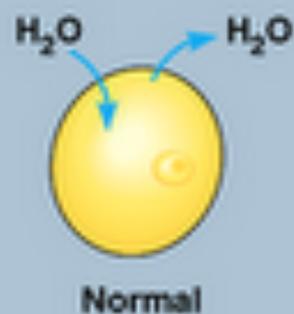
has LESS solutes than another solution

Hypotonic solution



Turgid (normal)

Isotonic solution



Flaccid

Hypertonic solution



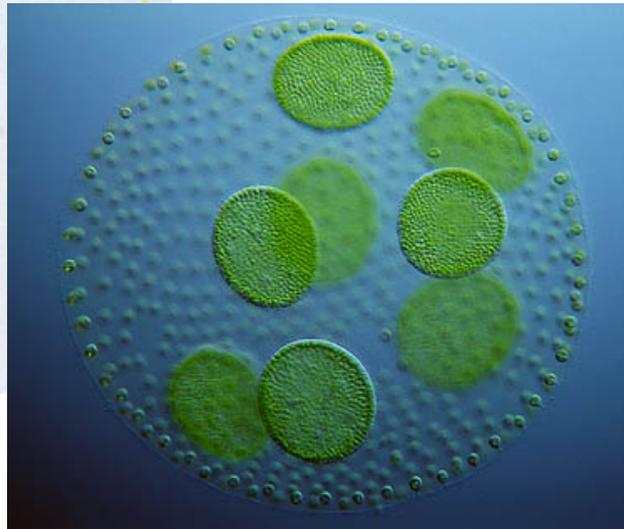
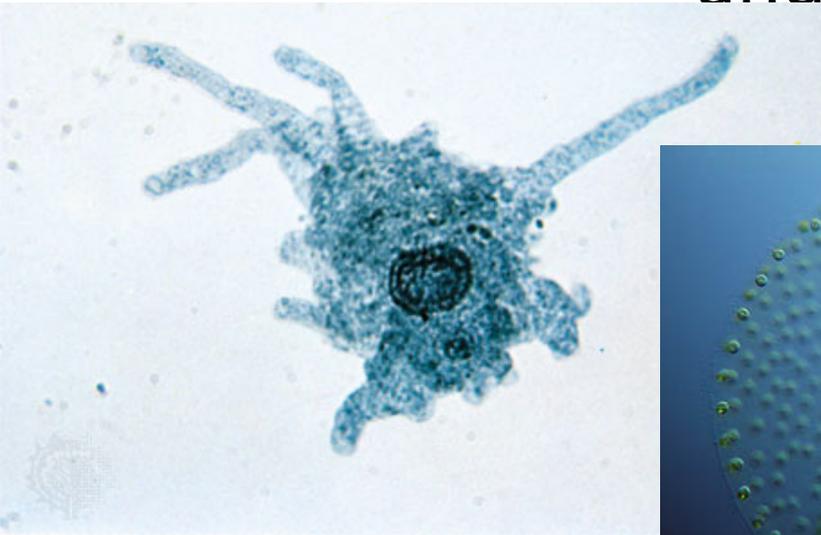
Plasmolyzed

Animal cell

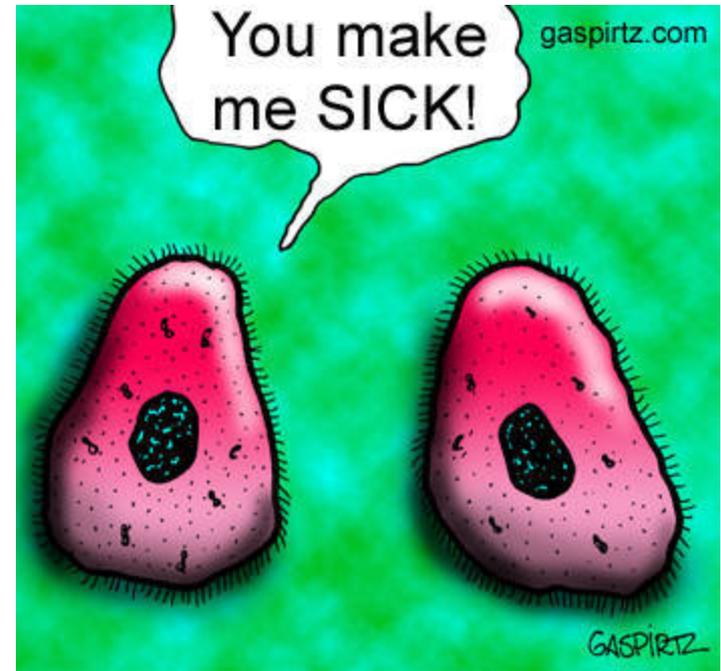
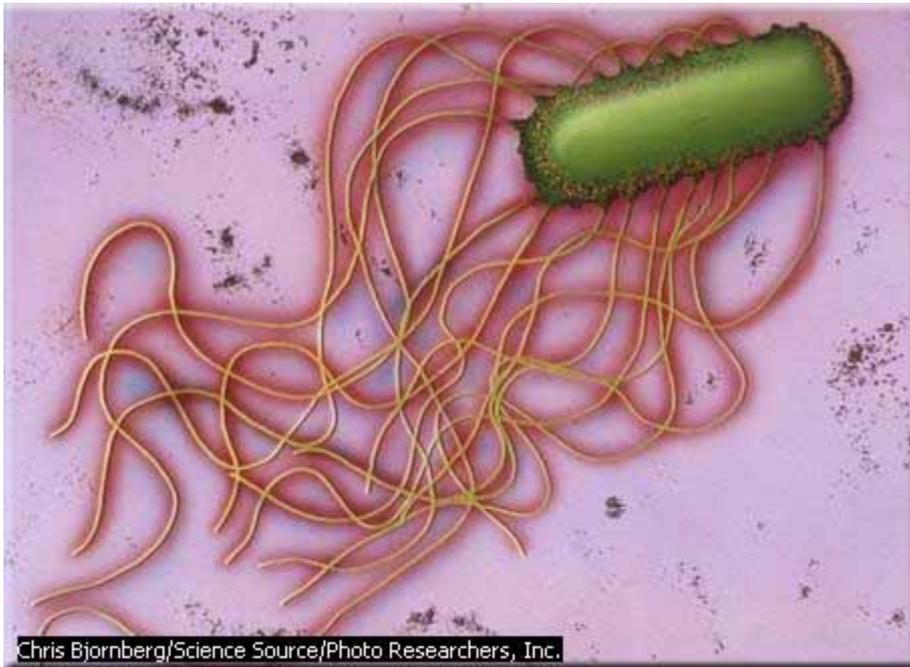
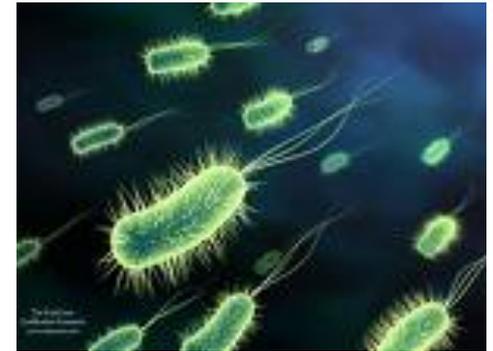
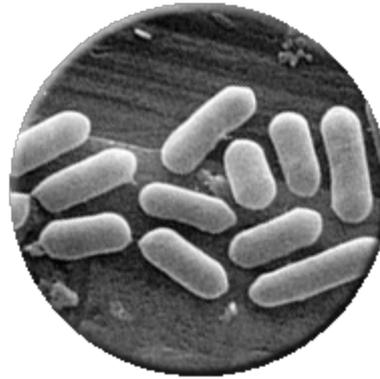
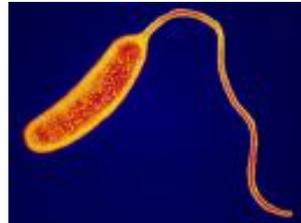
Plant cell

Remember:

- Protists are Eukaryotes!
- Amoeba, algae, paramecium and euglena



- And bacteria are always PROKARYOTES!!!!!!!!!!



When germ relationships go bad

