

# Unit 4: Summary

Similarities and Differences  
Between Living Things

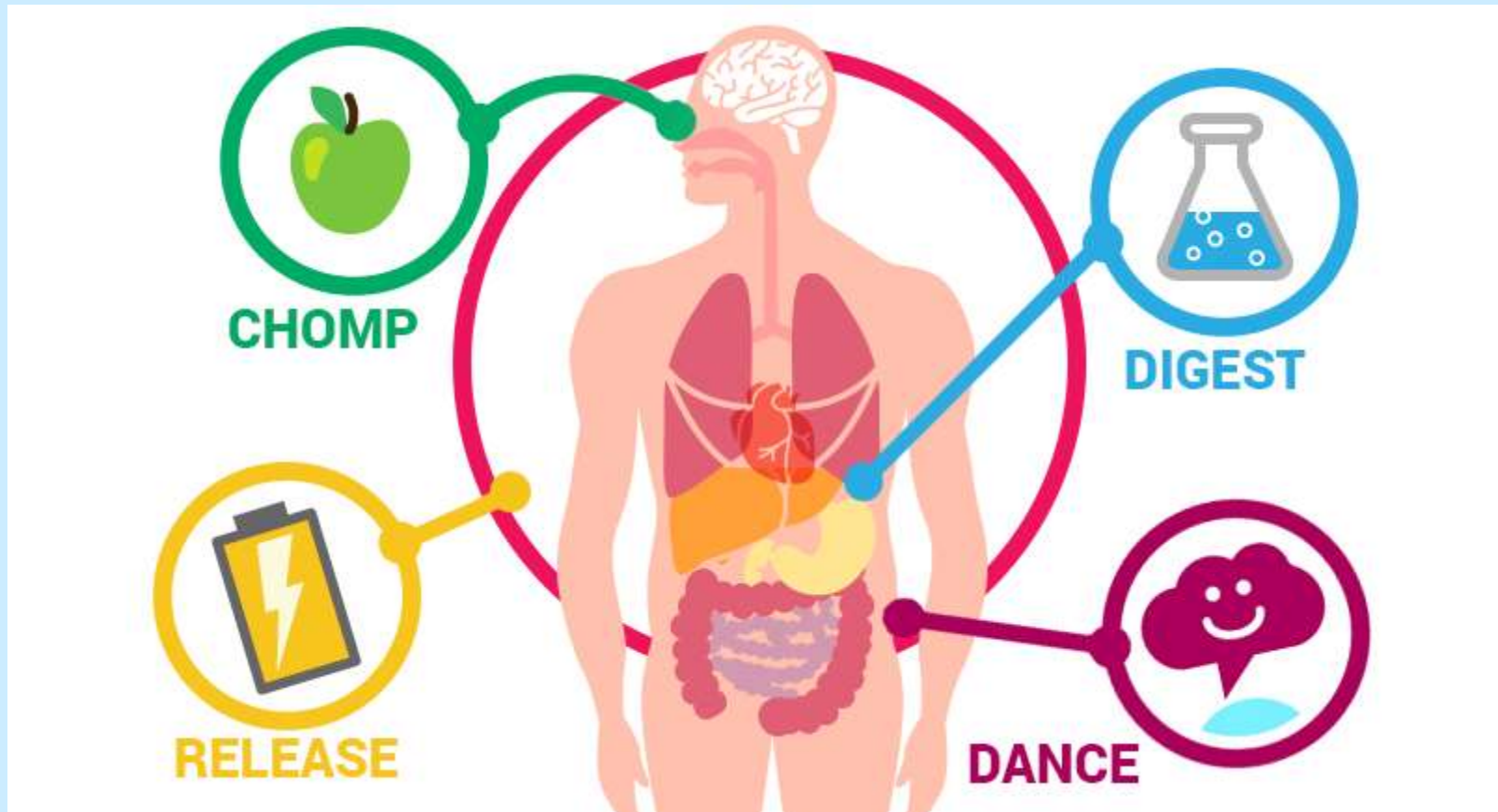
# Review cell theory

- All living things made of cells
- Cells perform life functions
- Cells come from pre existing cells

What are life functions?

# Metabolism

- Chemical reactions needed to live



A microscopic image showing several amoebae. The amoebae are large, irregularly shaped, and have a granular, blueish-grey appearance. They are surrounded by a clear, light blue fluid. One amoeba in the lower center is smaller and appears to be ingesting a green, filamentous structure. The background is a uniform light blue color.

**How does an amoeba perform  
life functions**

How do multi-celled organisms perform life functions?



# Human Body Systems



Work together to help organisms maintain homeostasis

# Homeostasis = Dynamic Equilibrium

- Define and draw in your notes

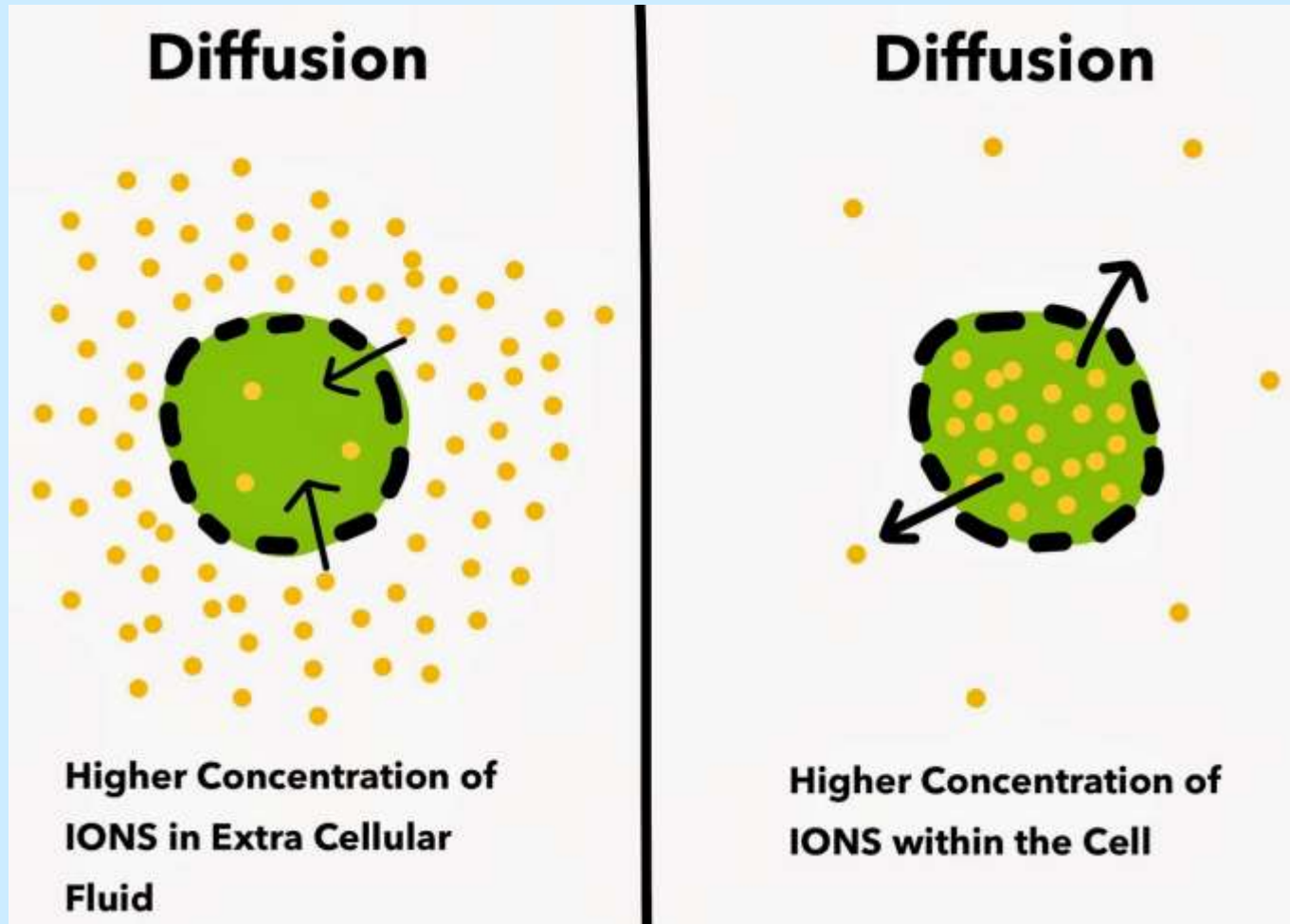


# Homeostasis in cells requires:

- Transport
- Communication
- Feedback mechanisms

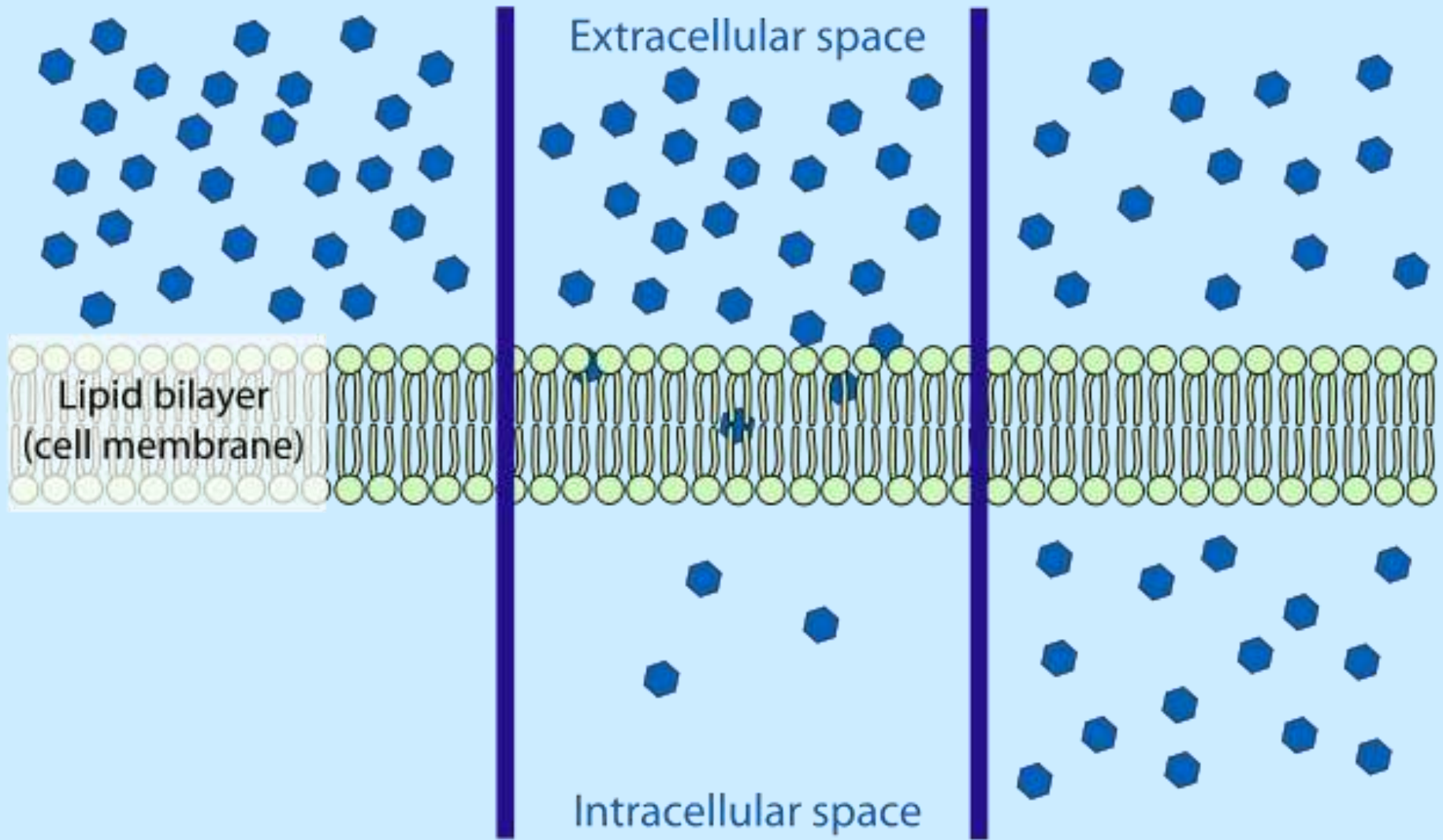
# Cell transport

- Passive transport = diffusion

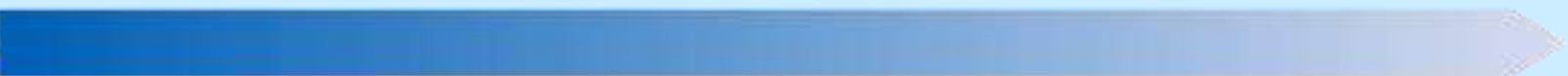


# Diffusion

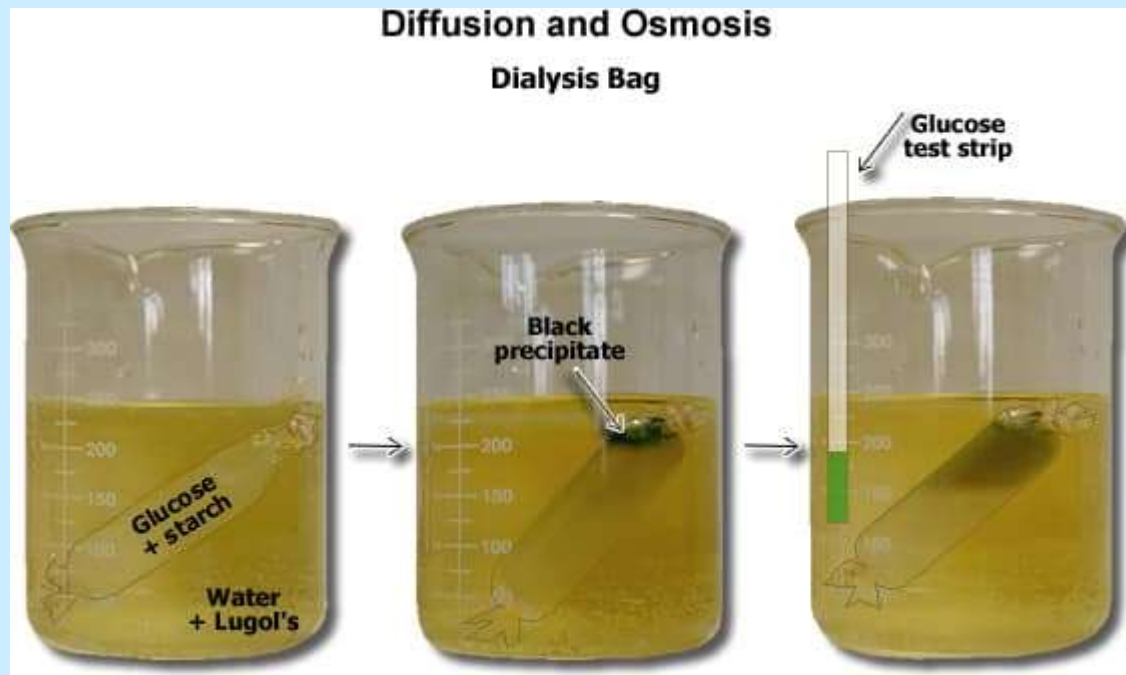
- Movement from high to low until it is equal on both sides



**TIME**



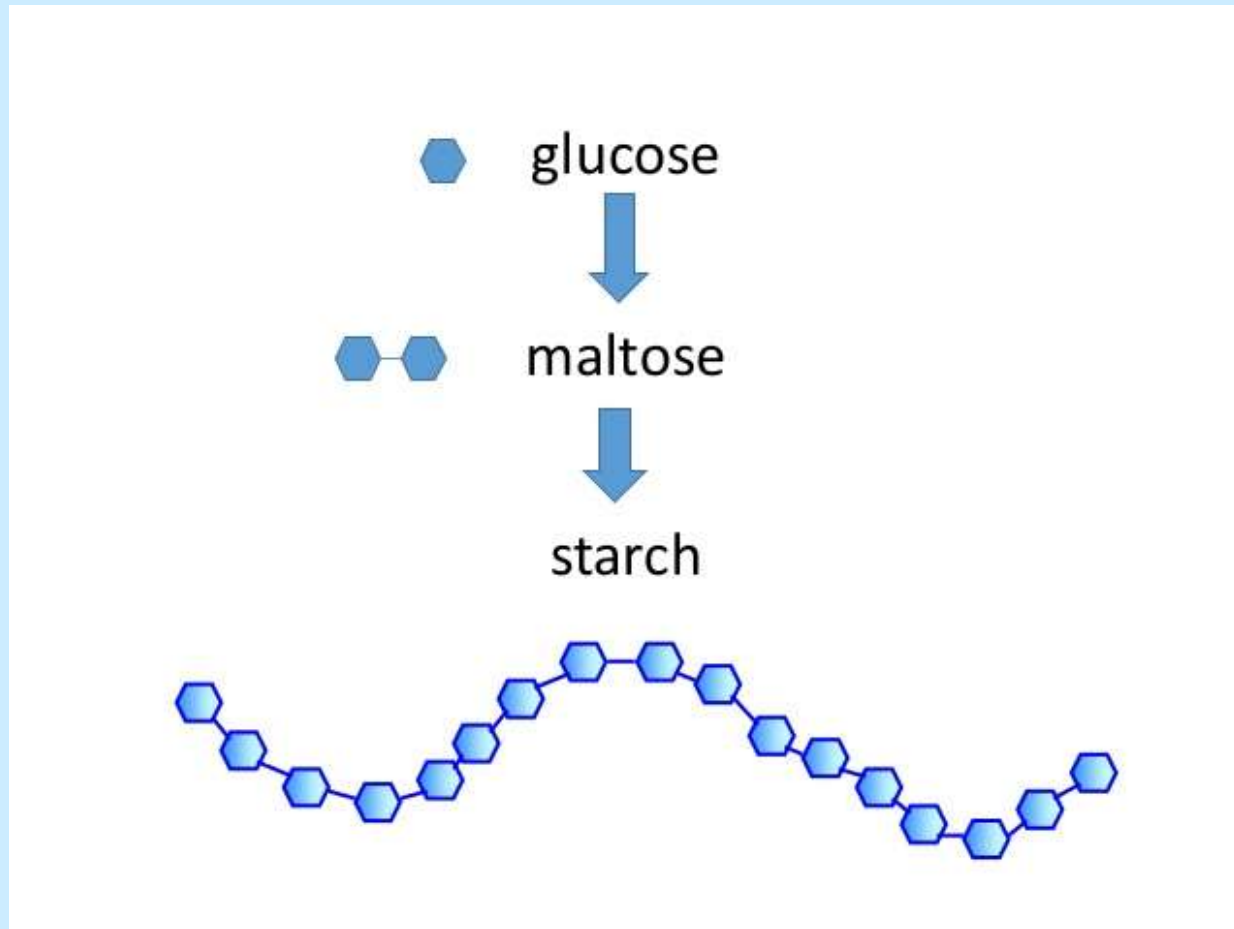
# What diffused through our fake cells in the diffusion through a membrane lab



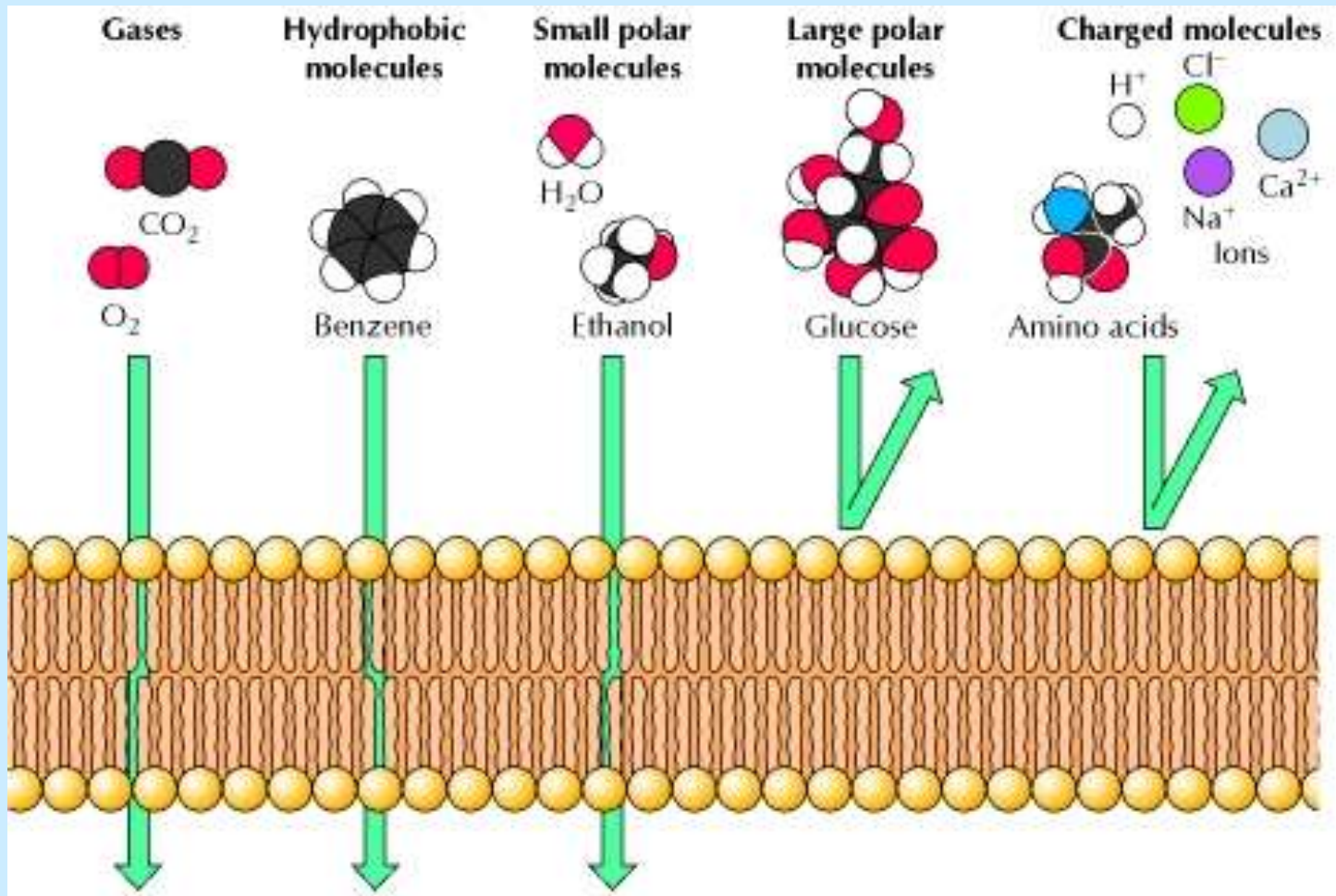
- Water
- Starch indicator (iodine)
  - glucose

How do we know?

# What didn't diffuse through the dialysis bags and why?



# What can diffuse through cell membranes

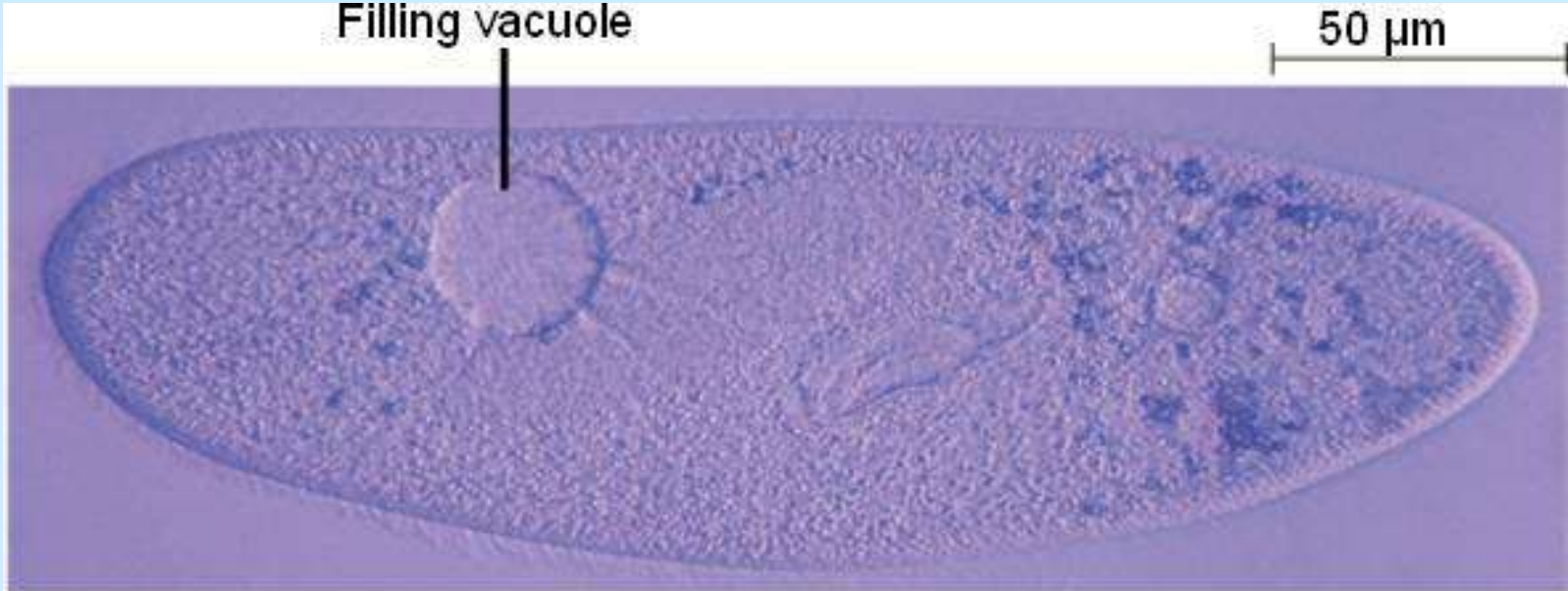




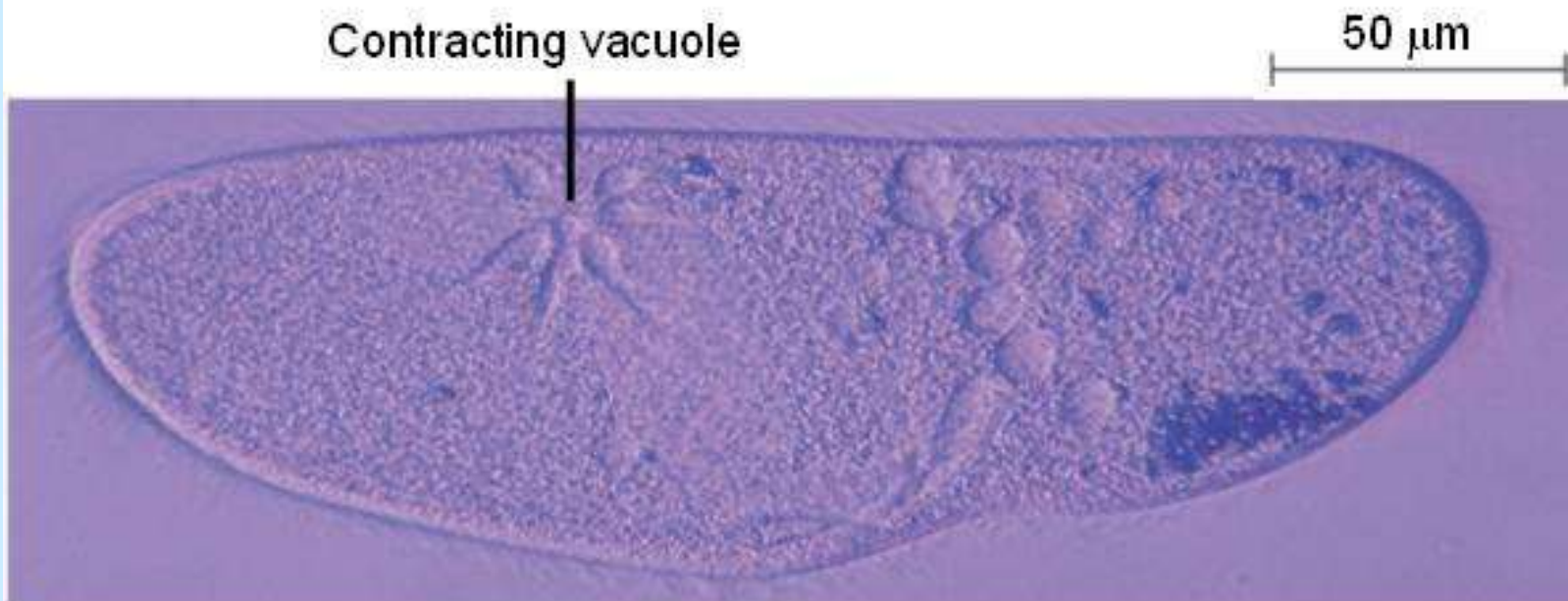
# Diffusion of water = osmosis

- What happens to a cell in pure water?
- Water moves in cell swells
- What happens to a cell in salt?
- Water moves out cell shrinks

So how do cells survive in  
freshwater ecosystems?



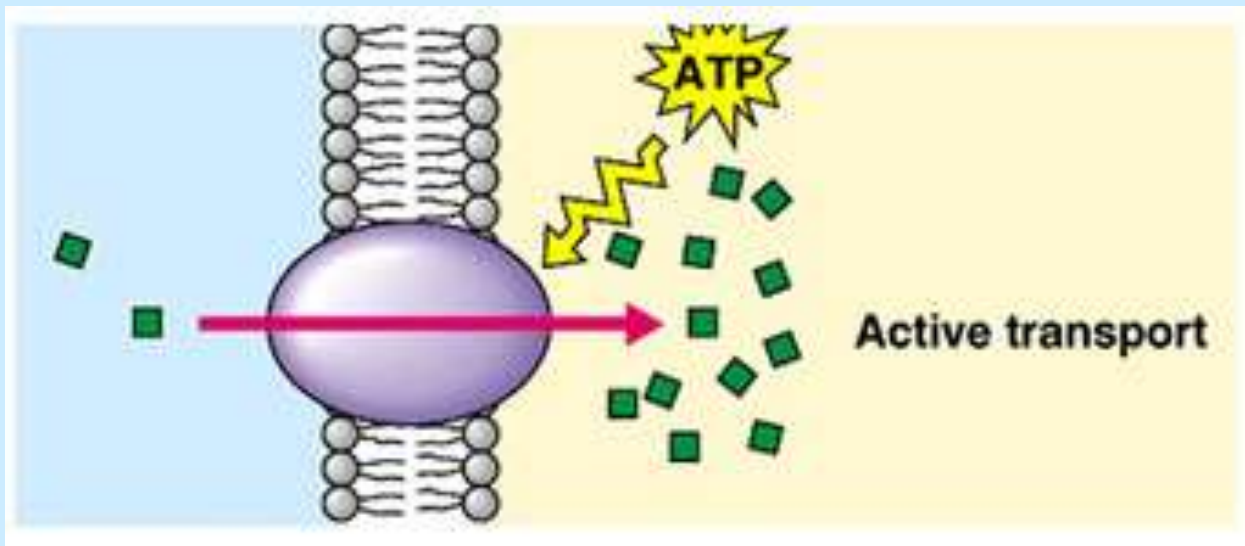
**(a)** A contractile vacuole fills with fluid that enters from a system of canals radiating throughout the cytoplasm.



**(b)** When full, the vacuole and canals contract, expelling fluid from the cell.

# Active transport

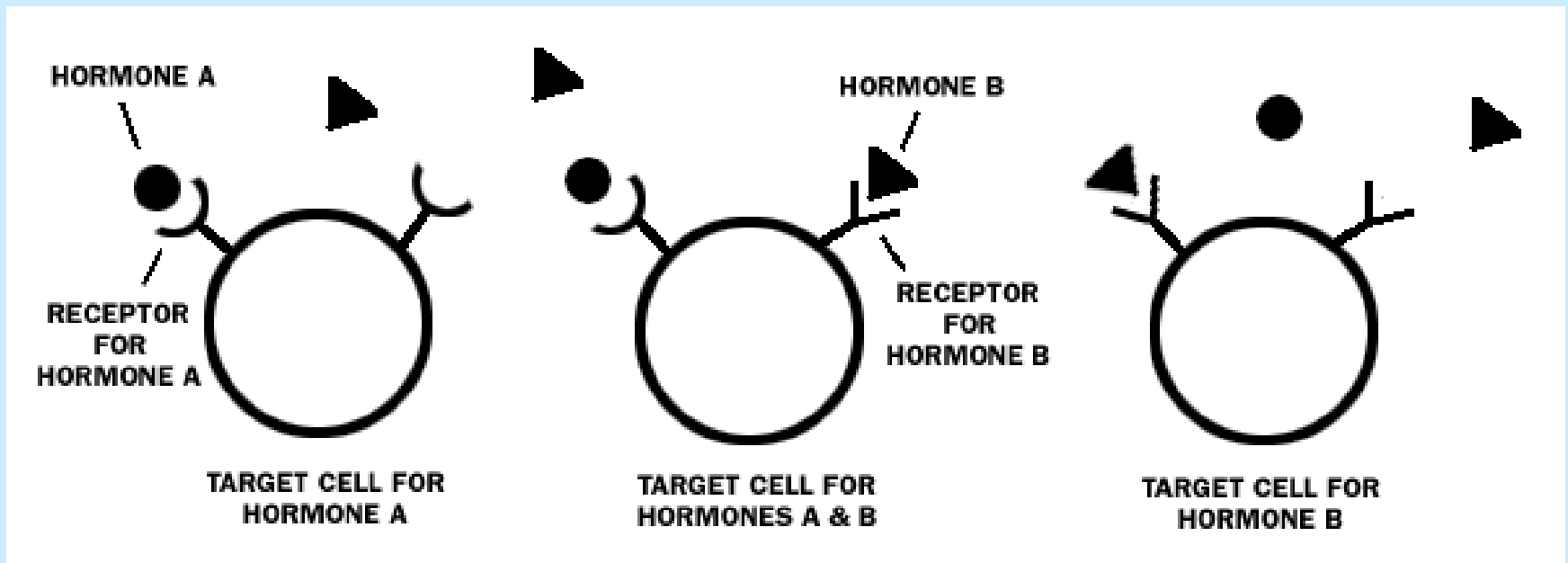
- Moves molecules from low to high
- **REQUIRES ENERGY**



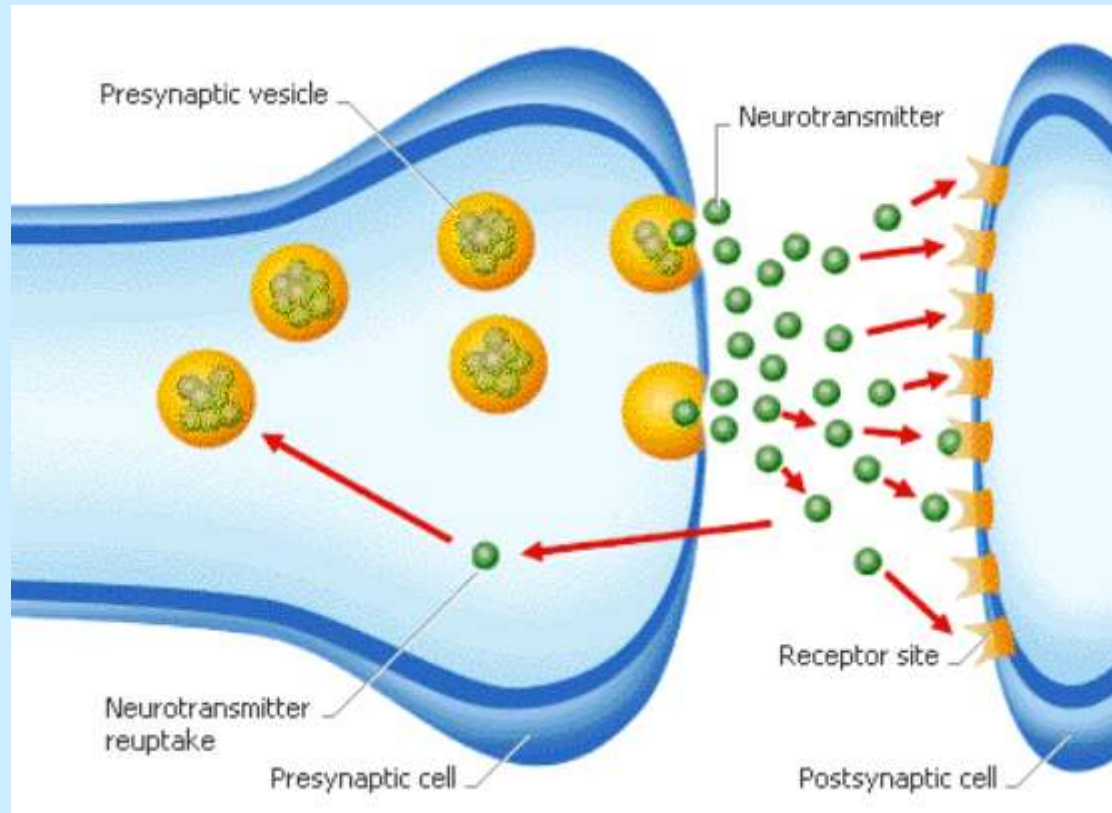
# Cellular communication

- Chemical messengers and receptor molecules are very specific because of their shape

# Hormones = chemical messengers of the endocrine system



# Neurotransmitters = chemical messengers of nerve cells



Both bind very specifically to  
receptor proteins in cell  
membranes



# Feedback mechanisms maintain homeostasis

- Stimulus = change in environment → response

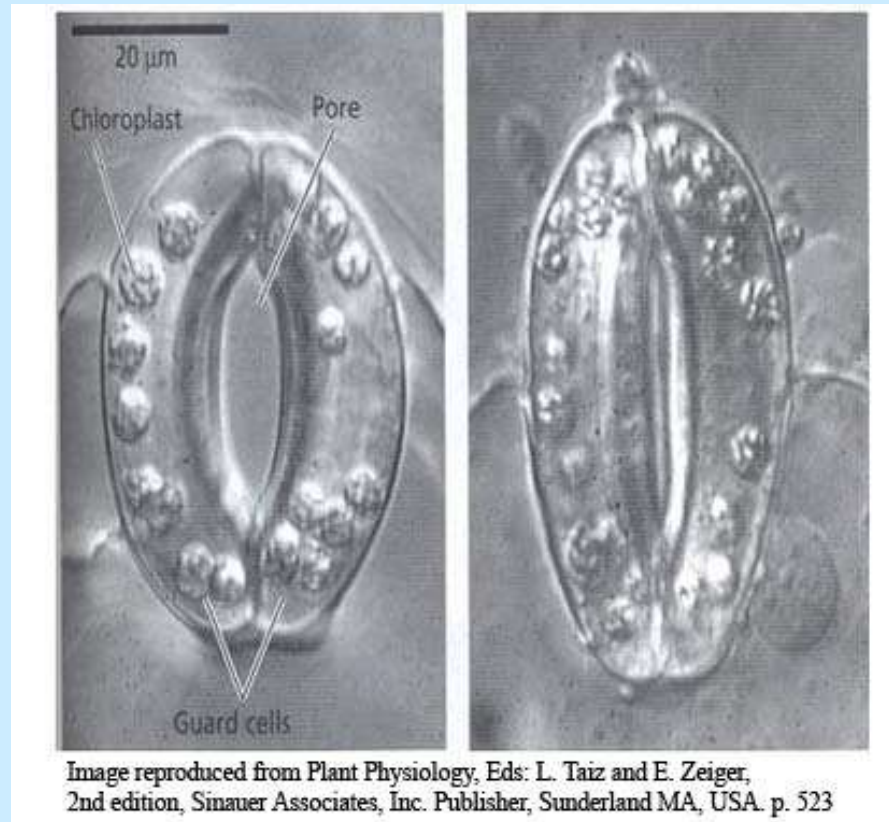
A microscopic image of a leaf cross-section, showing a network of green, polygonal cells. Several stomata are visible, each consisting of two guard cells that form a central pore. The guard cells are surrounded by other epidermal cells. The overall structure is a regular, repeating pattern of cells.

# Example in plants

- Guard cells open and close stomates in leaves

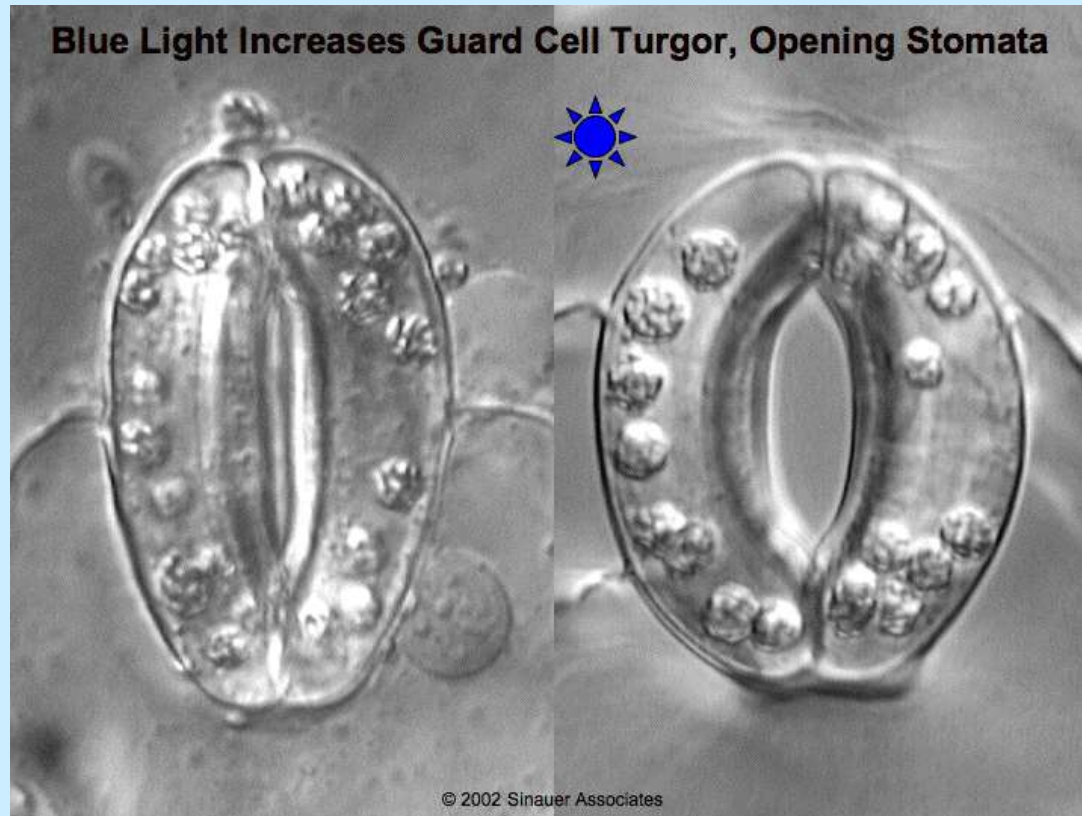
# Environment = Hot Dry

- Response = stomates close → less transpiration

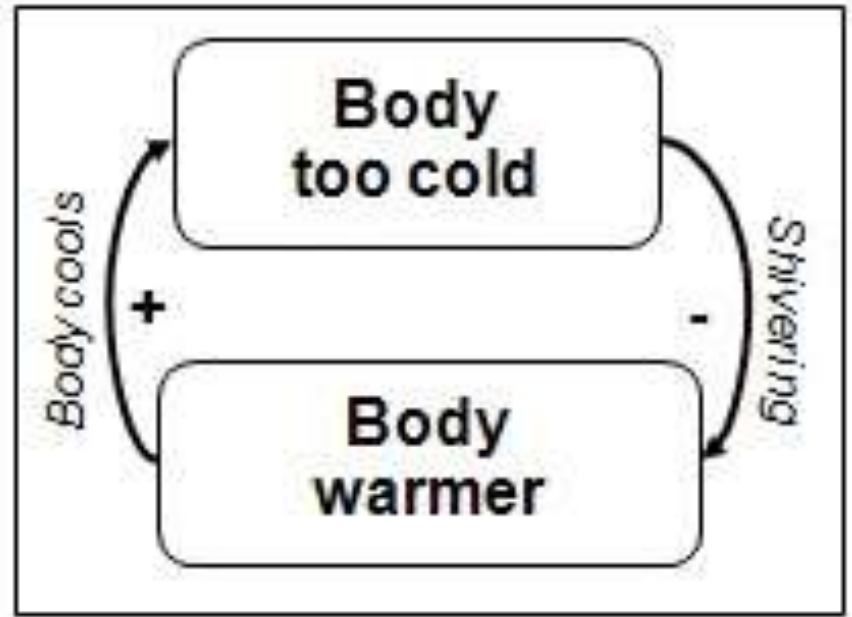
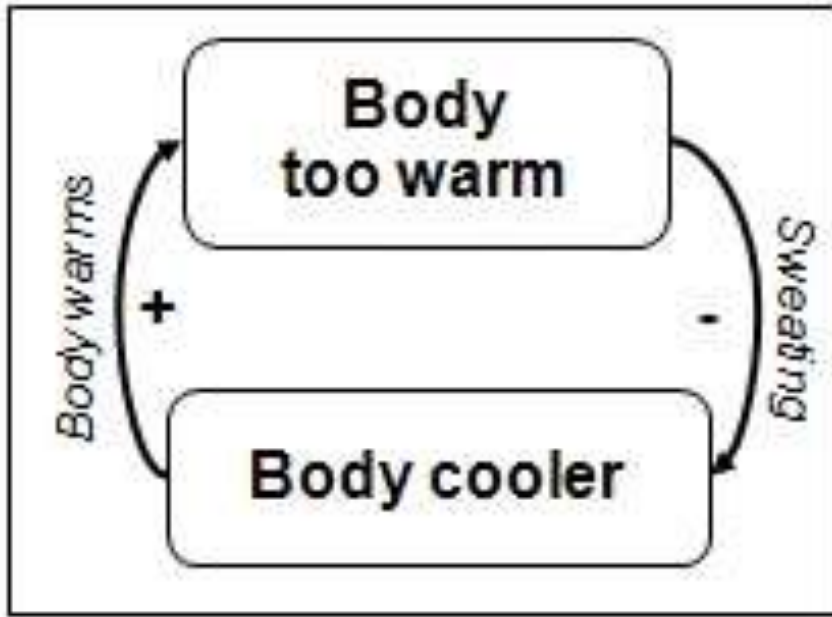


# Environment = cool and moist

- Response = stomates open → more transpiration



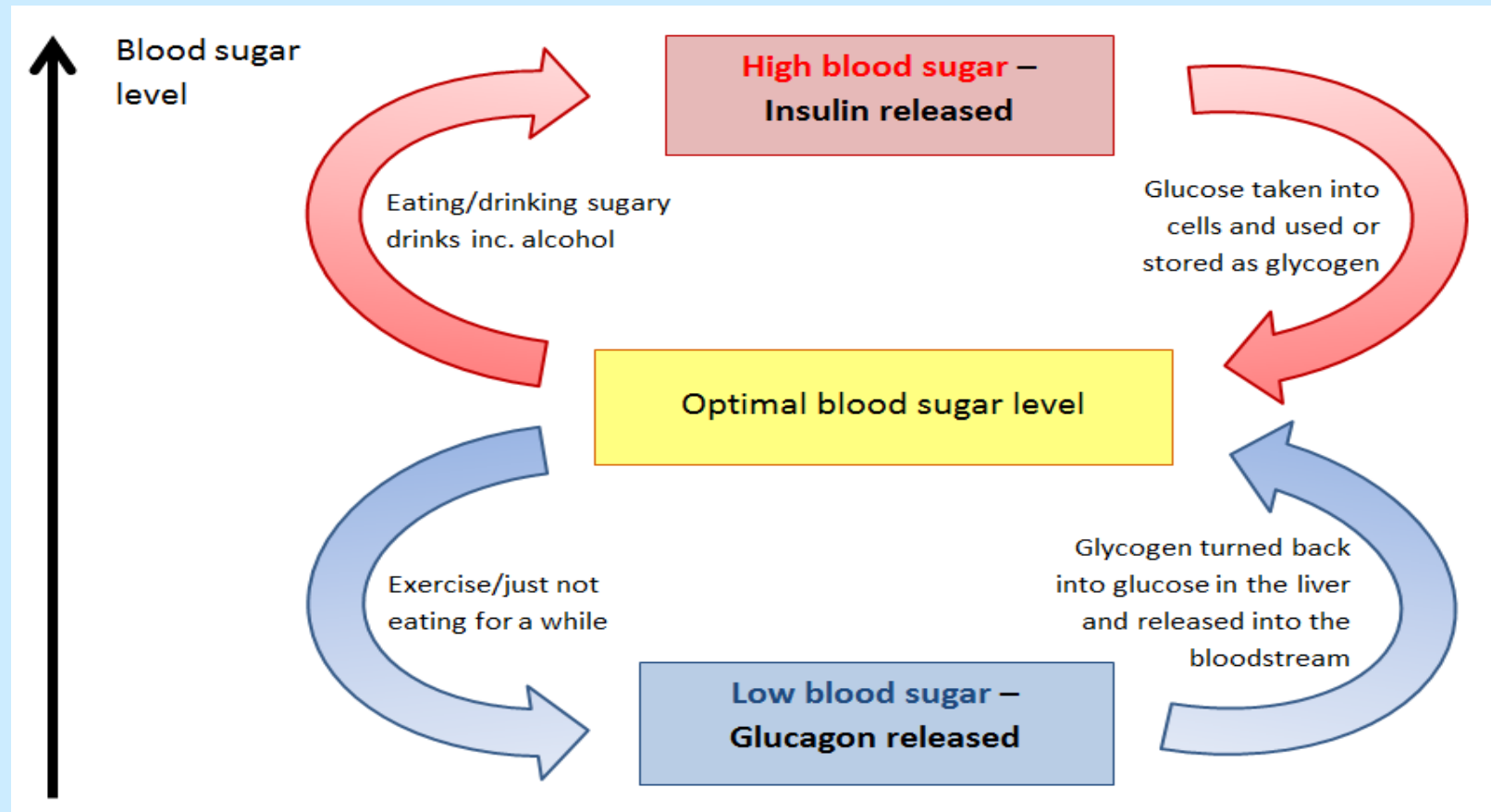
- Body temp controlled by sweating and shivering



# Ex: Glucose levels controlled by hormones

- Hi blood glucose → pancreas →
- insulin → decreases blood glucose
  
- Low glucose → pancreas →
- another hormone (glucagon) → release of sugar from liver

# Feedback loops maintain blood glucose



Practice Homeostasis Questions

Life Functions =

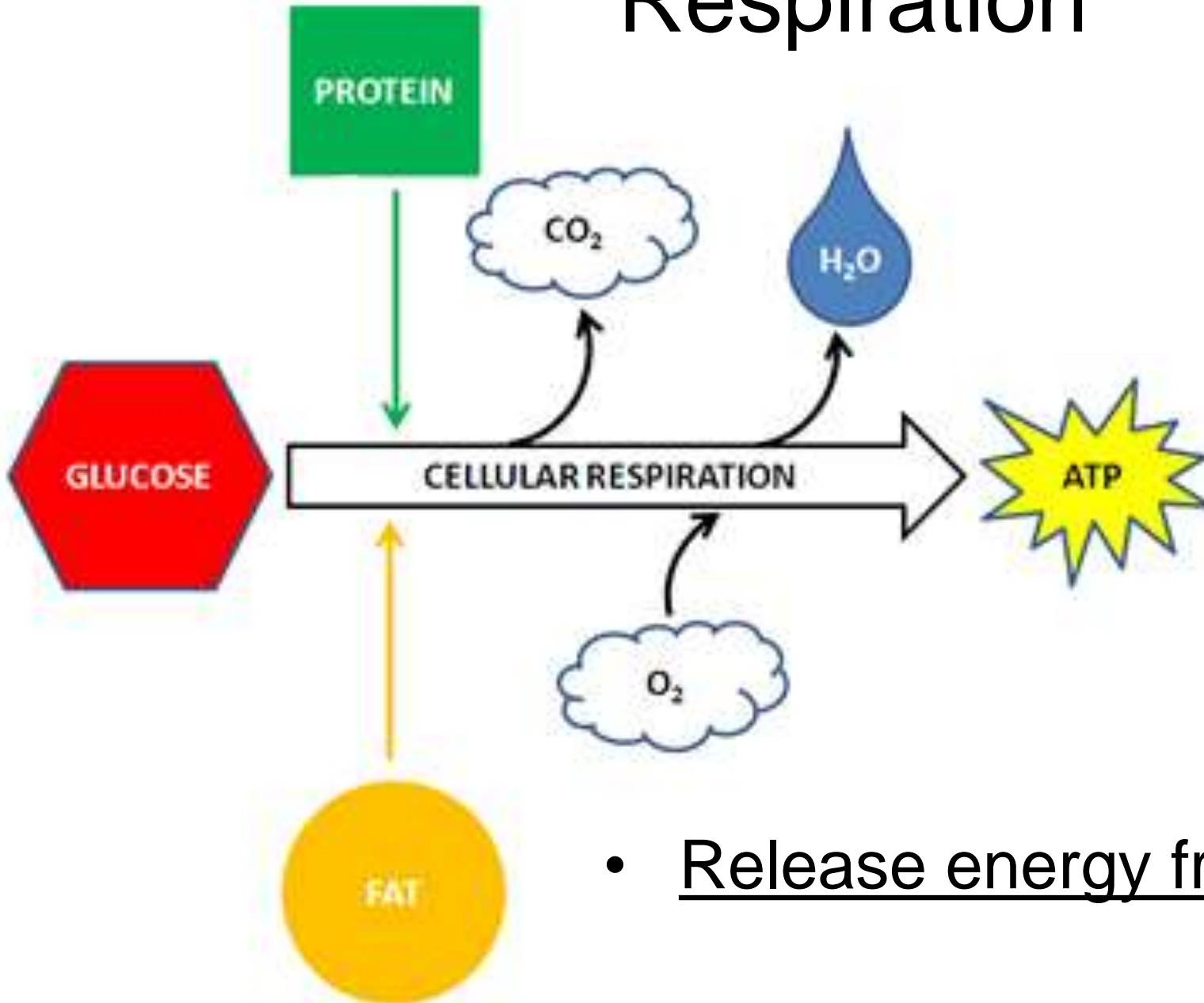


# Movement

- helps us respond to the environment



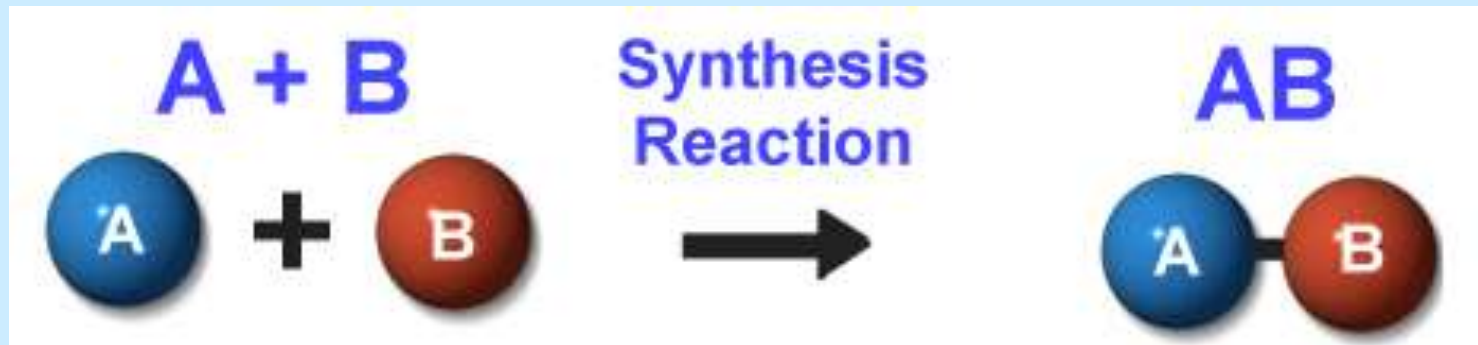
# Respiration



- Release energy from food

# Synthesis

- Making cell parts



# Circulation



- Transport food and wastes within organisms

# Excretion

- Waste removal



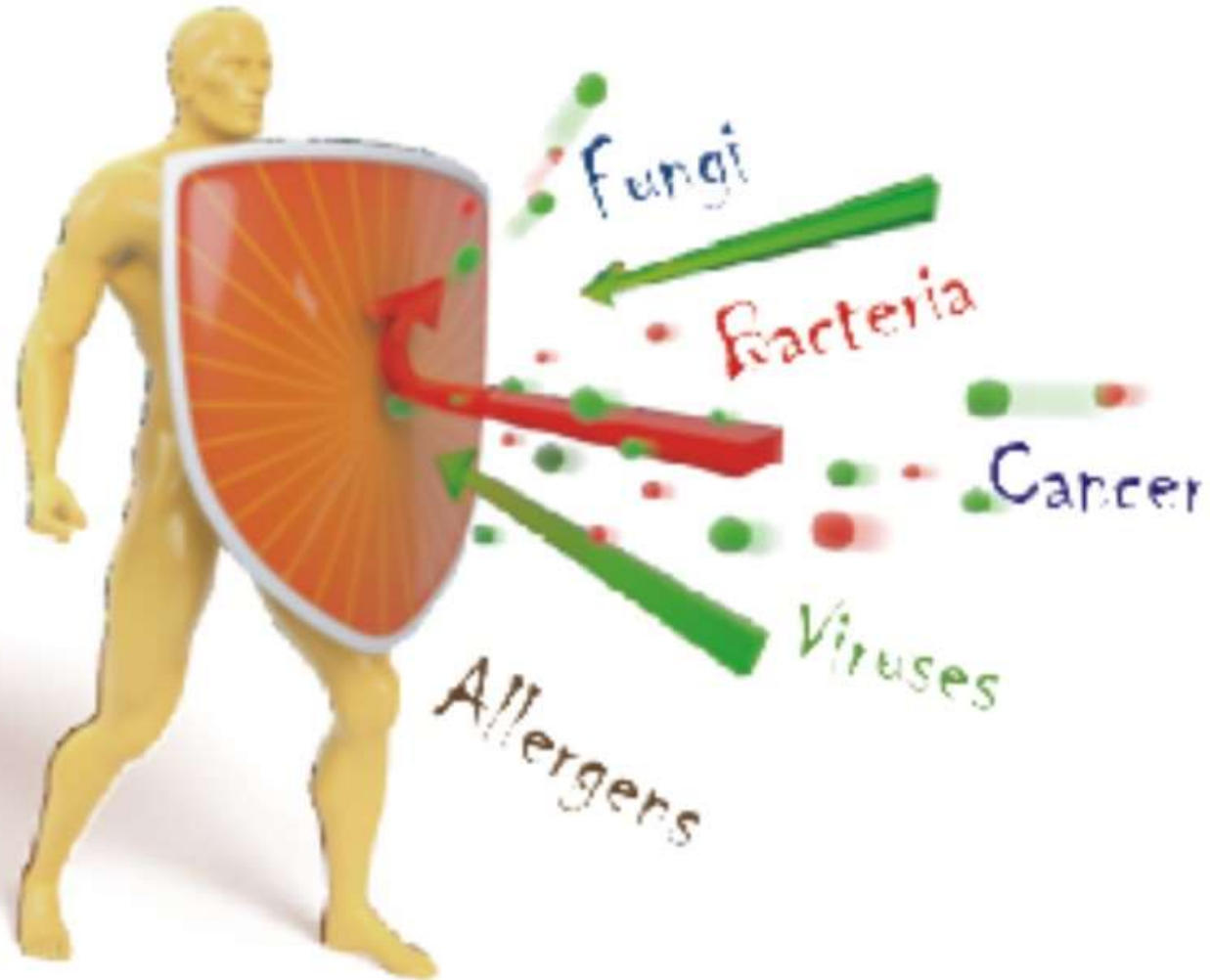
# Digestion



- lysis = breakdown

# Immunity

- Protect against invaders



# Coordination and regulation

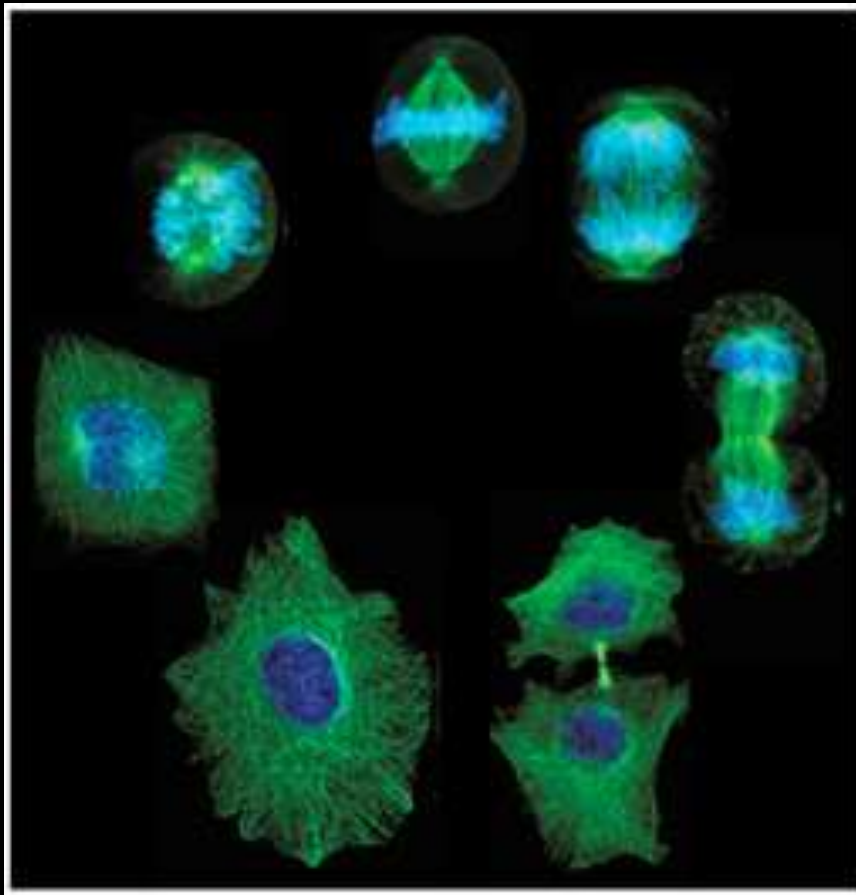
- Communication and control





# Reproduction

- DNA replicates → new cells



# Organelles → life functions



Body systems → life functions

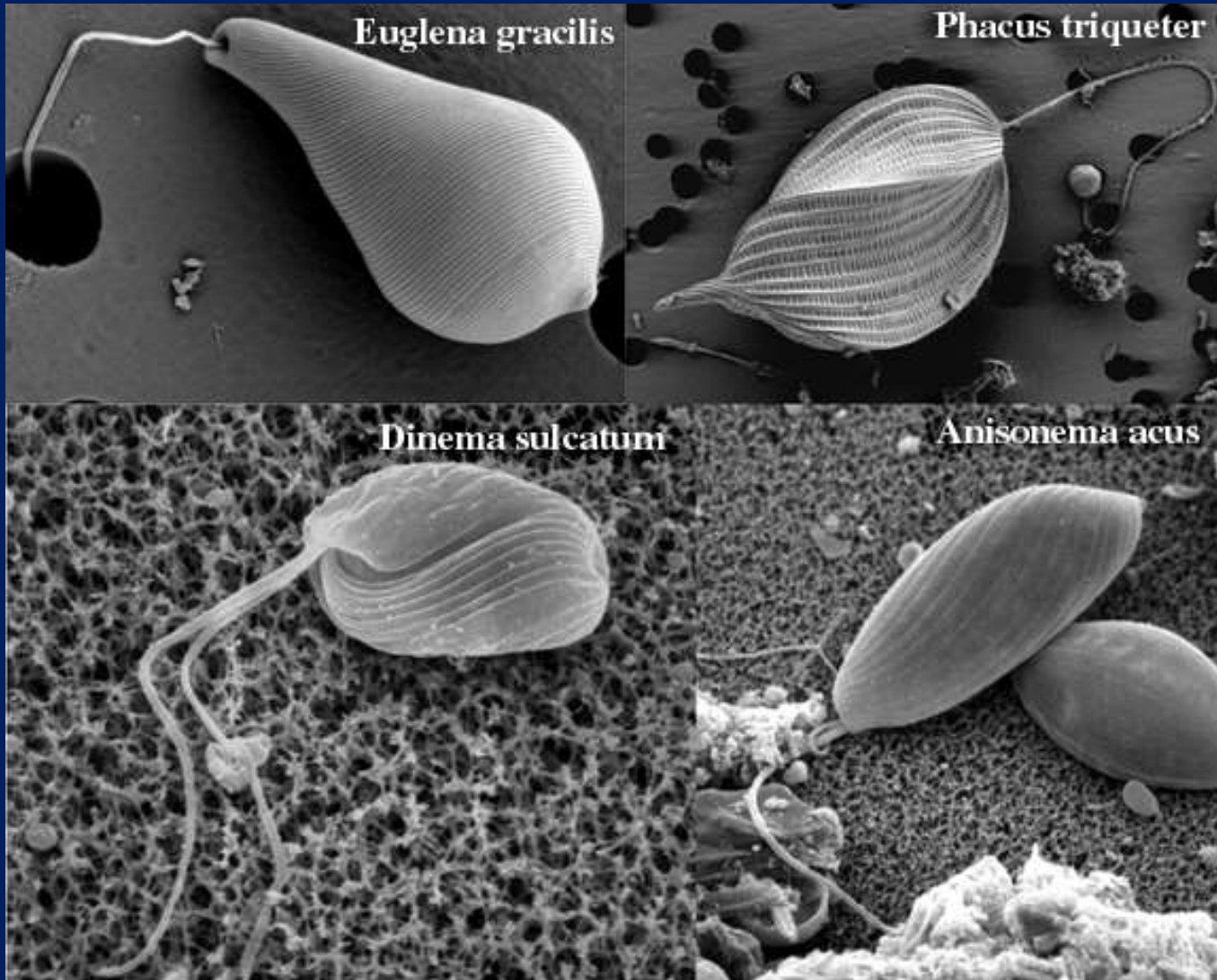
Multi-celled organisms only

# Life function chart

# Movement

- Purpose
- Helps living things respond to environment

# Flagella = whiplike tail



Flagellar diversity in Euglena species.

A microscopic image showing numerous sperm cells against a dark background. Each sperm cell consists of a small, oval-shaped head at the front, followed by a shorter, thicker midpiece, and a long, thin, wavy tail called a flagellum. The flagella are seen in various orientations, some extending across the frame. The overall appearance is that of a dense population of these microscopic organisms.

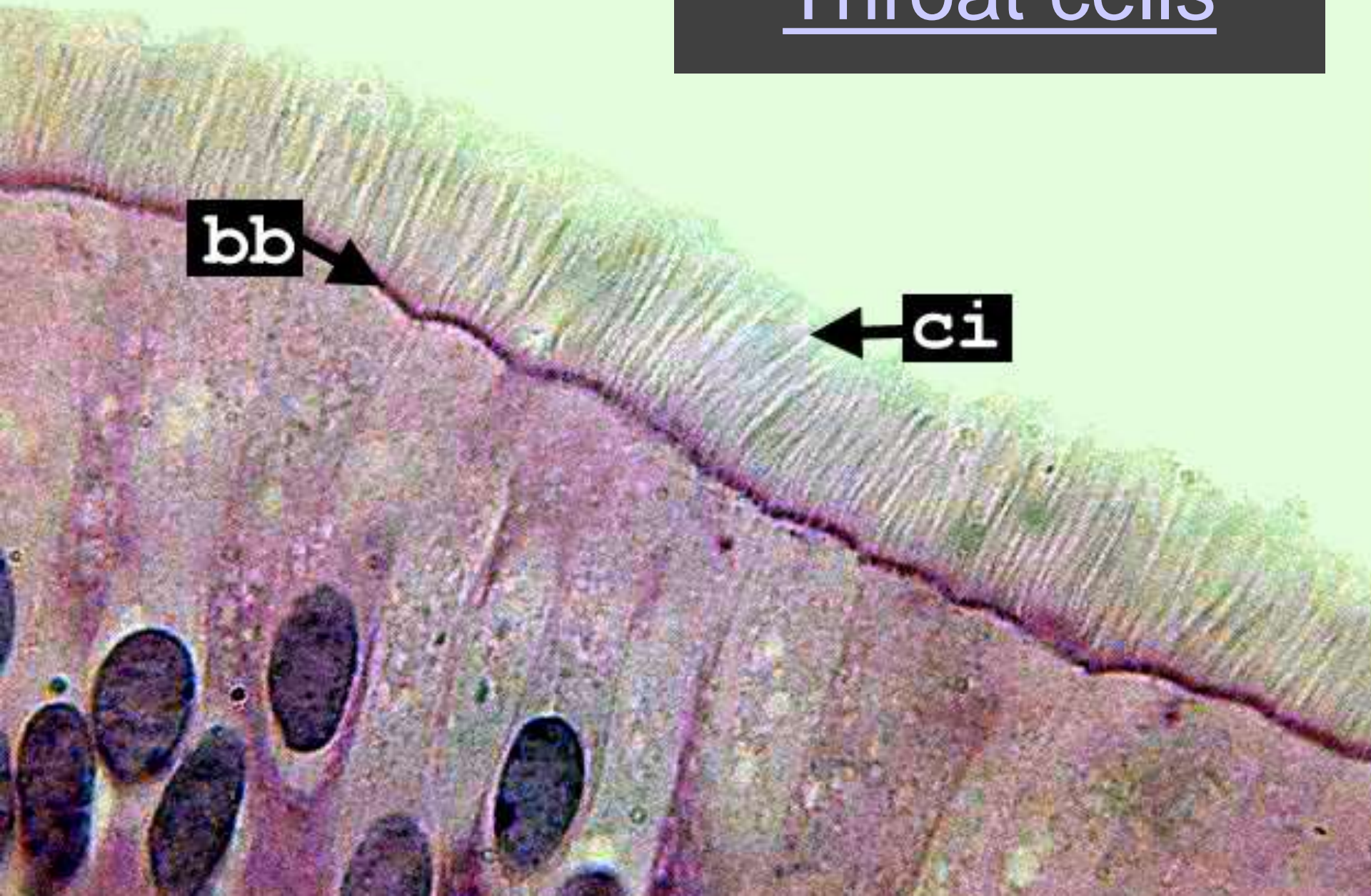
Sperm use flagella

# Cilia



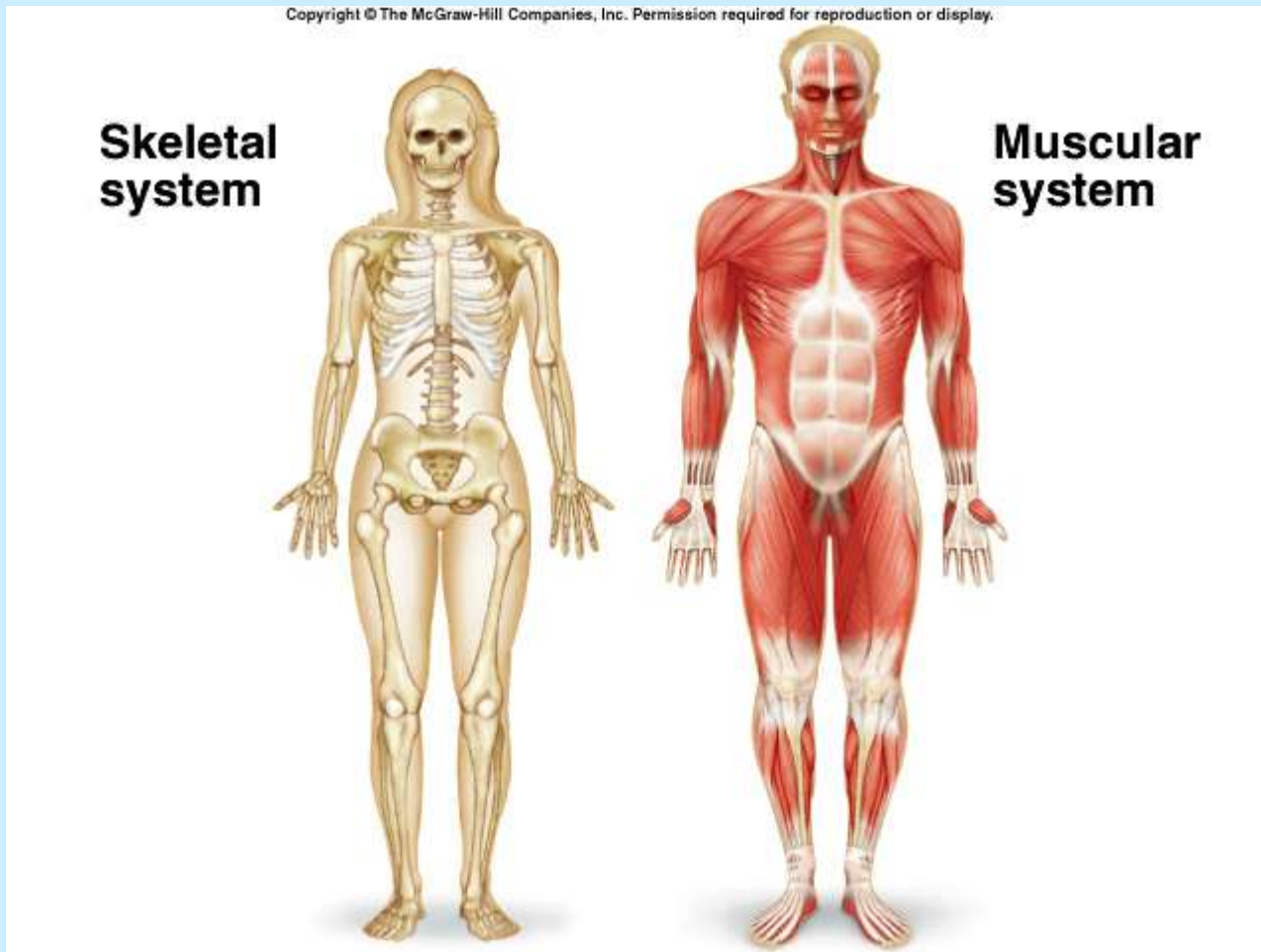


# Throat cells



# Skeletal muscle system

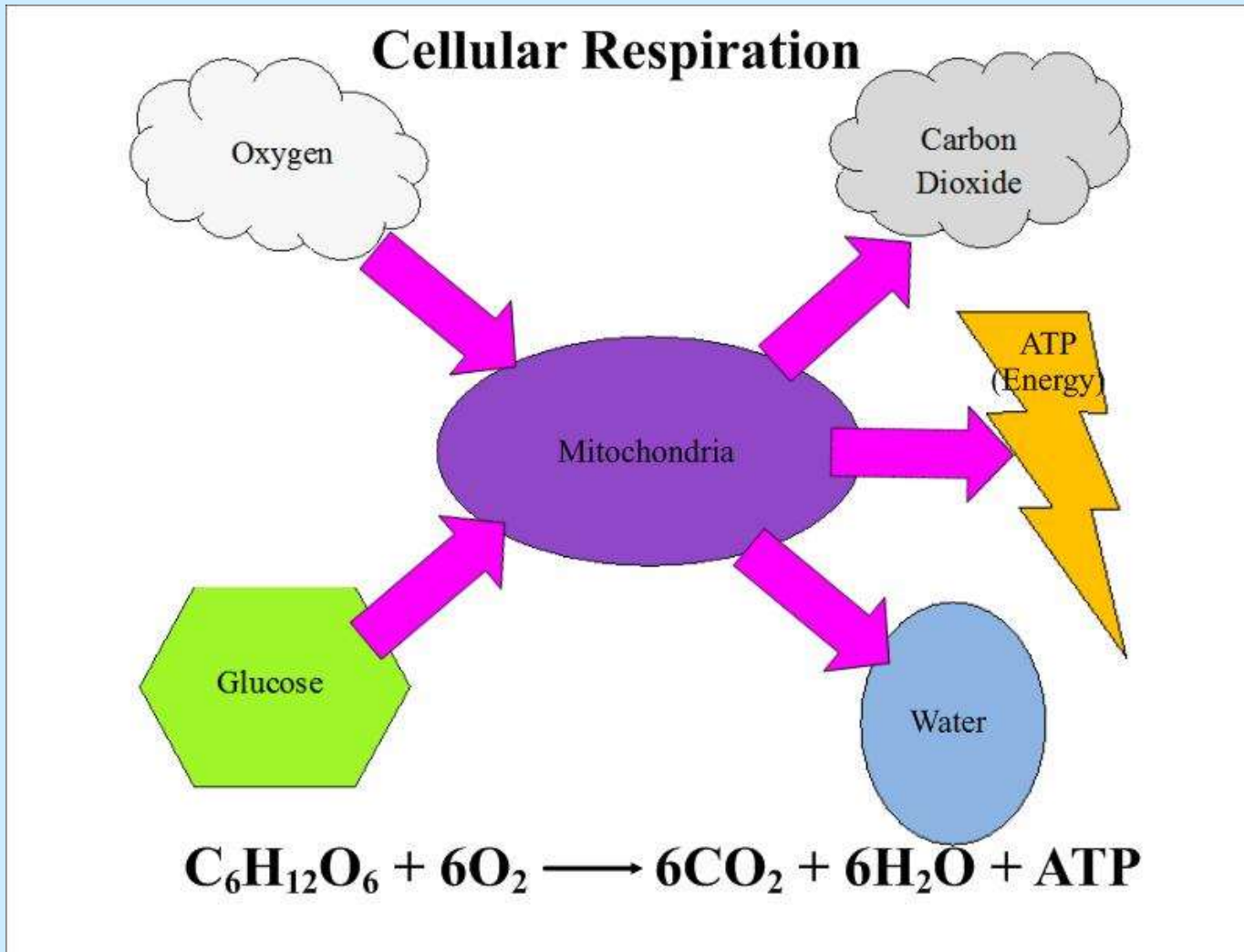
- Bones connected by ligaments
- Muscles connected by tendons



# Respiration

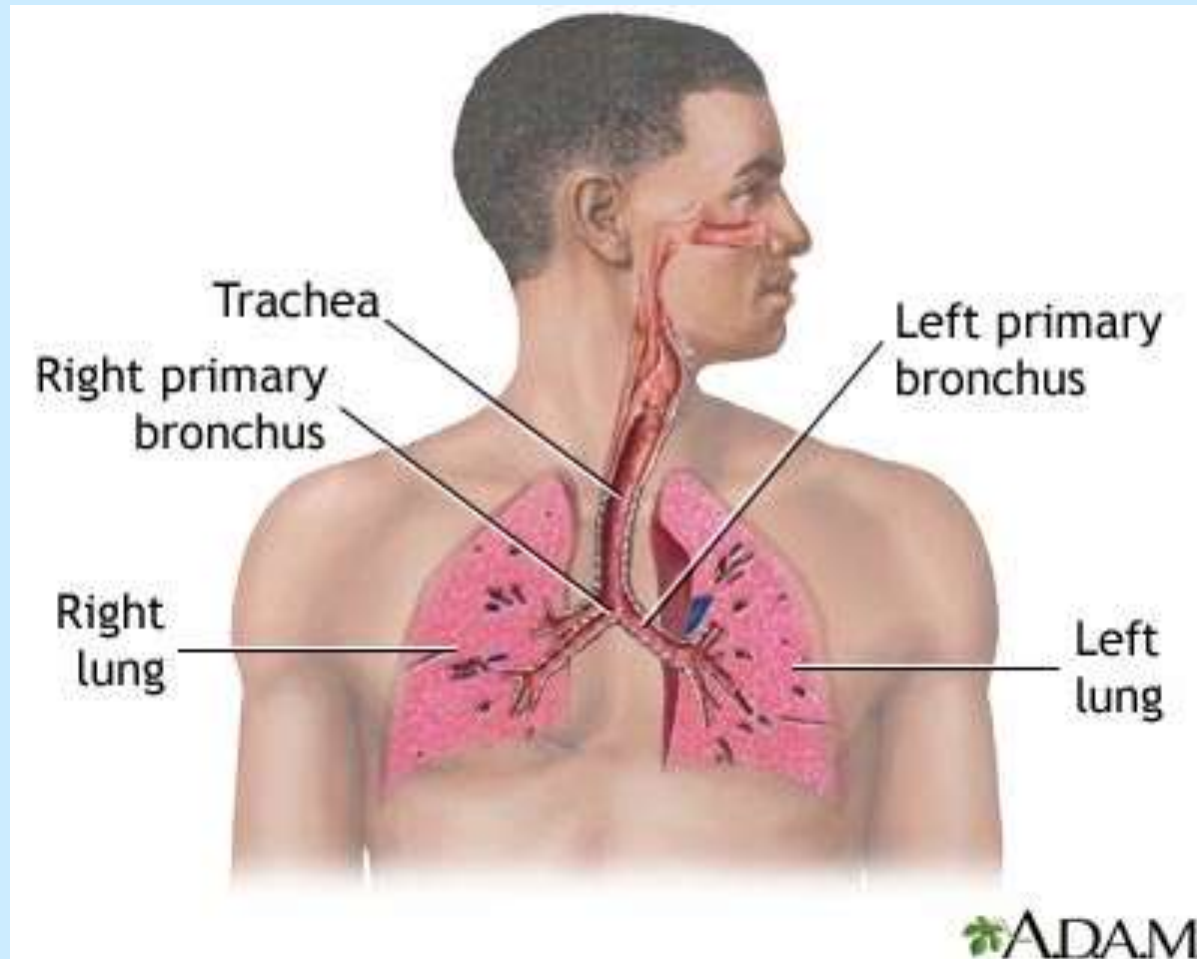
- Purpose:
  - Release **energy** from food
- Types:
  - Aerobic = with  $O_2$
  - Anaerobic = absence of  $O_2$

# Mitochondria





# Respiration requires gas exchange = Respiratory system



# Synthesis

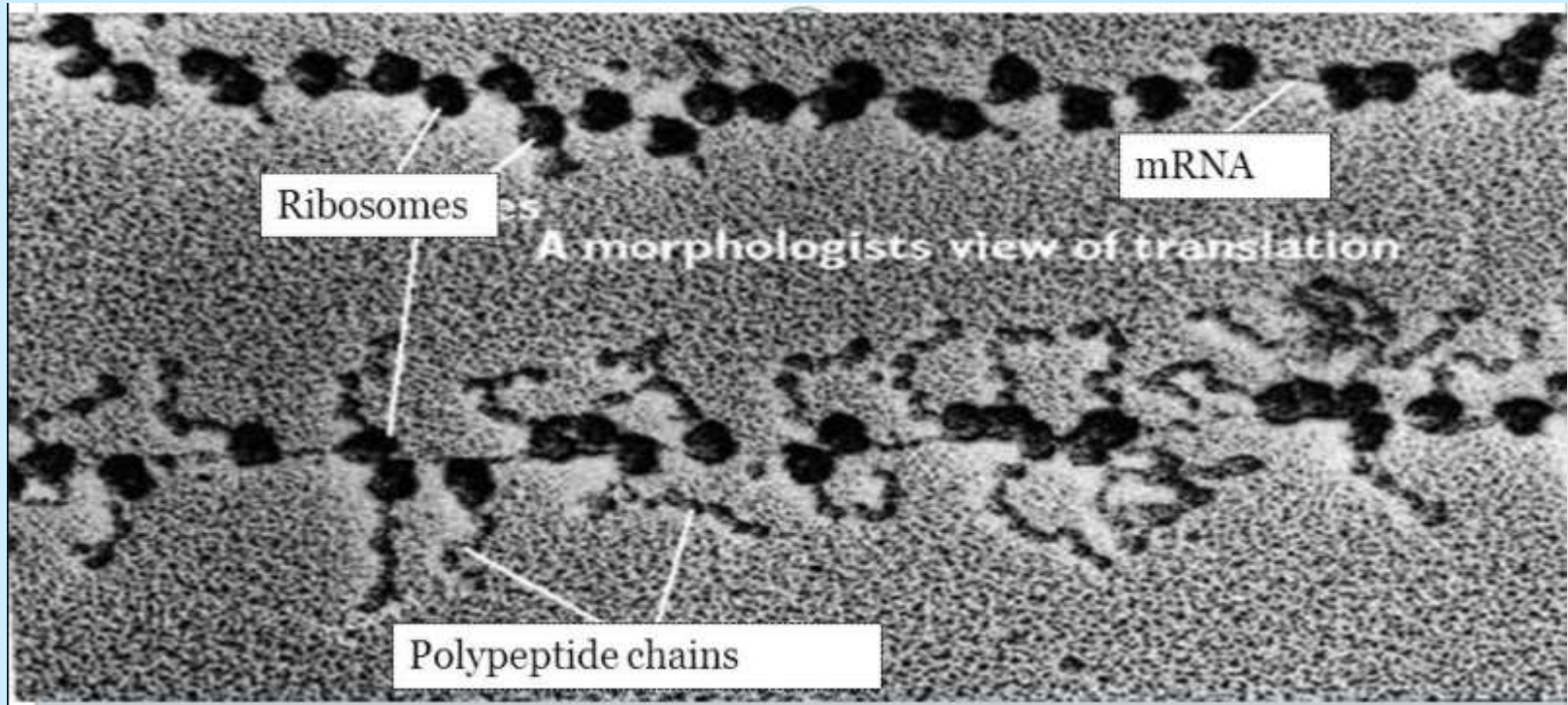
- Purpose
  - Make things
- Examples:
  - photosynthesis
  - Protein synthesis

**Chloroplasts absorb sunlight**





# Ribosomes → protein synthesis

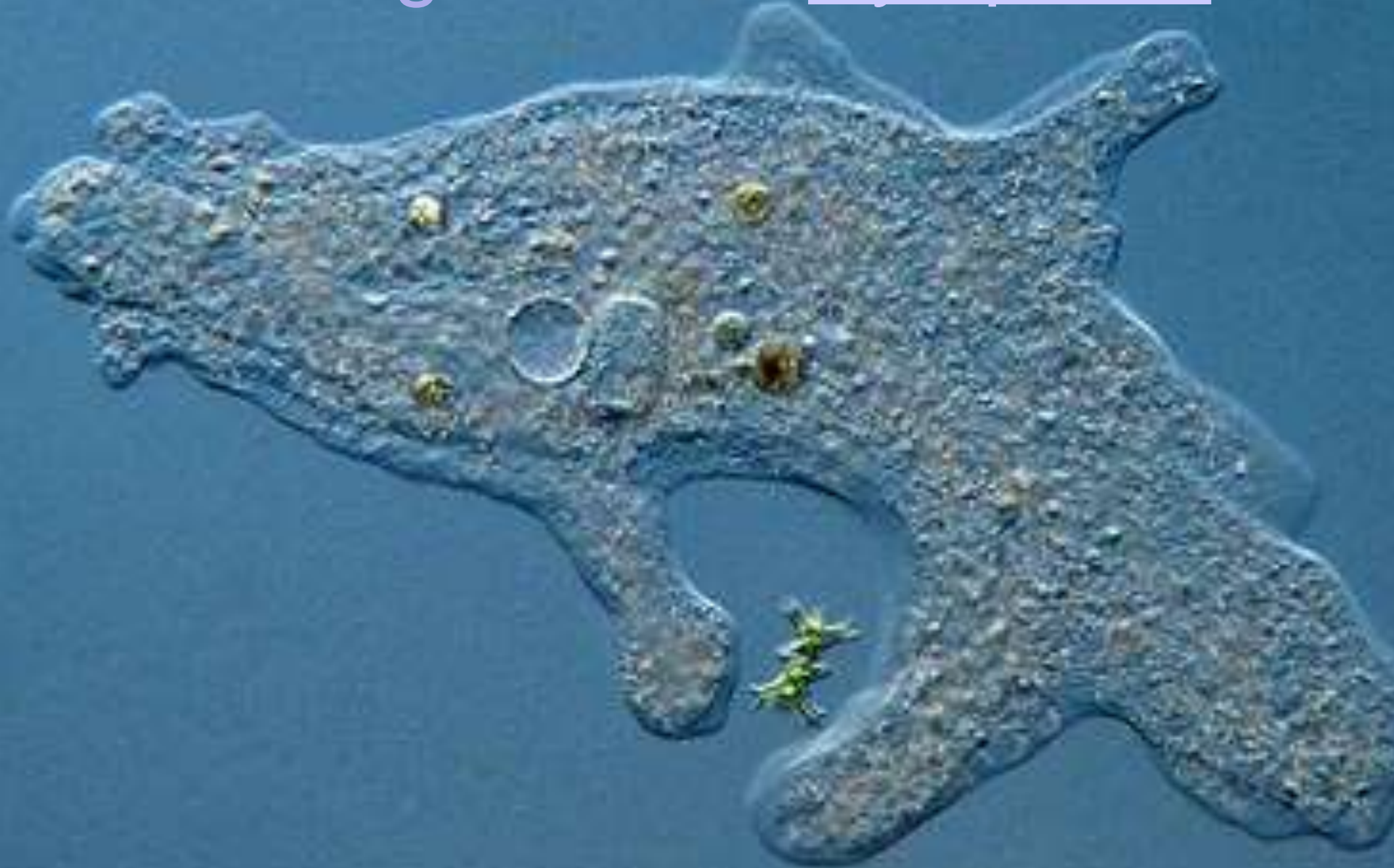


# Circulation

Purpose =

- Transport of materials within an organism

Organelles = Cytoplasm



# 2 types of transport tissues in plants

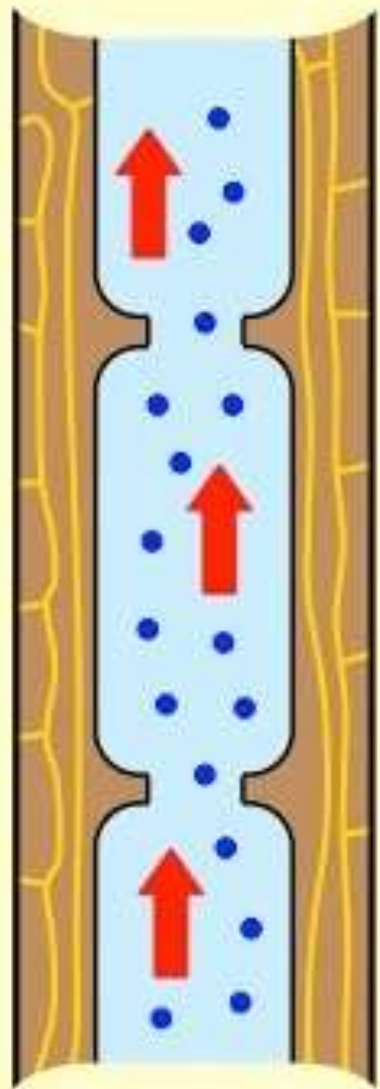
- Xylem = carries water and nutrients up to leaves
- Phloem = carries sugar down to roots

water and minerals

no end walls between cells

one-way only

outer cells are not living



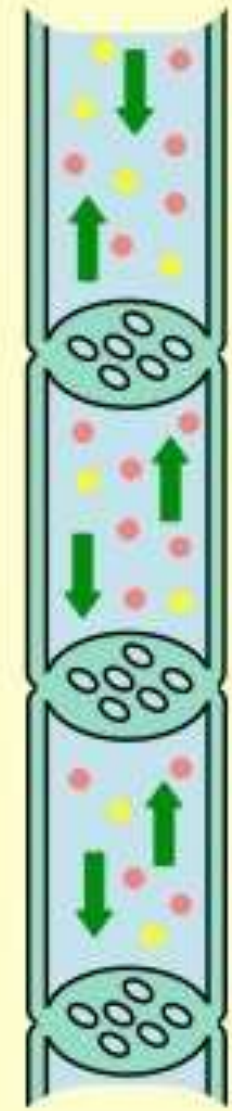
**XYLEM**

organic molecules

end walls (sieve plates)

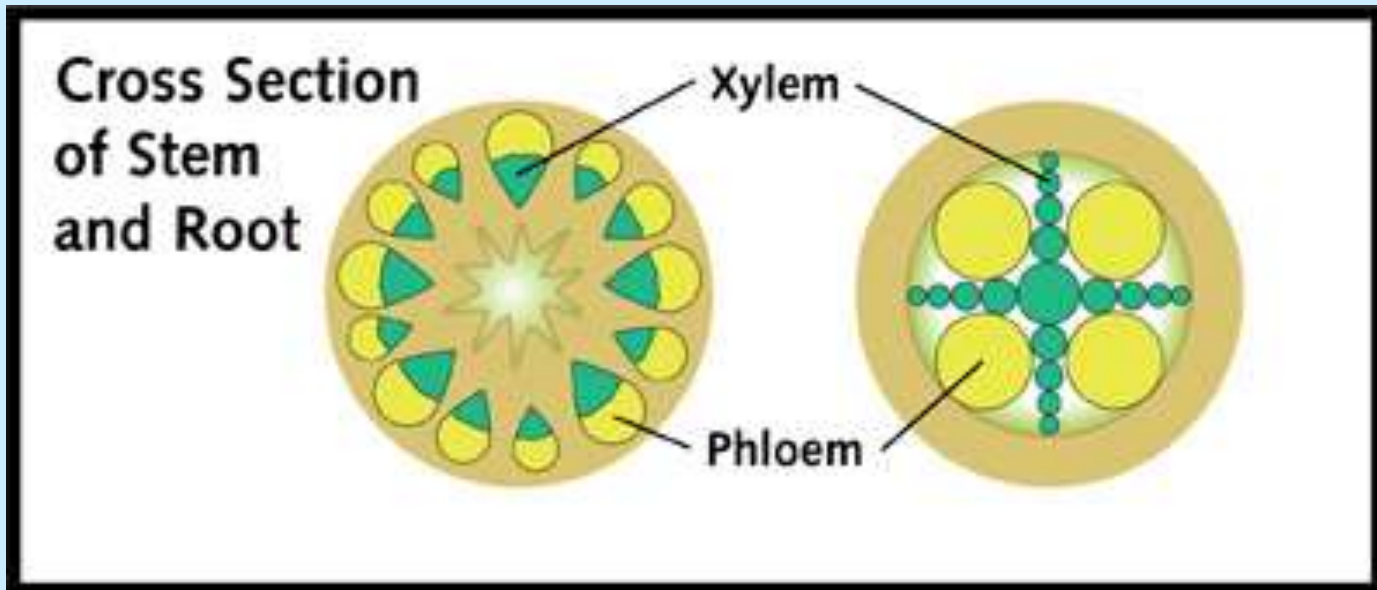
two-way movement

cells are living but need support

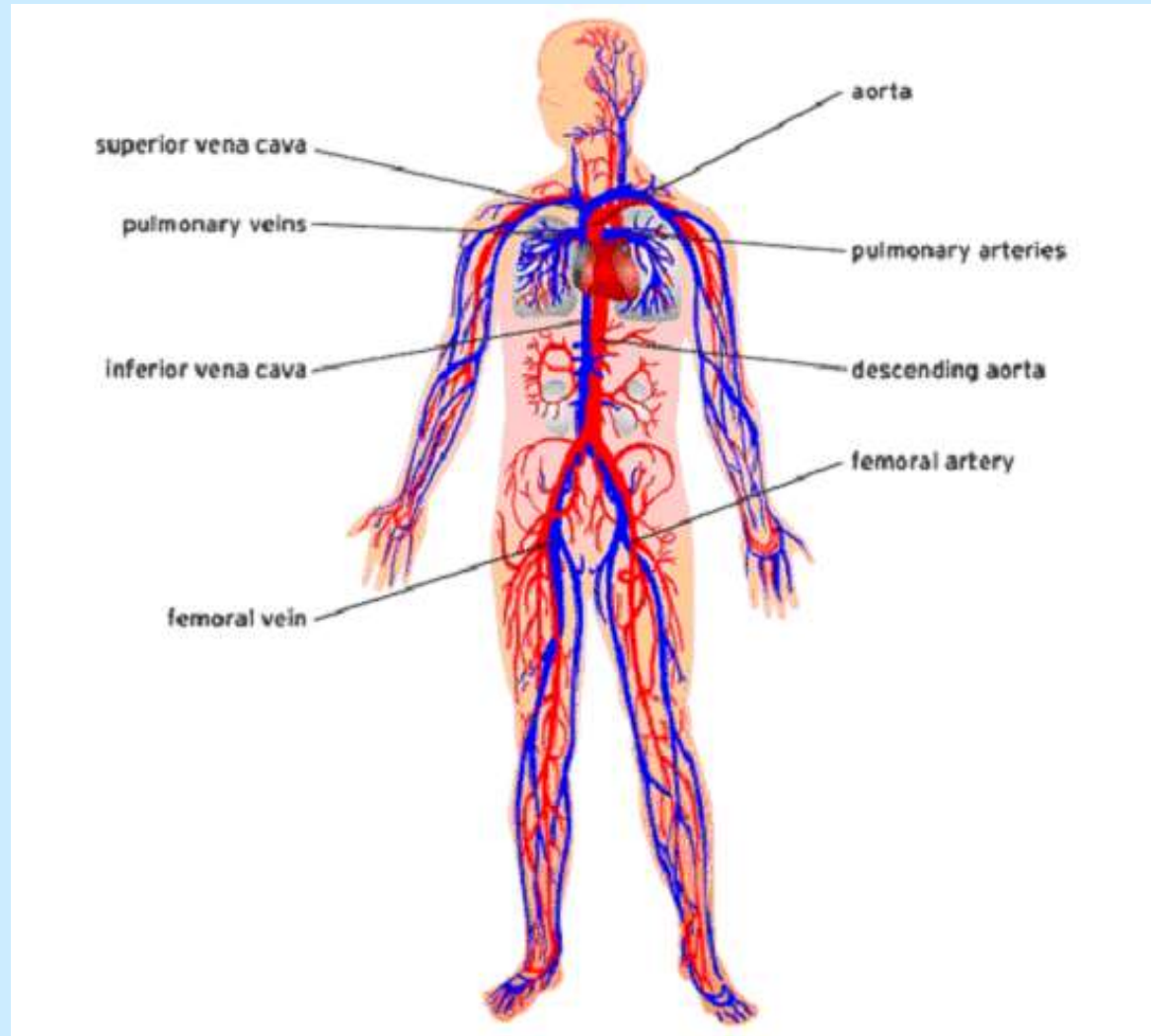


**PHLOEM**

# Circulation in plants



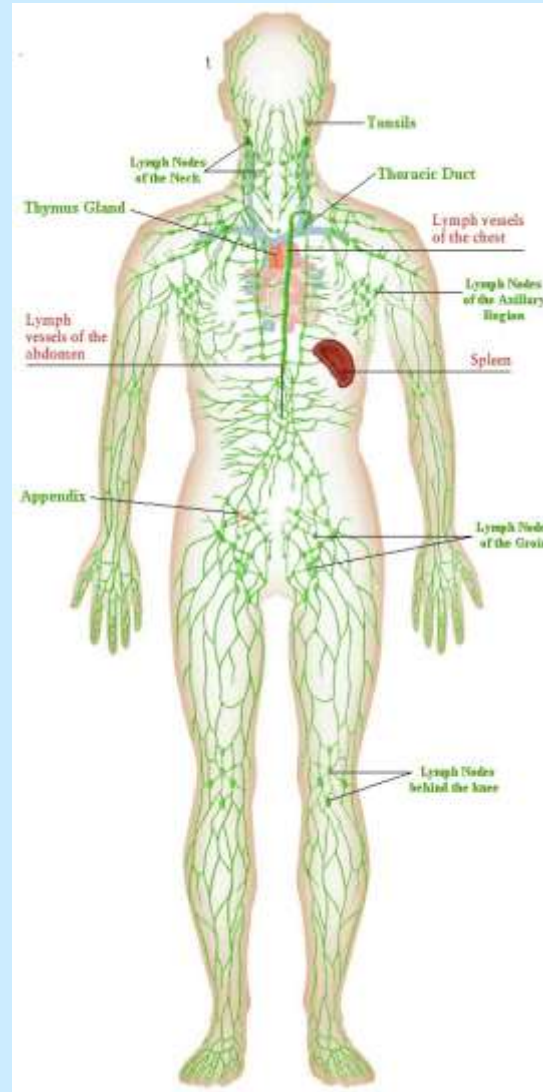
# Human Circulatory System



Heart pumps blood through  
arteries, veins and capillaries



# Lymphatic System



Lymph collects body fluids  
and checks for disease

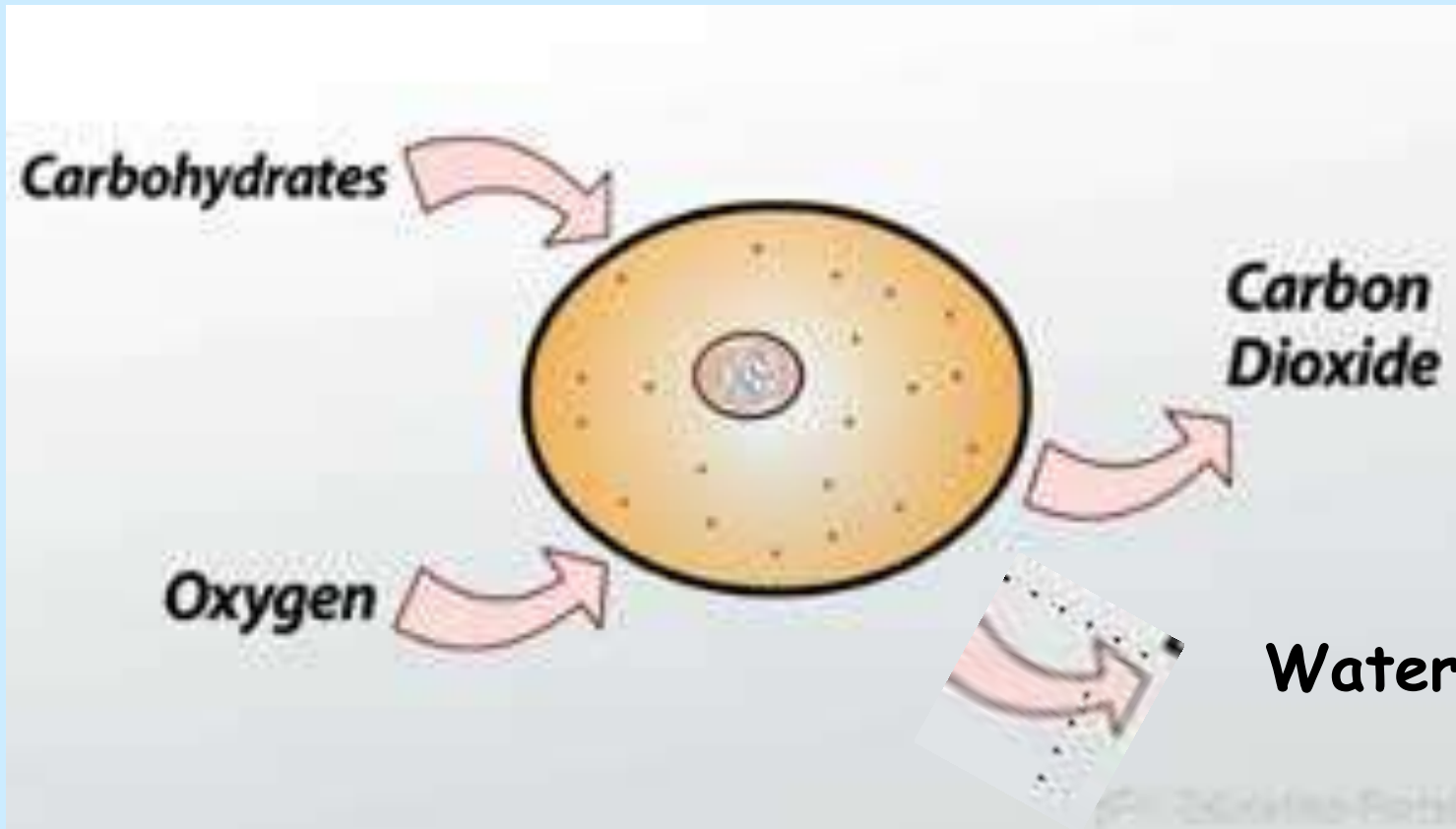
# Excretion

## Purpose:

- Removal of cellular wastes
- Wastes include:
  - $\text{CO}_2$ ,  $\text{H}_2\text{O}$ ,
  - heat, nitrogen wastes → urine and sweat

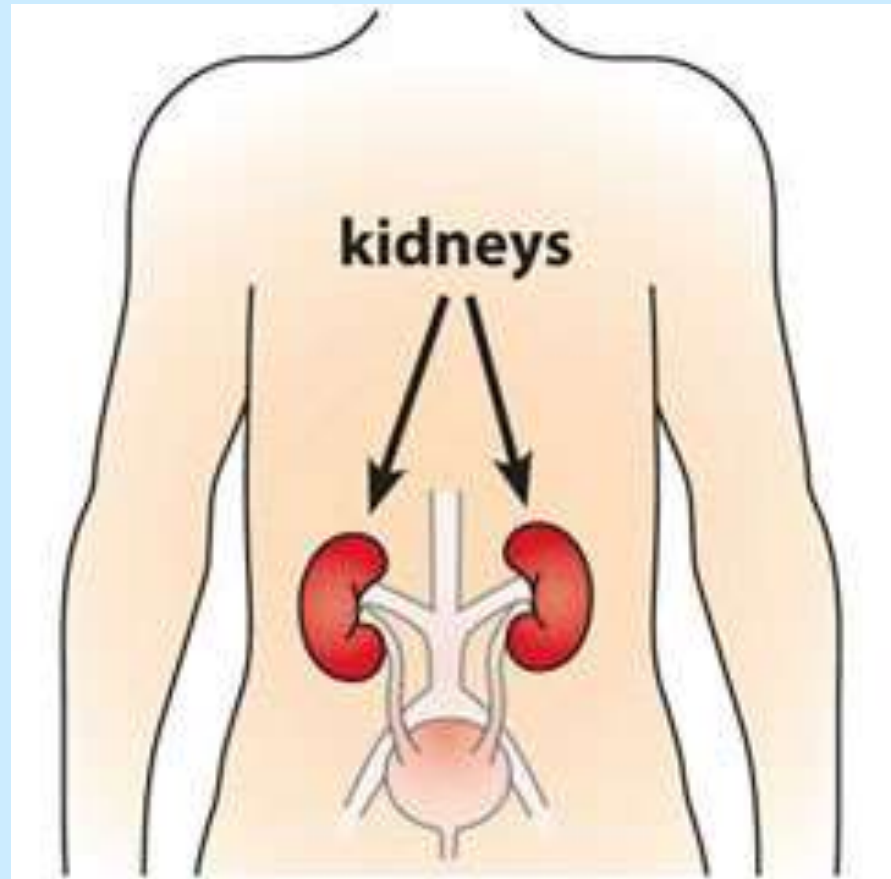
# Organelle

Cell membrane



# Excretory system

Kidneys filter  
blood → urine



# Digestion

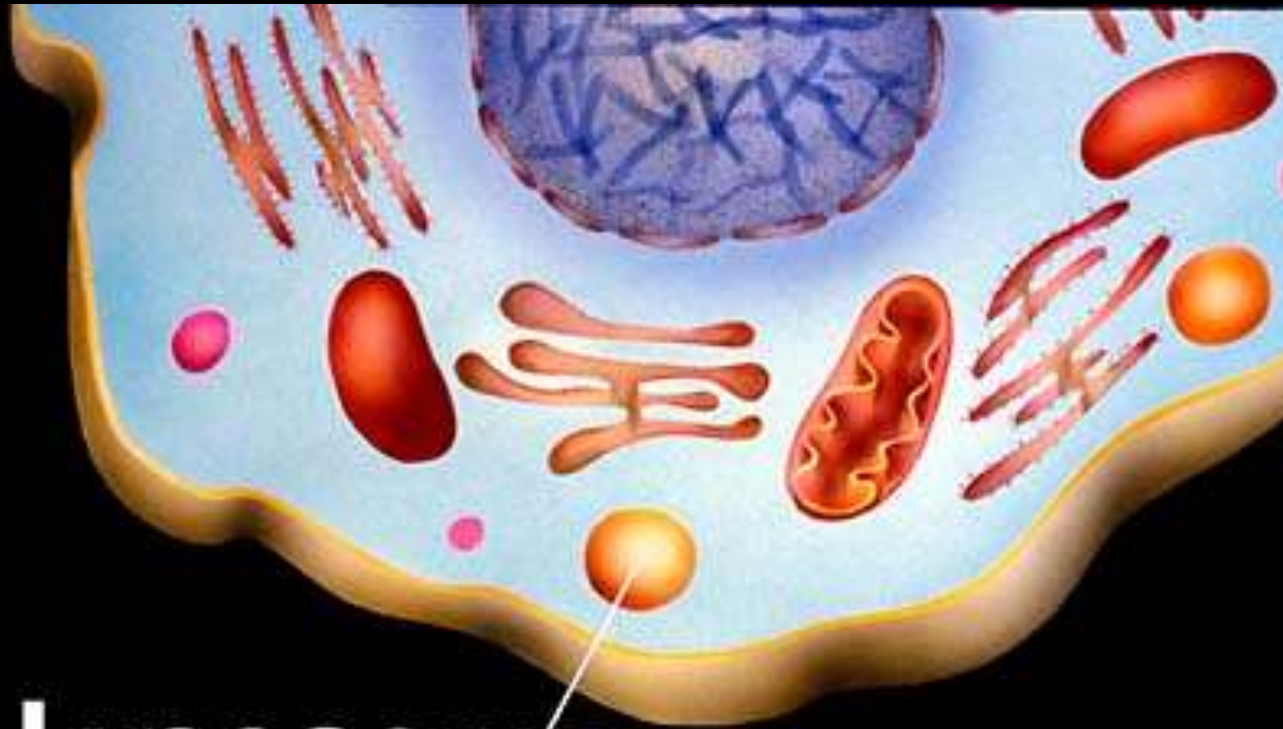
## Function

- Lysis = break down
  - Complex sugars → simple sugars
  - Proteins → amino acids
  - Fats → fatty acids

## Body system

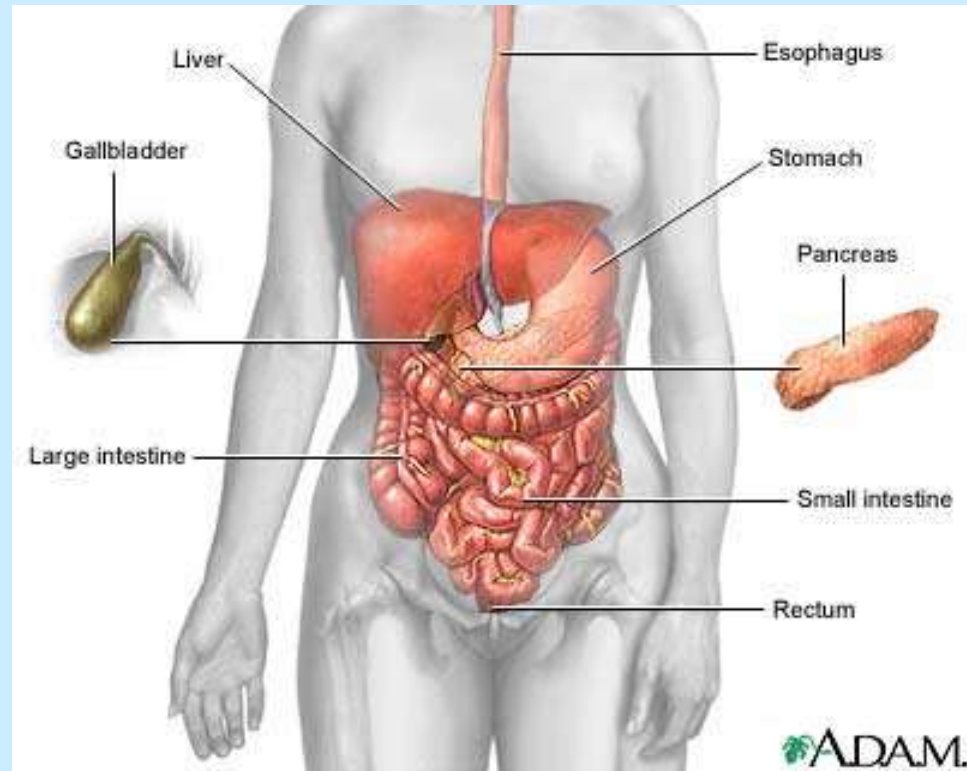
- digestive system (lots of enzymes)
  - Organs (mouth, stomach, intestines)

# Lysosomes (lots of acids and enzymes)



**Lysosome**

# Digestive system





# Digestive system

- Chemical digestion
  - (enzymes and acids)
- Mechanical
  - Chewing and churning

# Immunity

## Purpose

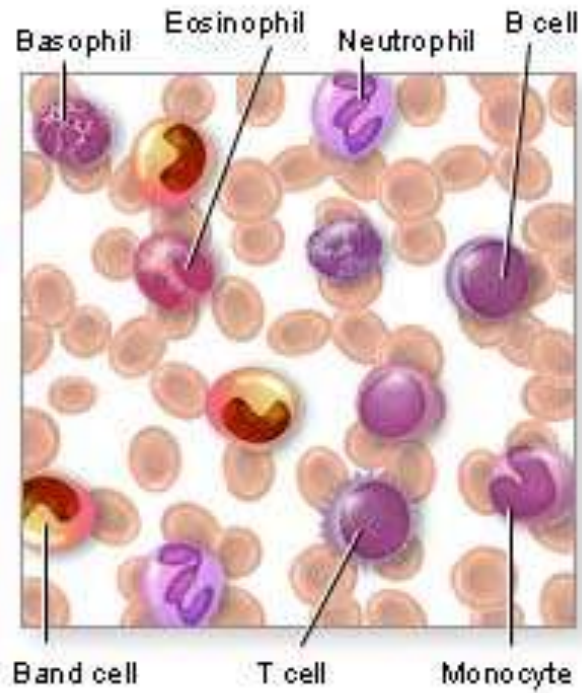
- Prevent disease and kill pathogens
- Pathogens = disease causing organisms

Organelle = Cell membrane

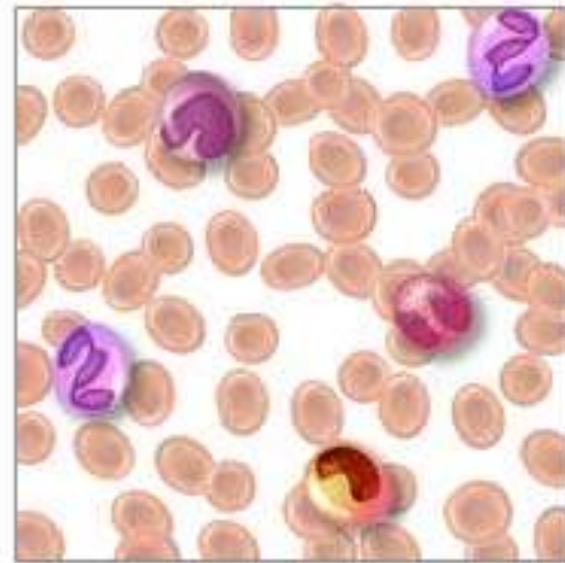
# Body system = immune system

- White blood cells travel in blood and lymph

## High WBC count



## Low WBC count



ADAM.

# Coordination and regulation

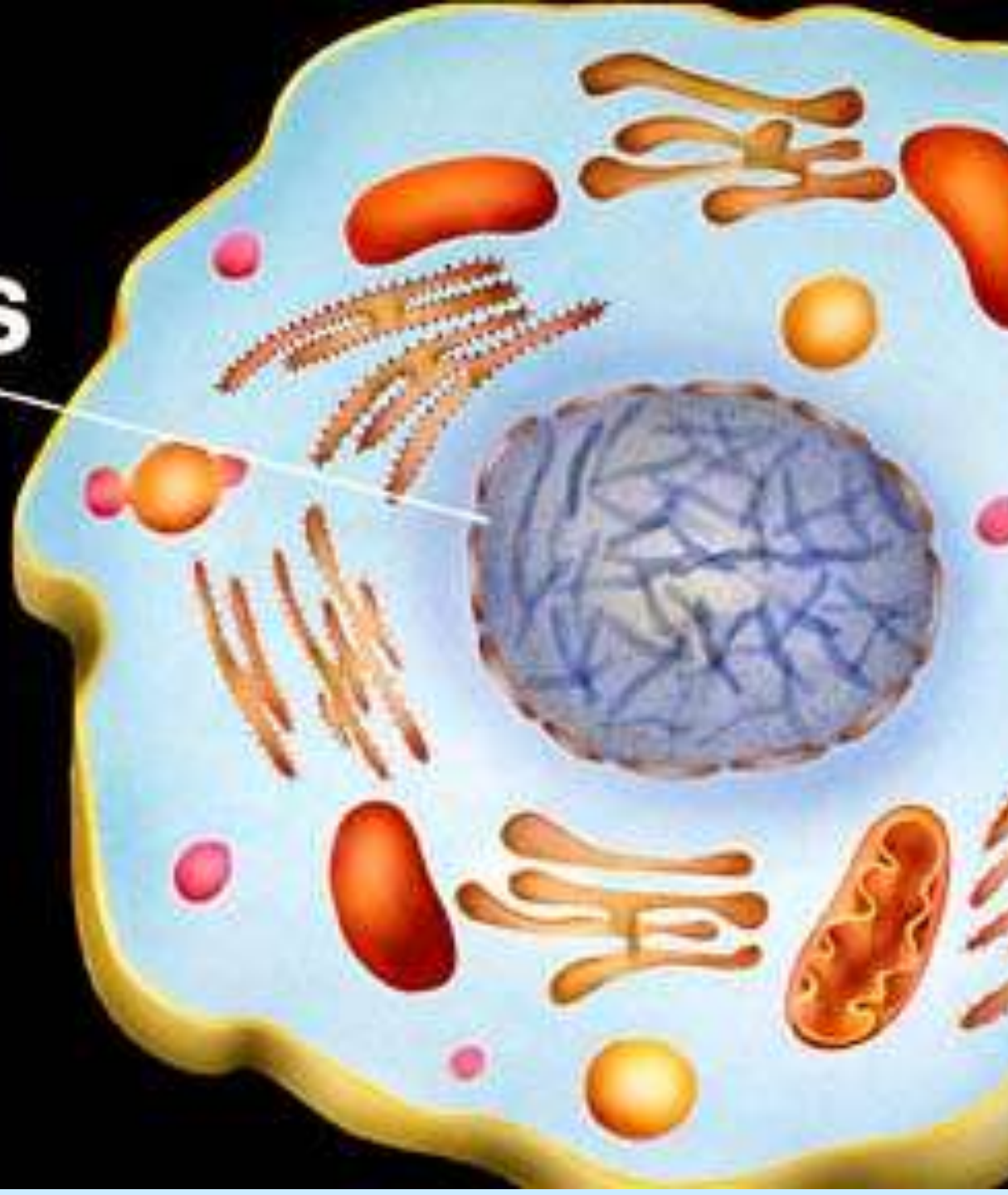
## Purpose

- Control life functions
- communication

# Organelle = Nucleus

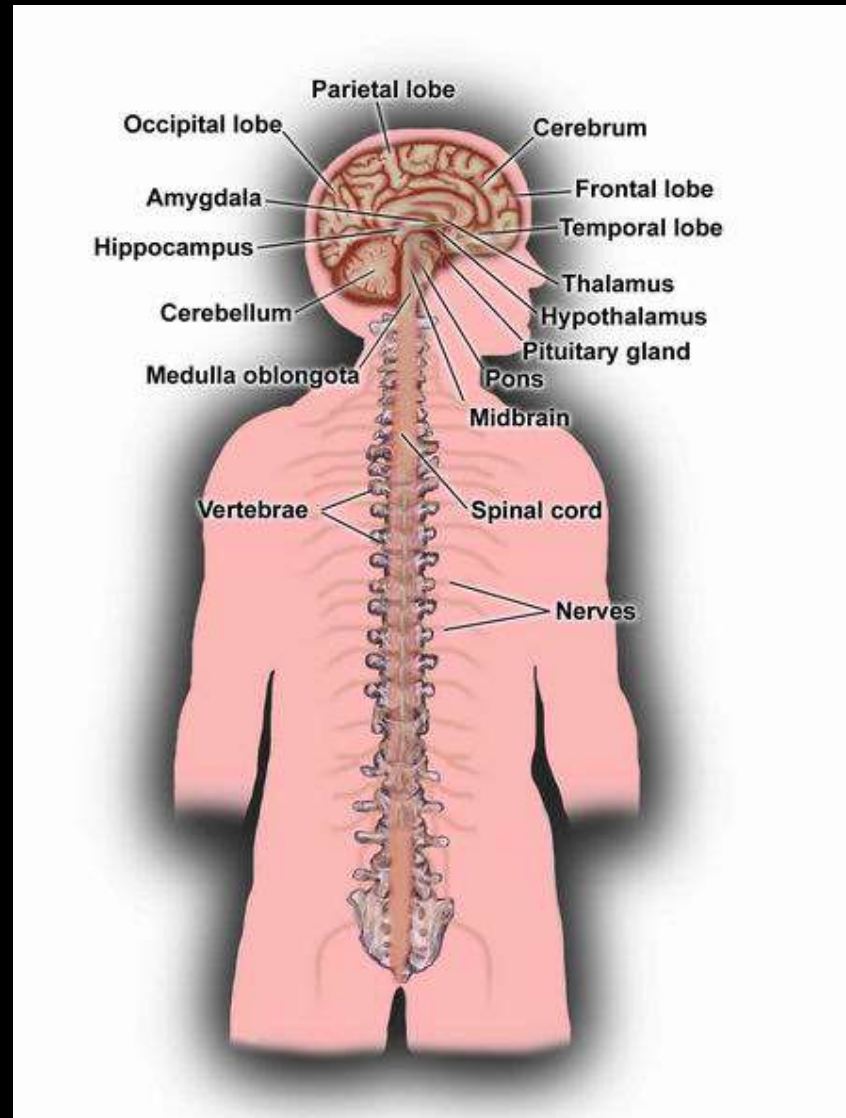
- Nucleus
  - DNA → heredity
  - DNA → enzymes → chemical reactions

**Nucleus**





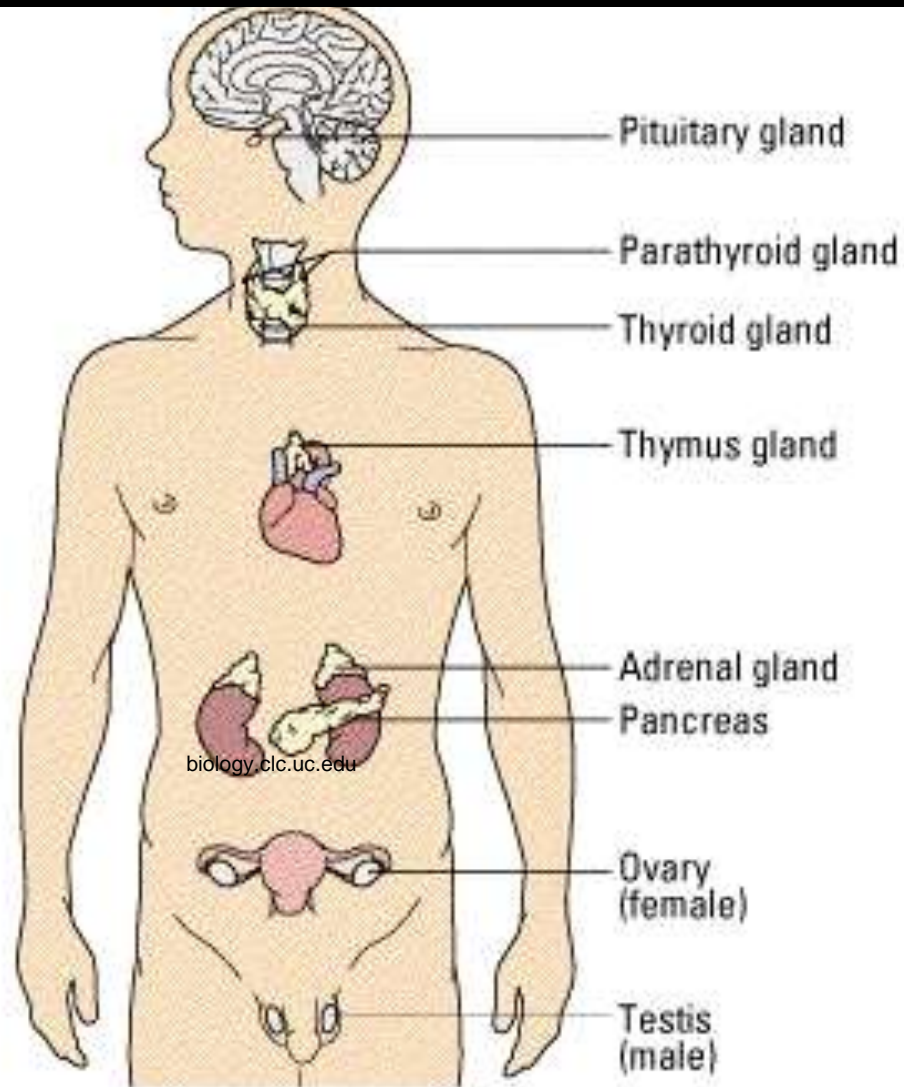
# Nervous system



# Nervous system

- Organs = brain and spinal chord
- Cells = nerve cells

# Endocrine system



# Endocrine system

Organs =

- glands release chemical messengers
- Called hormones

# Reproduction

## Purpose:

- Necessary for the continuation of life
- 2 types
- Asexual → genetically identical offspring
- Sexual → diversity

Organelle = nucleus

DNA replicates and cells split

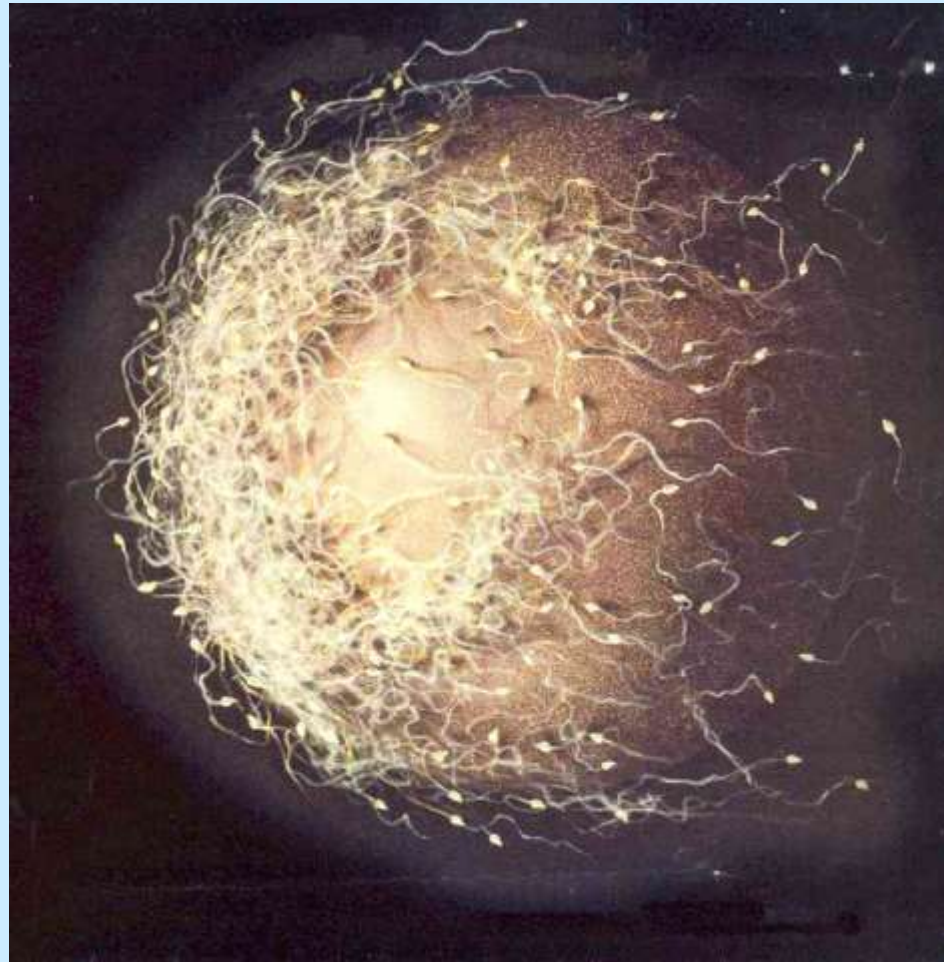
# Reproductive system

- Organs

- Females = ovaries → eggs

- Males = testes → sperm

Advantage of Sexual reproduction →  
increased diversity





# MRS. CEDICR

- Movement
- Respiration
- Synthesis
- Circulation
- Excretion
- Digestion
- Immunity
- Coordination and regulation
  - reproduction

# Cells and Tissues

- <https://www.youtube.com/watch?v=7bDpYZsC8mQ>
- Tissue rap  
<http://www.teachertube.com/video/4-types-of-tissues-rap-464117>