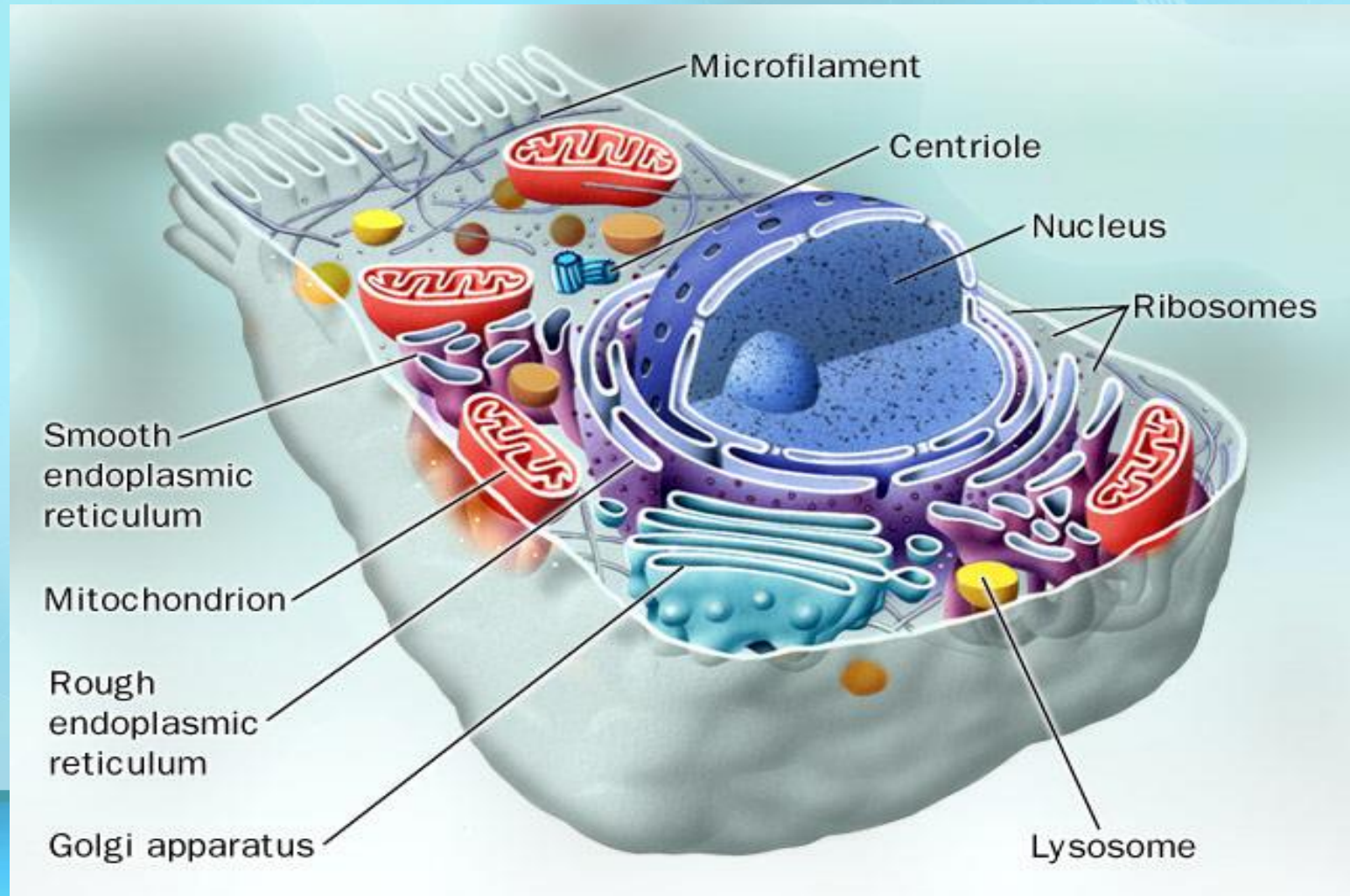


# Basic Structure of a Cell



# Introduction to Cells

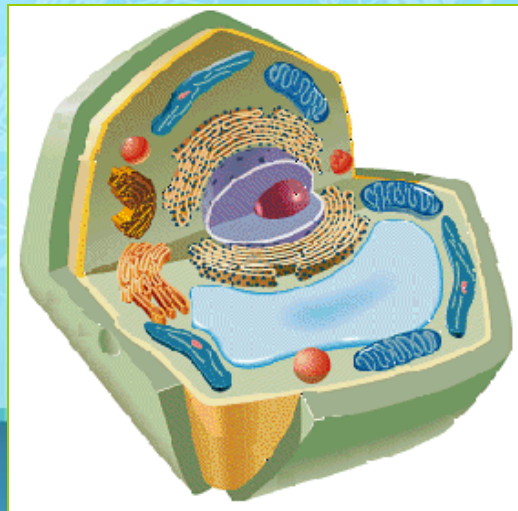
Cells are the basic units of organisms

Cells can only be observed under  
microscope

Basic types of cells:

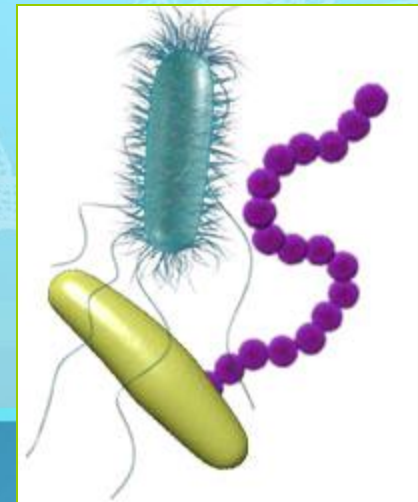


Animal Cell



Plant Cell

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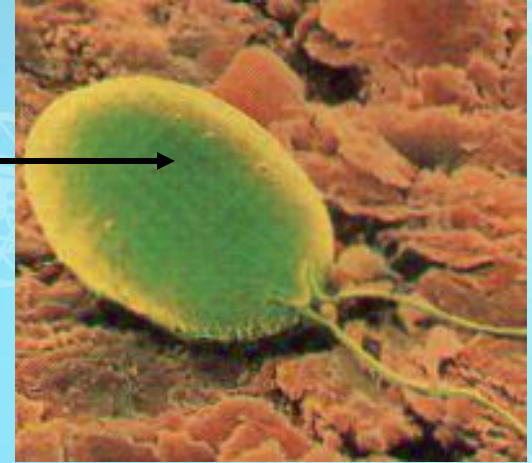


Bacterial Cell

# Number of Cells

Organisms may be:

- *Unicellular* - composed of one cell
- *Multicellular* - composed of many cells that may organize



# Cells May be Prokaryotic or Eukaryotic

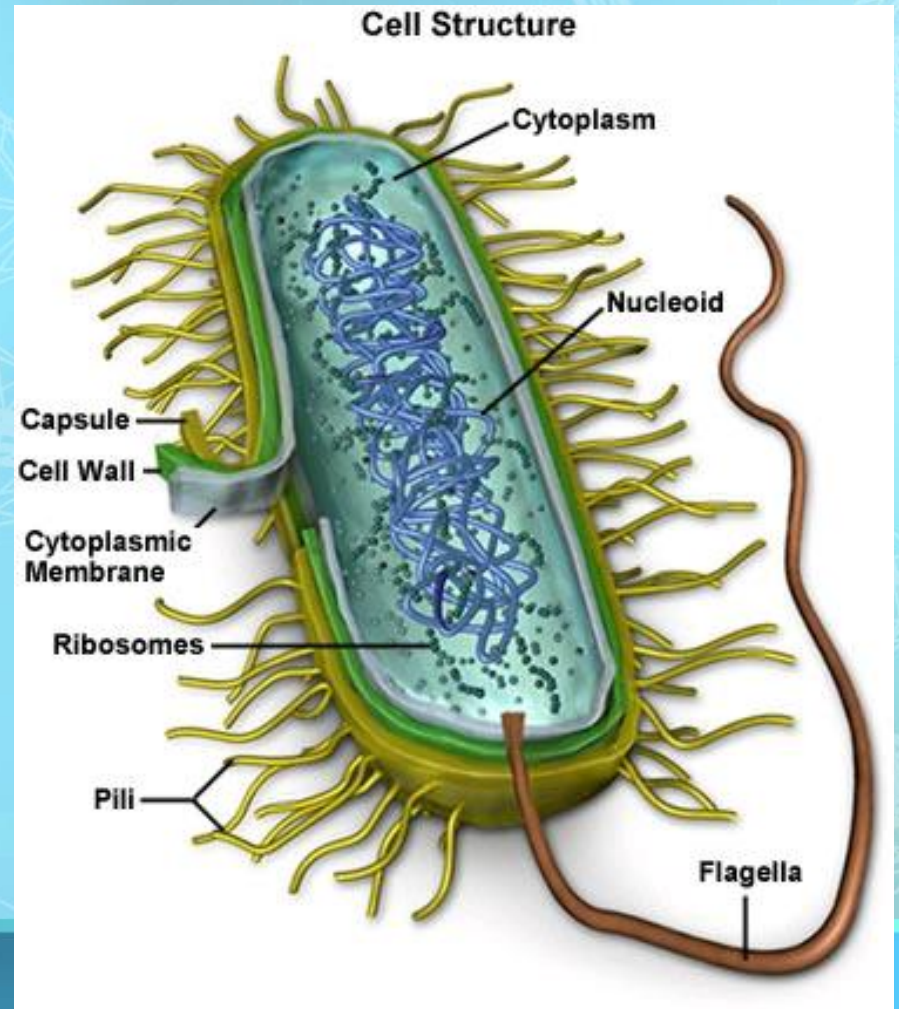
- *Prokaryotes* include bacteria & lack a nucleus or membrane-bound structures called organelles
- *Eukaryotes* include most other cells & have a nucleus and membrane-bound organelles (plants, fungi, & animals)

# Prokaryotes

Nucleoid region  
contains the DNA

- Cell membrane &  
cell wall

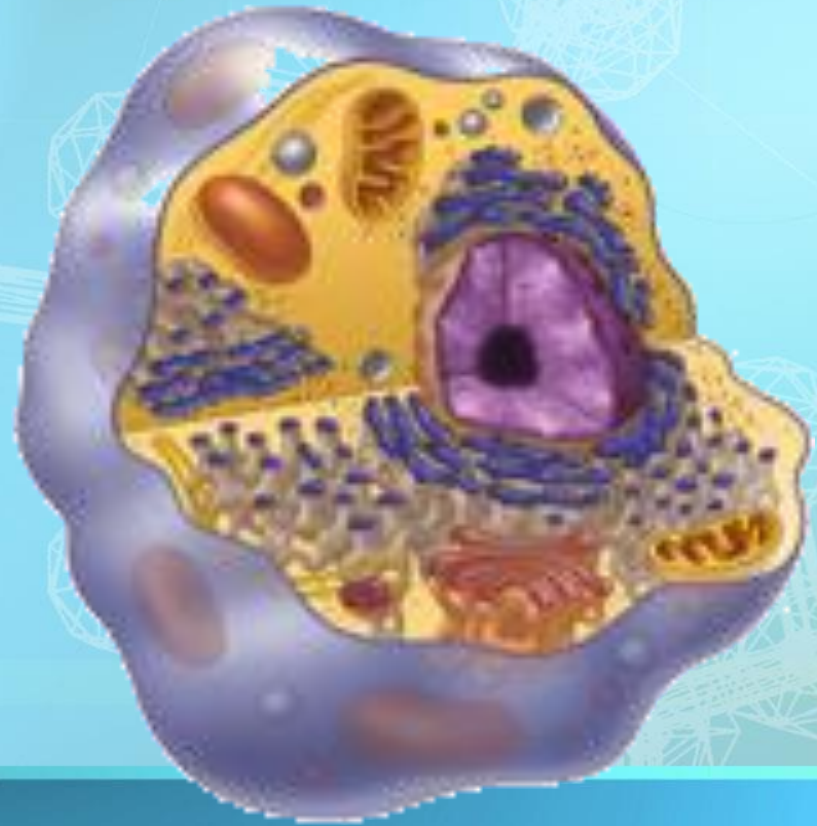
- Contain ribosomes  
(no membrane) to  
make proteins in  
their cytoplasm



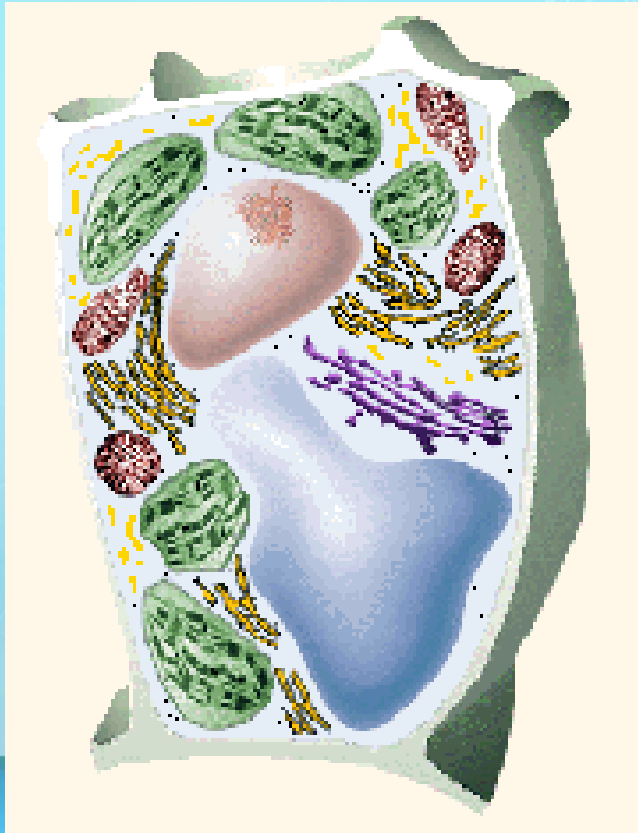
# Eukaryotic Cell

Contain 3 basic cell structures:

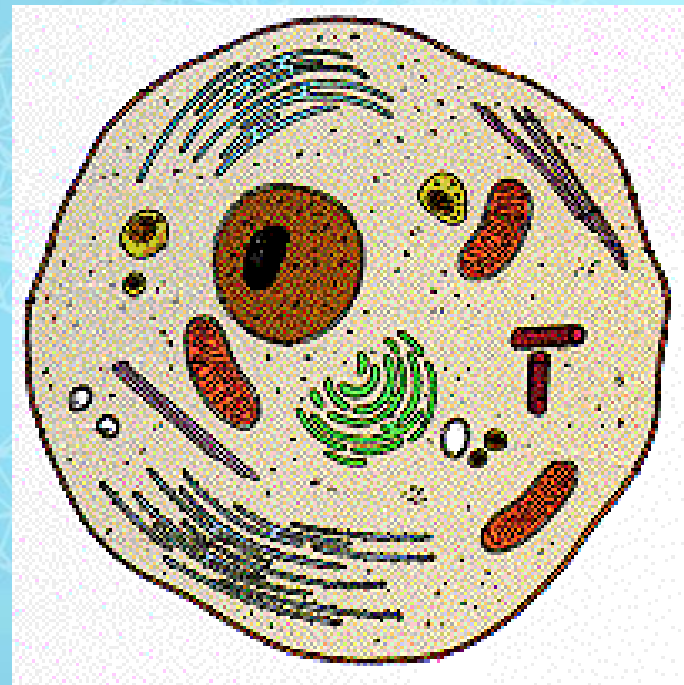
- **Nucleus**
- **Cell Membrane**
- **Cytoplasm with organelles**



# Two Main Types of Eukaryotic Cells



**Plant Cell**



**Animal Cell**

# Organelles

Very small size

Can only be observed under a microscope

Have specific functions

Found throughout cytoplasm

# Organelles Found in Cells

*Examples of Organelles include:*

Endoplasmic reticulum (rough & smooth) -  
canals for movement

Golgi Bodies - wrap & export proteins

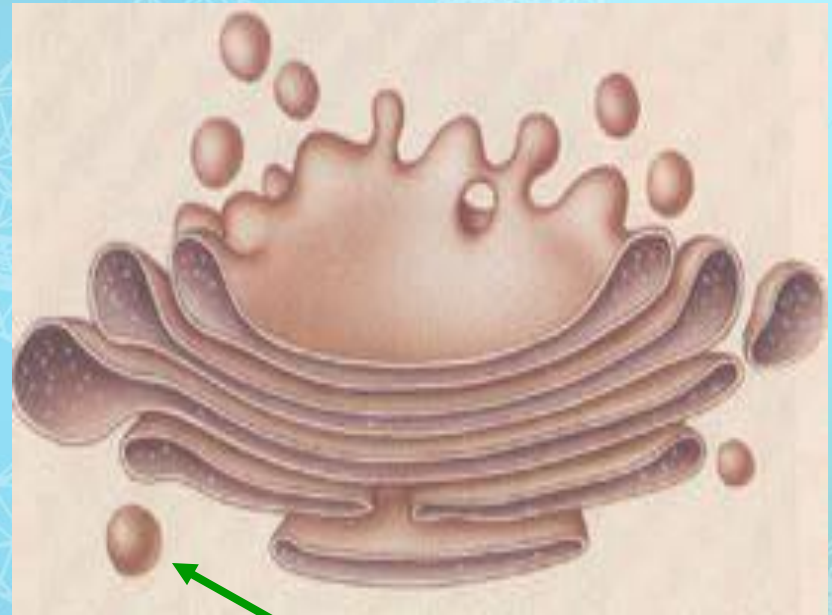
Nucleolus - makes ribosomes

Lysosomes - digests & gets rid of wastes

Ribosomes - makes proteins

# Golgi Bodies

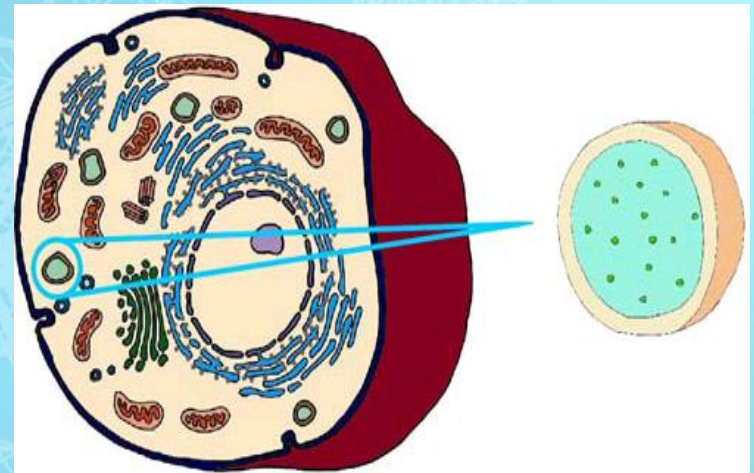
- Stacks of **flattened sacs**
- Have a shipping side & a receiving side
- Receive & **modify proteins** made by ER
- **Transport vesicles** with modified proteins pinch off the ends



Transport  
vesicle

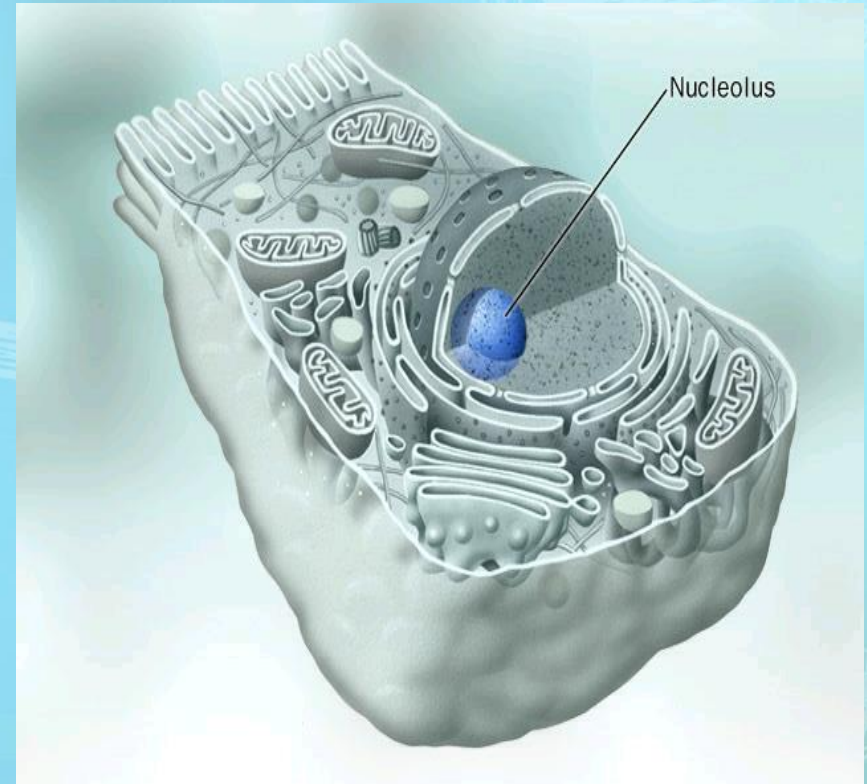
# Lysosome

- Contain digestive enzymes
- Break down food and worn out cell parts for cells
- Programmed for cell death (lyse & release enzymes to break down & recycle cell parts)



# Nucleolus

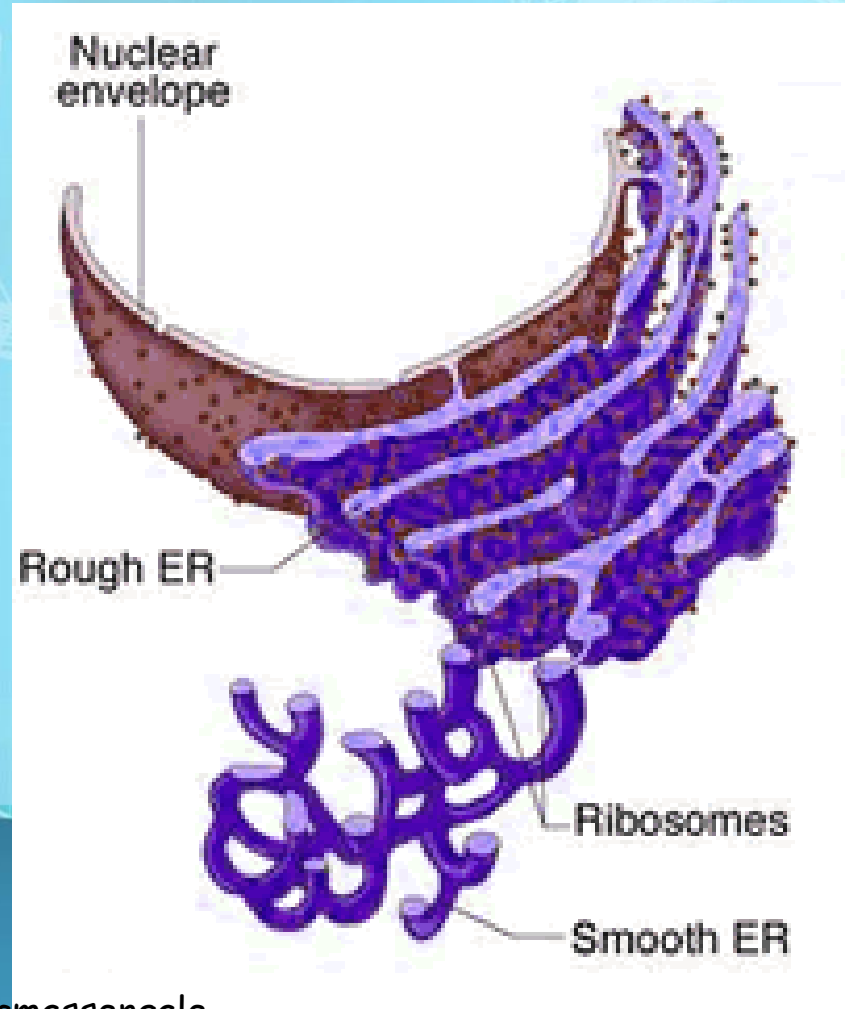
- Cell may have **1 to 3** nucleoli
- **Inside nucleus**
- **Disappears** when cell divides
- **Makes ribosomes** that make proteins



# Smooth & Rough Endoplasmic Reticulum

*Smooth ER* lacks ribosomes & makes proteins USED In the cell

*Rough ER* has ribosomes on its surface & makes proteins to EXPORT

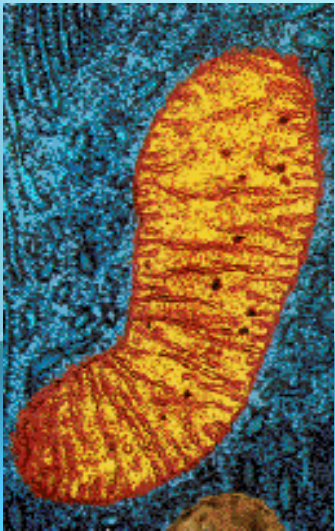


# Cell Powerhouse

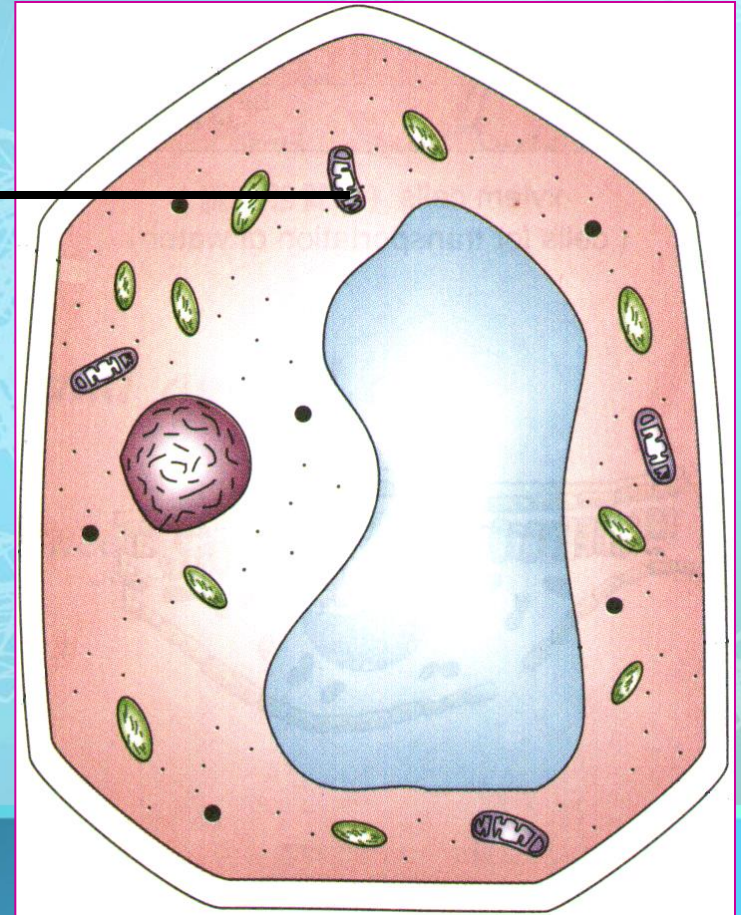
## Mitochondrion ( mitochondria )

Rod shape

Site of Cellular  
respiration

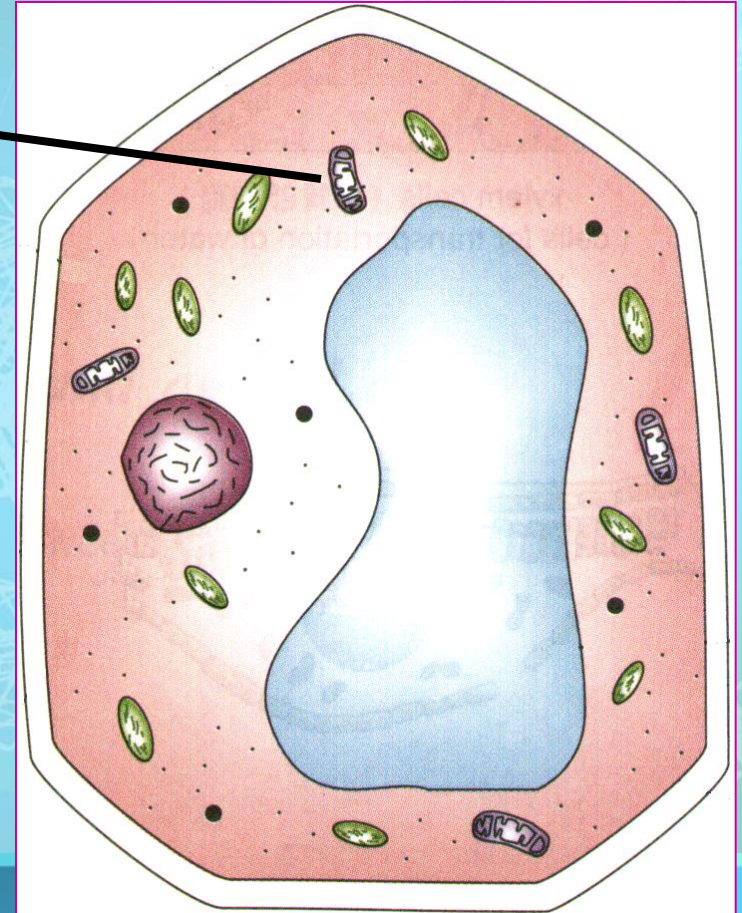
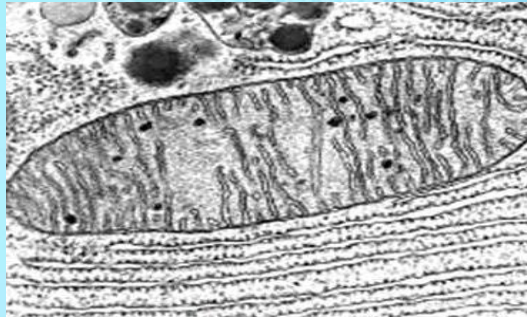
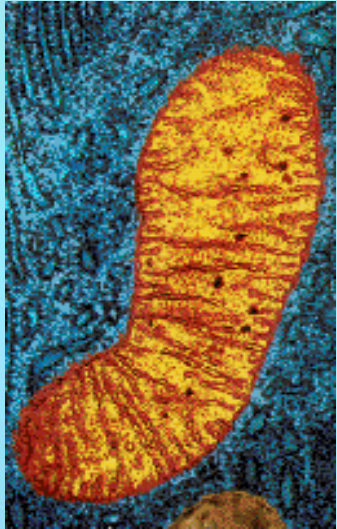


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# In Animal Cells:

## Mitochondria



Active cells like  
muscles have more  
mitochondria

Burn sugars to  
produce energy ATP

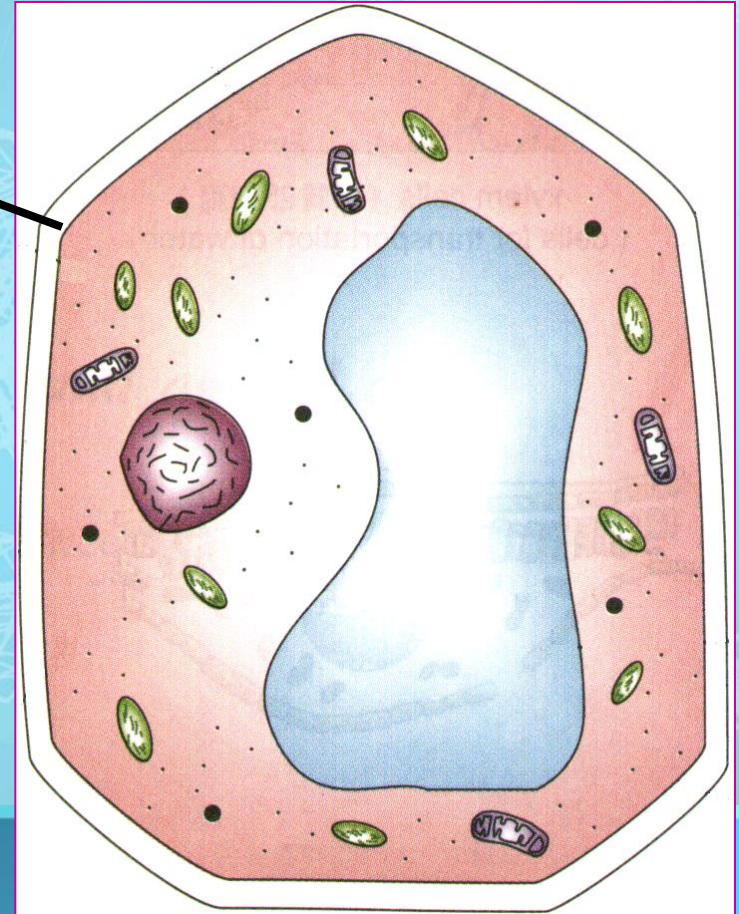
# Surrounding the Cell

## Cell membrane

Lies immediately  
against the cell wall  
in plant cells

Made of protein and  
phospholipids

Selectively permeable



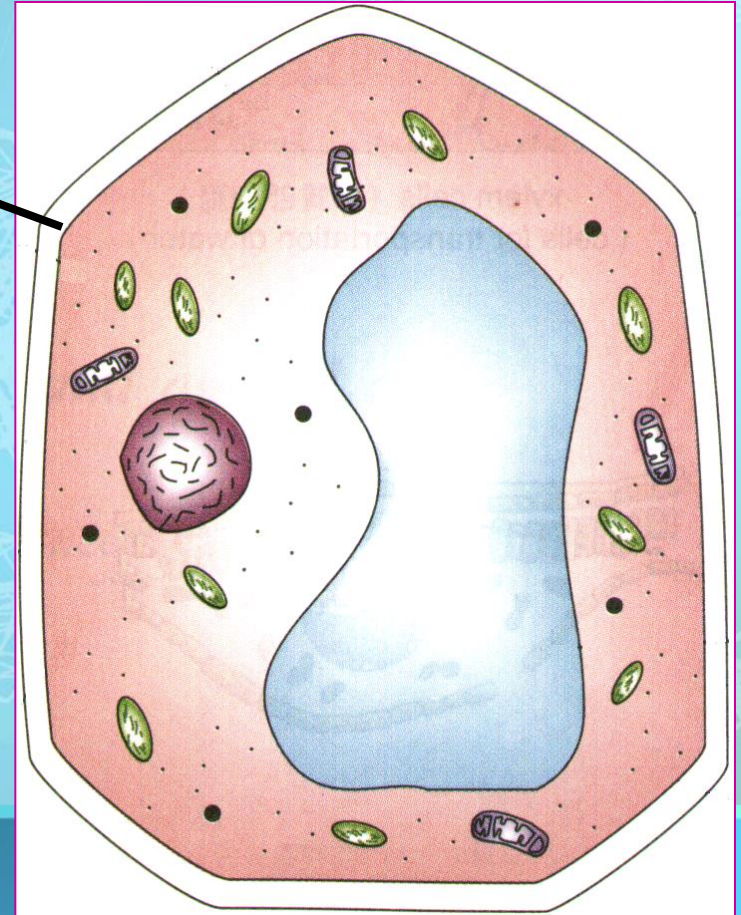
# Cell or Plasma Membrane

Cell membrane

Living layer

Controls the  
movement of  
materials into and  
out of the cell

Selectively  
permeable

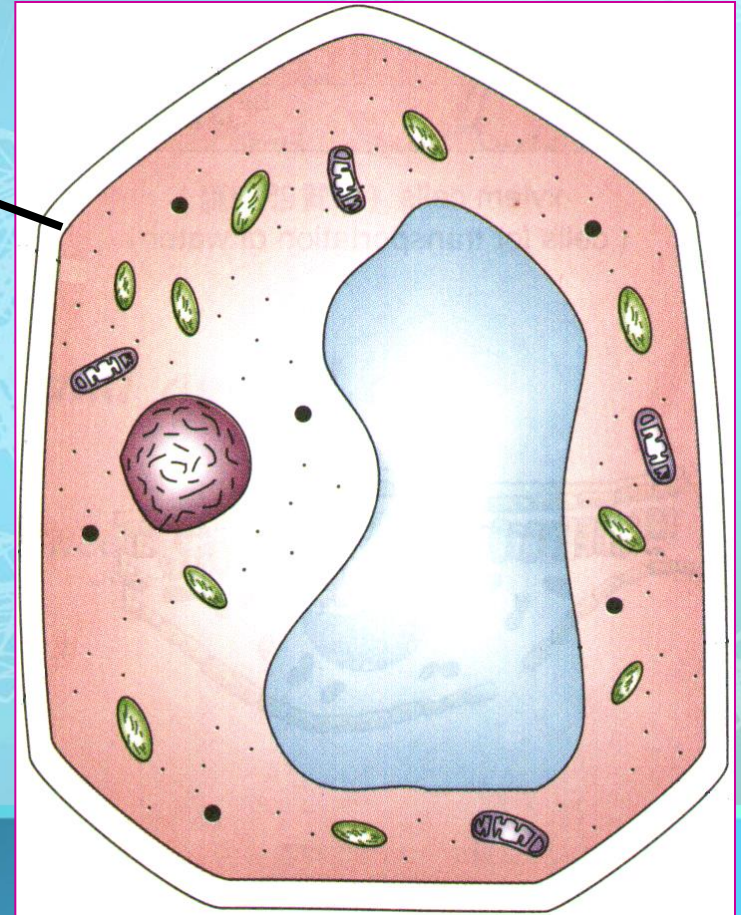


# Cell Wall

Cell wall

Nonliving layer

Gives structure and  
shape to plant and  
bacterial cells

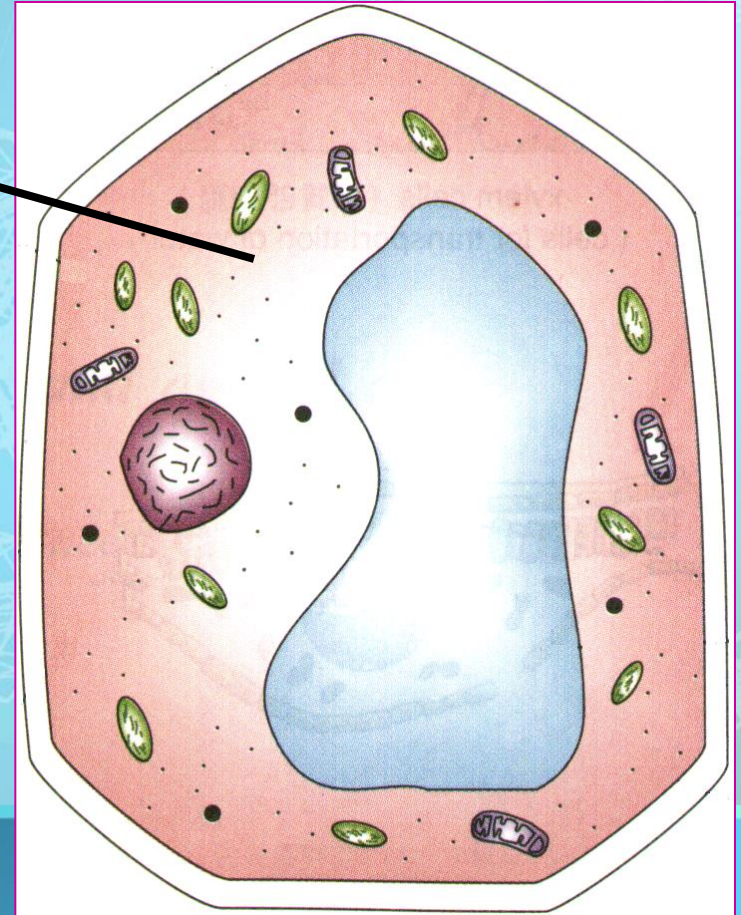


# Cytoplasm of a Cell

## Cytoplasm

Jelly-like substance  
enclosed by cell  
membrane

Provides a medium  
for chemical  
reactions to take  
place



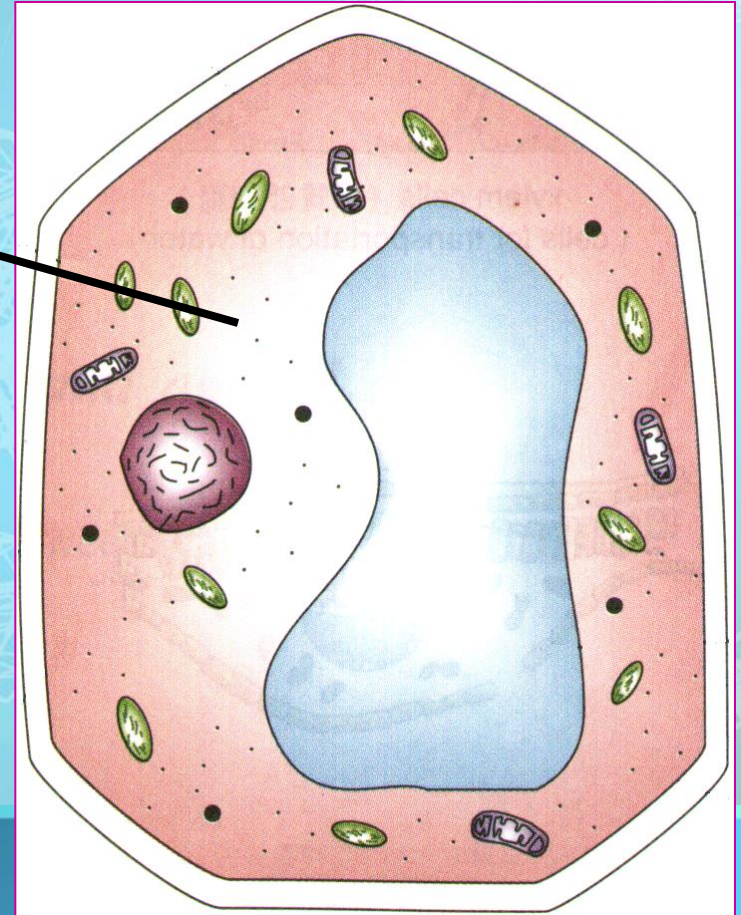
# More on Cytoplasm

## Cytoplasm

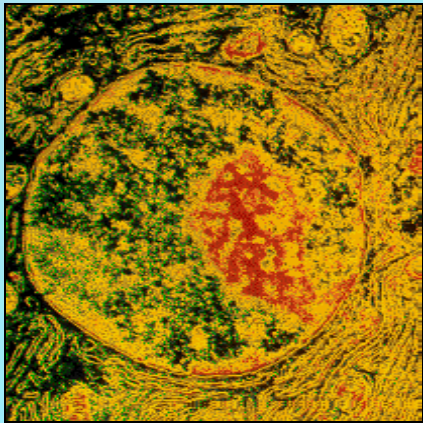
Contains organelles  
to carry out  
specific jobs

Examples:

chloroplast &  
mitochondrion



# Control Organelle



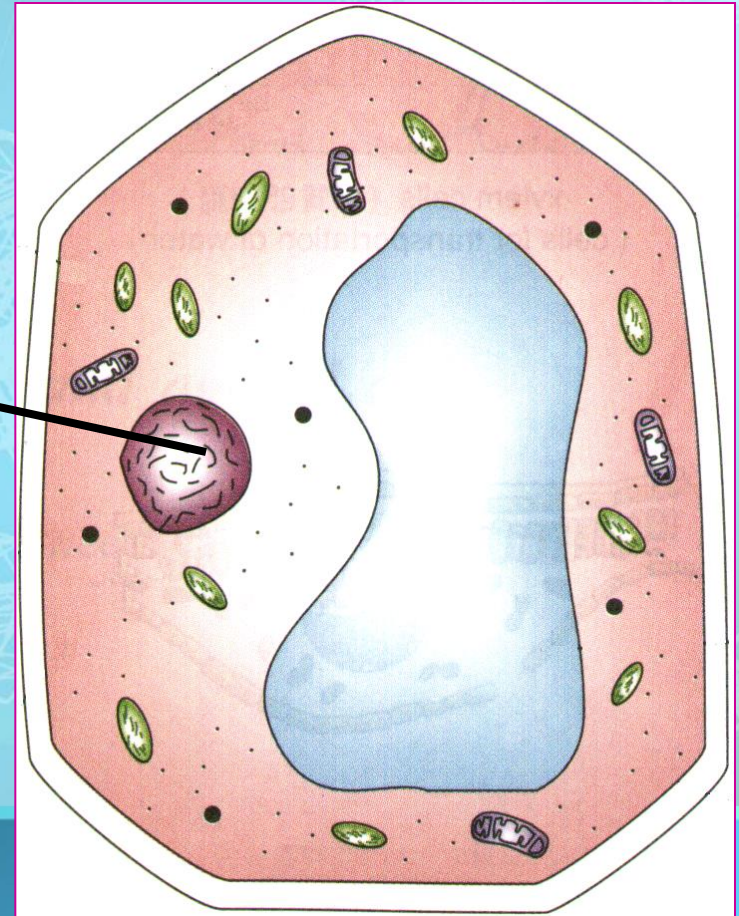
## Nucleus

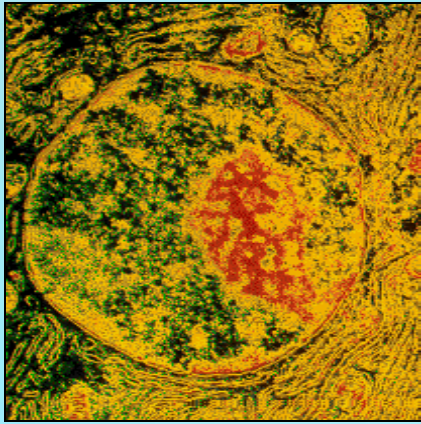
Controls the normal activities of the cell

Contain the DNA

Bounded by a nuclear membrane

Contains chromosomes



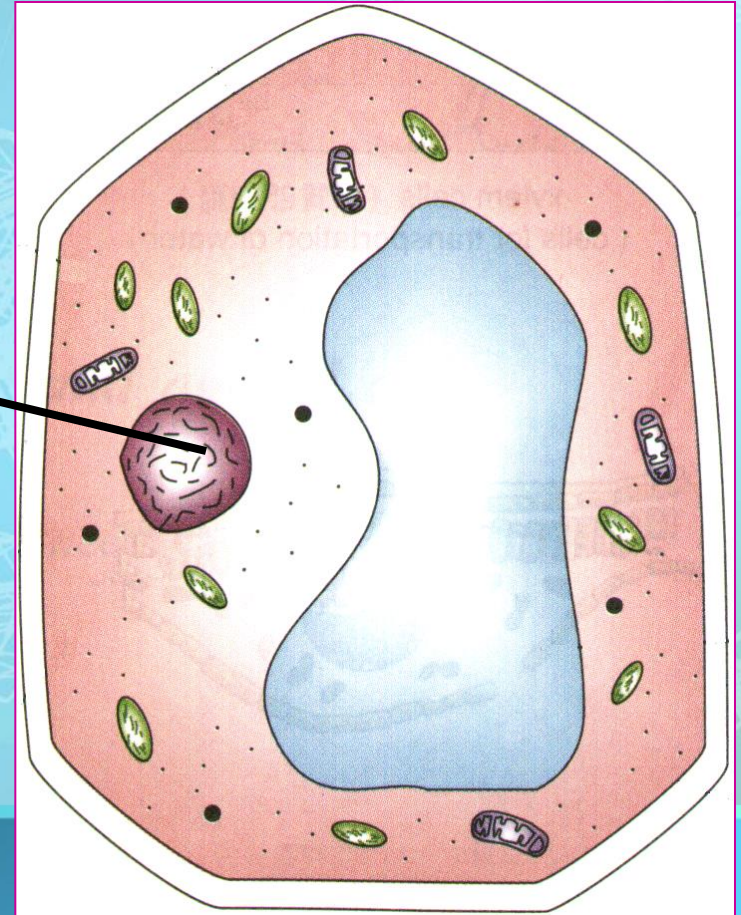


## More on the Nucleus

### Nucleus

Each cell has fixed number of chromosomes that carry genes

Genes control cell characteristics



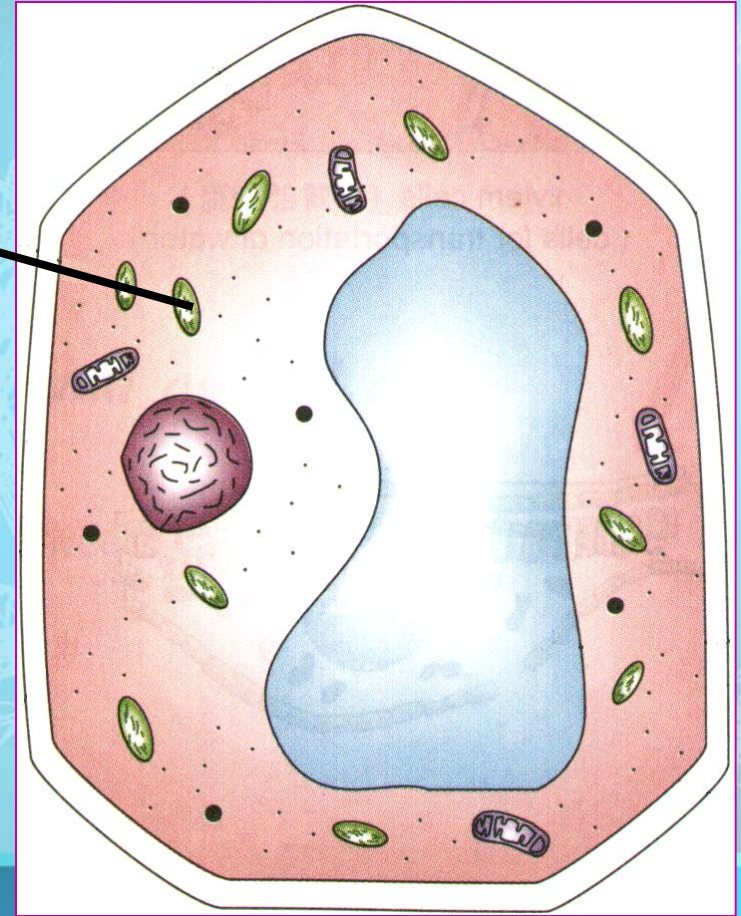
# Plant Cell Organelles

## Chloroplast

Contain the green pigment chlorophyll

Traps sunlight to make to make sugars (food)

Process called photosynthesis



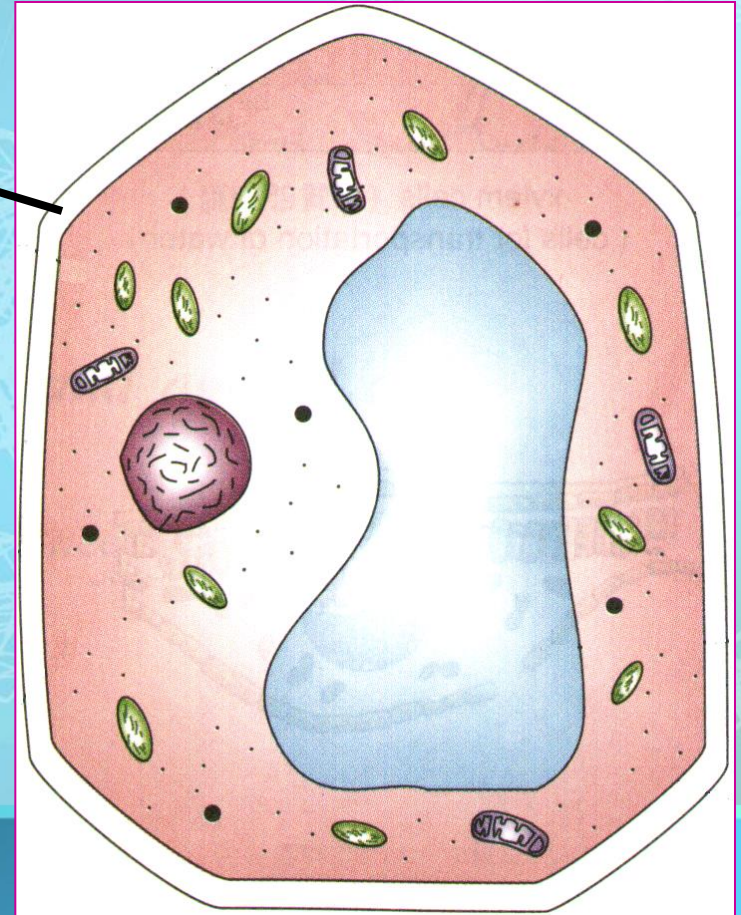
# Plant Cell

Cell wall

Dead layer

Large empty spaces  
present between  
cellulose fibers

Freely permeable



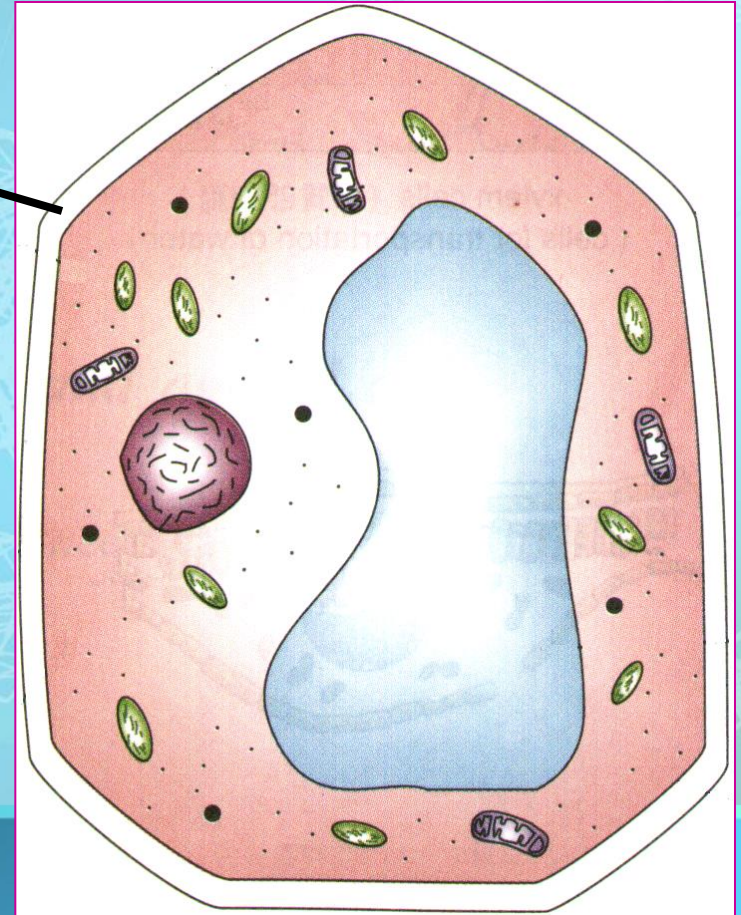
# Plant Cell

Cell wall

Made of *cellulose*  
which forms very  
thin fibers

Strong and rigid

Found in plant cells



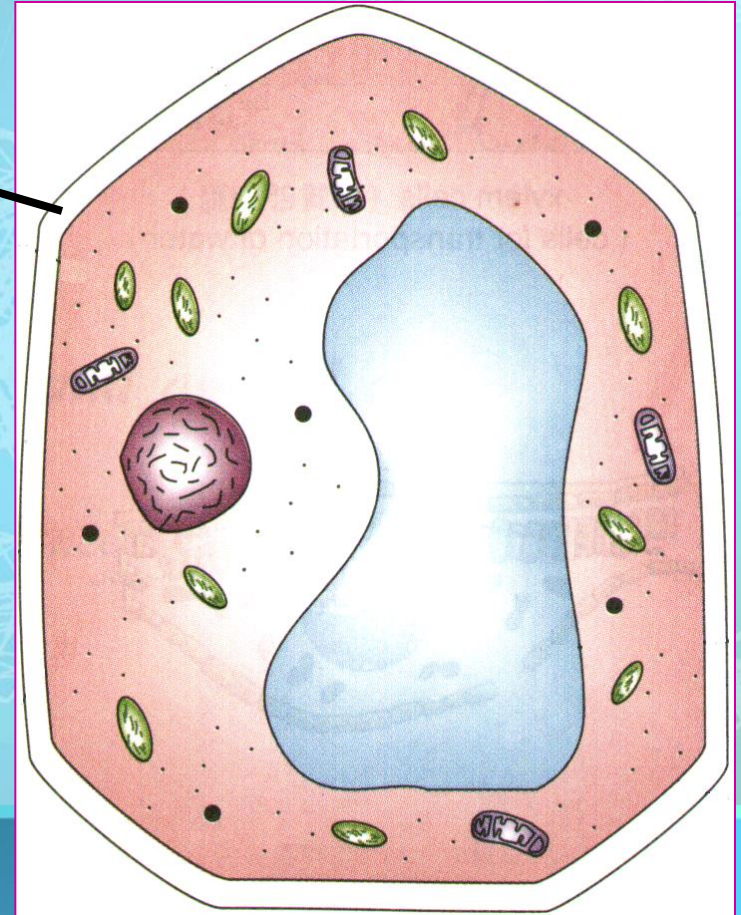
# Plant Cell

## Cell wall

Protect and support  
the enclosed  
substances  
(protoplasm)

Resist entry of  
excess water into  
the cell

Give shape to the cell



# Plant Cell Organelles

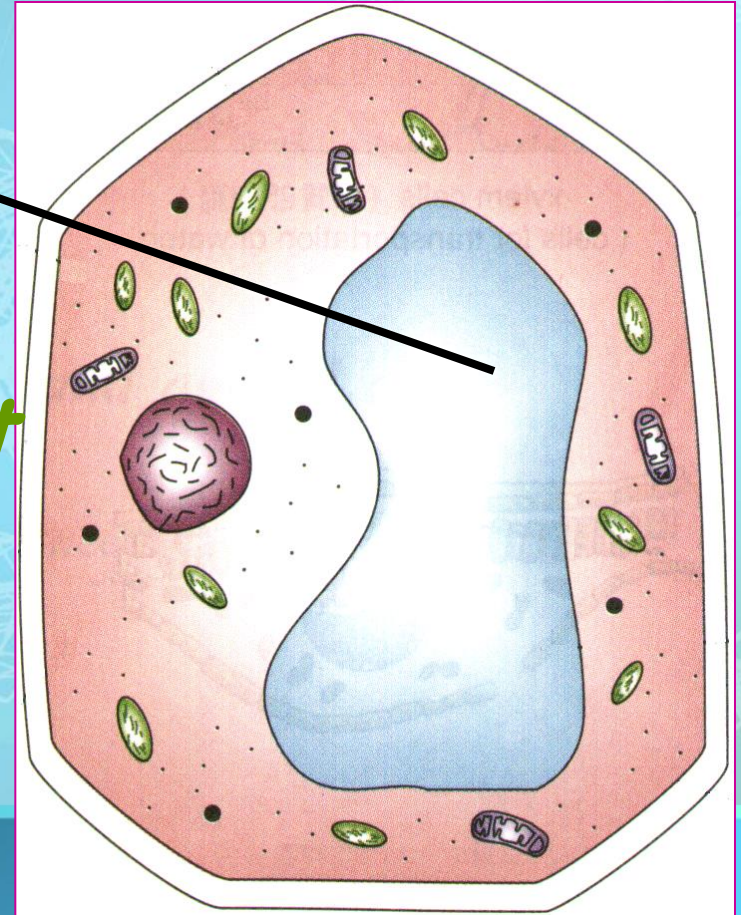
## Vacuole

Have a large central  
vacuole

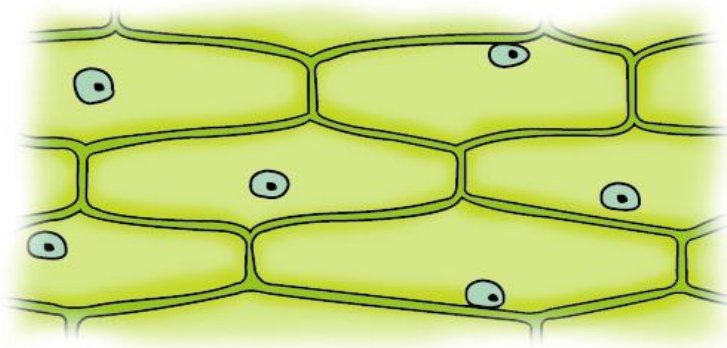
Surrounded by *tonoplast*

Contains cell sap

Sugars, proteins,  
minerals, wastes, &  
pigments



# Different kinds of plant cells



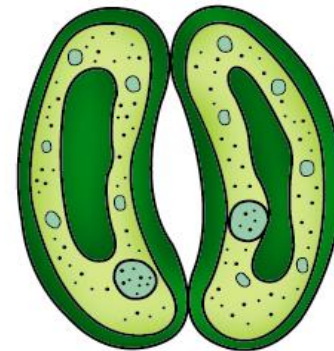
**Onion Epidermal Cells**

**root hair**



**Root Hair Cell**

**Guard Cells**



**vacuole**

**cytoplasm**

**nucleus**

**mitochondrion**

**glycogen  
granule**

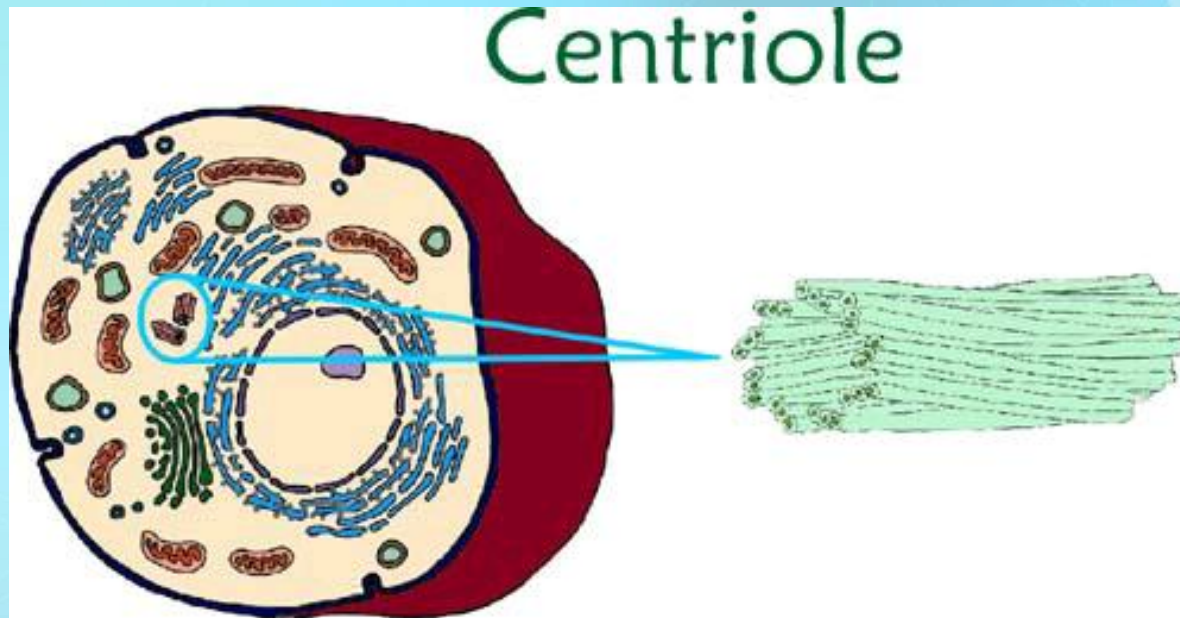
**cell  
membrane**

# Animal cell

No cell wall or  
chloroplast

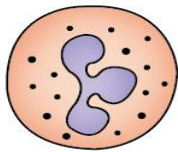
Stores glycogen  
in the  
cytoplasm for  
food energy

# Animal Cell Organelles



- Near the nucleus
- Paired structures
- Help cell divide

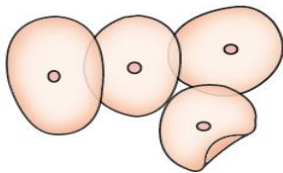
# Different kinds of animal cells



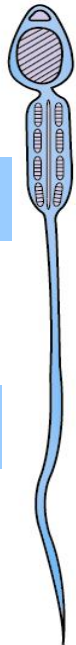
**white blood cell**



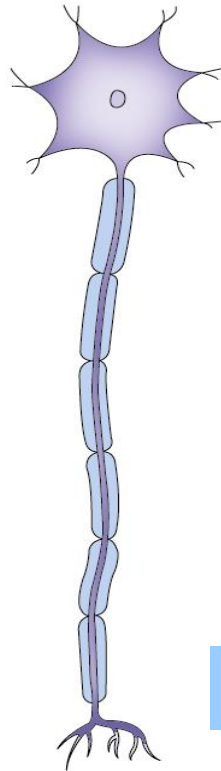
**red blood cell**



**cheek cells**



**sperm**

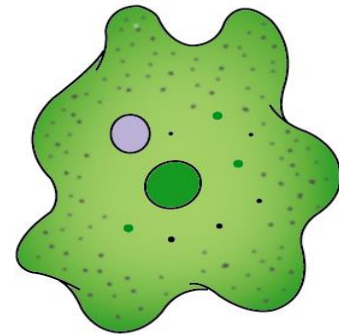


**nerve cell**

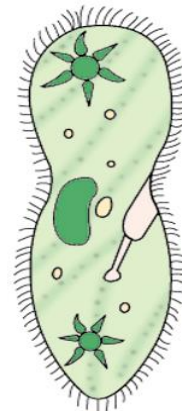
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**muscle cell**



**Amoeba**



**Paramecium**

# Similarities between plant cells and animal cells

Both have a cell membrane surrounding the cytoplasm

Both have a nucleus

Both contain mitochondria

# Differences between plant cells and animal cells

## **Animal cells**

Relatively  
smaller in size

Irregular shape

No cell wall

## **Plant cells**

Relatively  
larger in size

Regular shape

Cell wall present

# Differences between Plant Cells and Animal Cells

## **Animal cells**

Vacuole small or absent

Glycogen as food storage

Nucleus at the center

## **Plant cells**

Large central vacuole

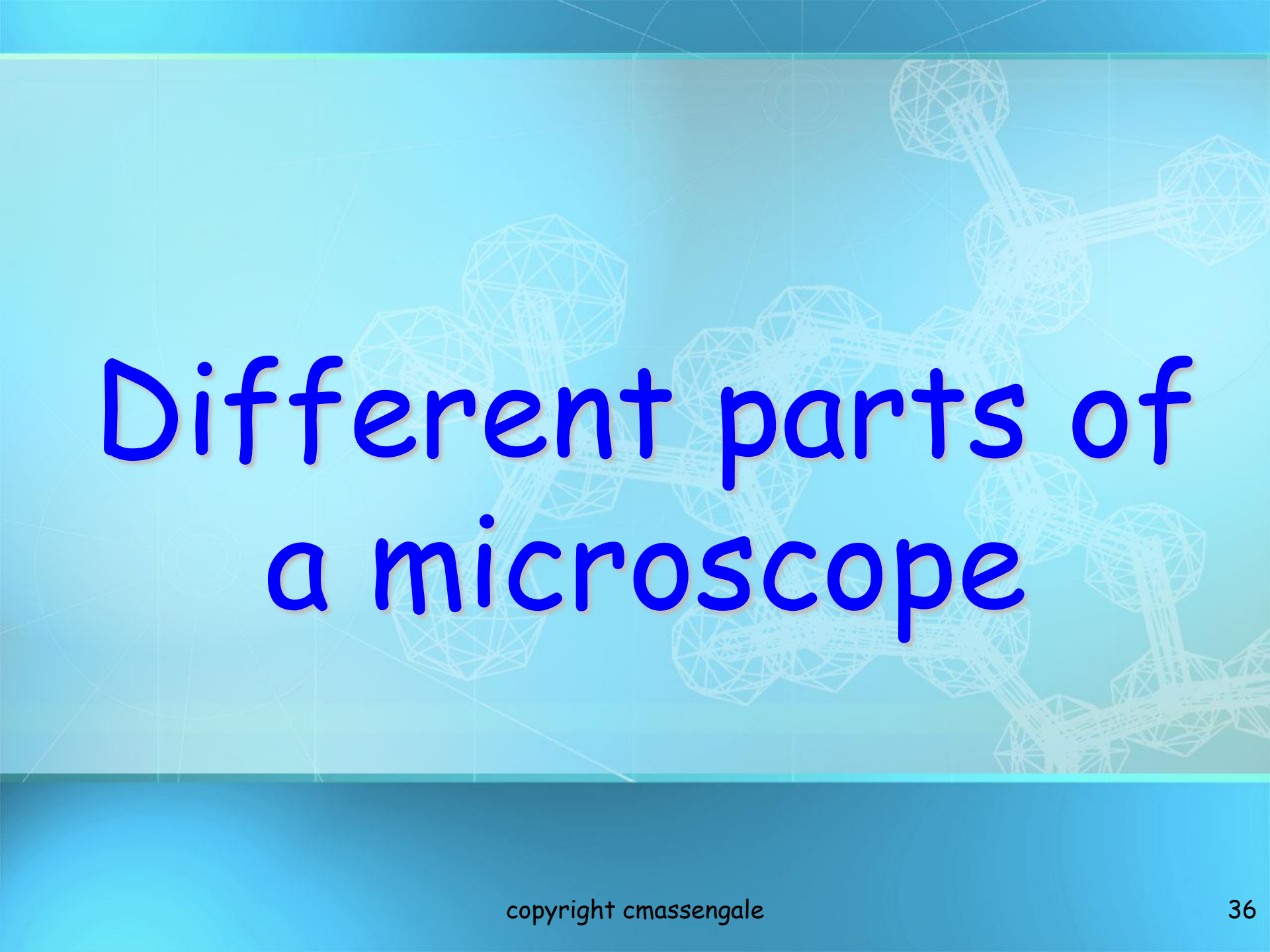
Starch as food storage

Nucleus near cell wall

# Compound Microscope

- Instrument for observing small objects
- Magnify images up to 2000X their size





# Different parts of a microscope

**Revolving  
nosepiece**

**Objective**

**Clip**

**Condenser**

**Iris diaphragm**

**Mirror**

**Eyepiece**

**Body tube**

**Coarse  
adjustment**

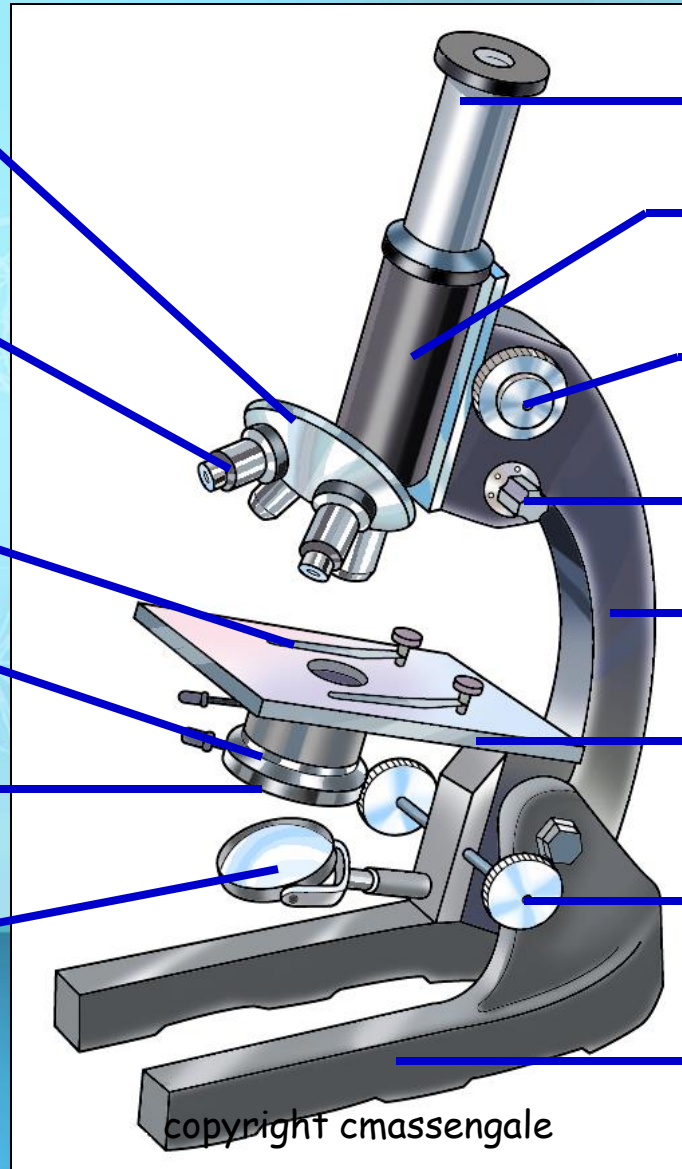
**Fine adjustment**

**Arm**

**Stage**

**Condenser  
control knob**

**Base**

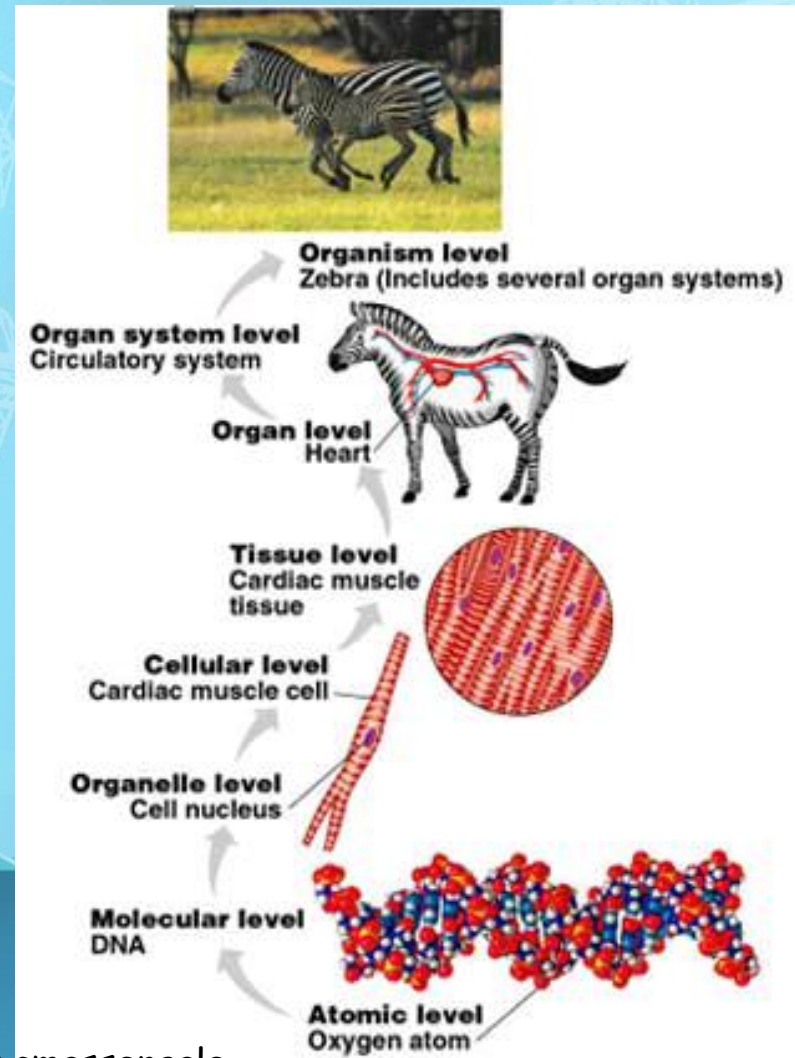


# The cell is the Basic Unit of Life

- Cell is the smallest unit of living organisms
- Unicellular organisms are made of one cell only
- The cells of multicellular organisms are specialized to perform different functions
  - e.g. mesophyll cells for photosynthesis and root hair cells for water absorption

# Levels of organization

- Cells are grouped together and work as a whole to perform special functions

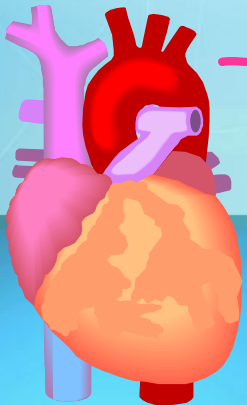


# Tissue

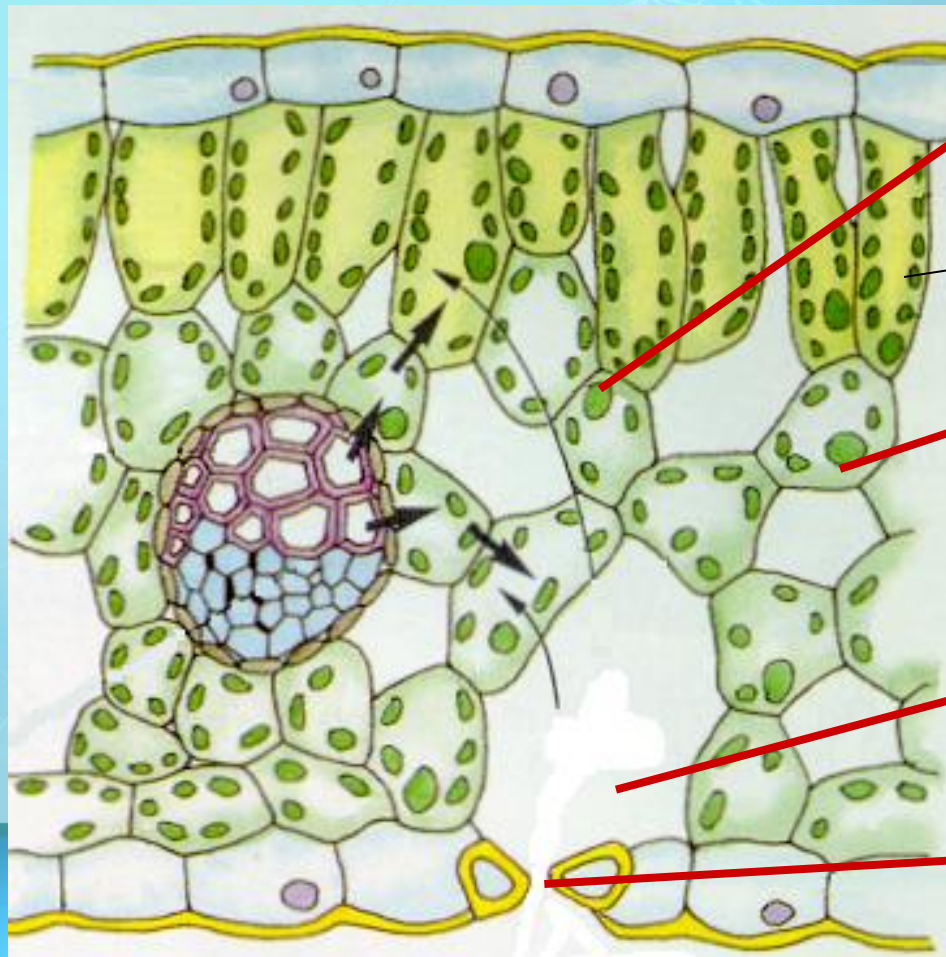
- A group of similar cells to perform a particular function
  - **Animals** : epithelial tissue, muscular tissue
  - **Plants** : vascular tissue, mesophyll

# Organ

- Different tissues group together to carry out specialized functions
  - Heart : consists of muscles, nervous tissue and blood vessels
  - Leaf : consists of epidermis, mesophyll and vascular tissue



# The Structures of a Leaf (Plant Organ)



Chloroplast

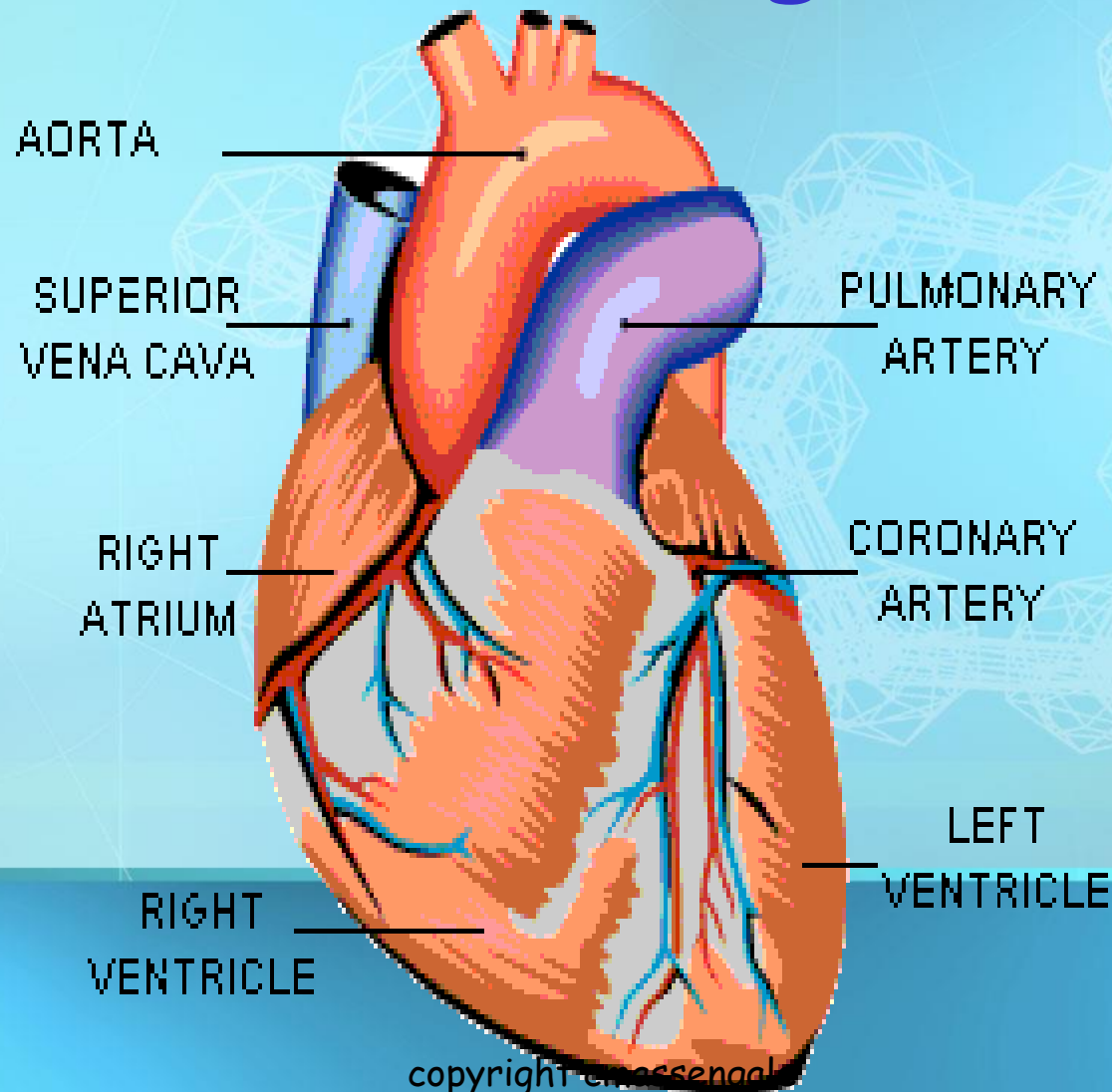
Palisade  
Mesophyll Cell

Spongy Mesophyll  
Cell

Air Space

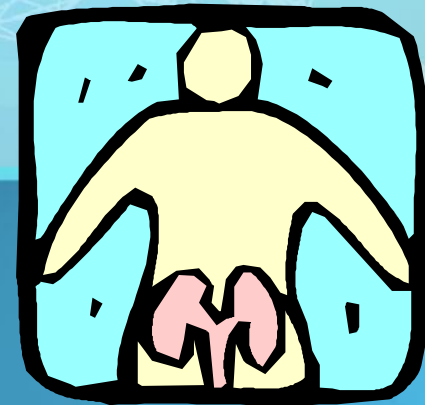
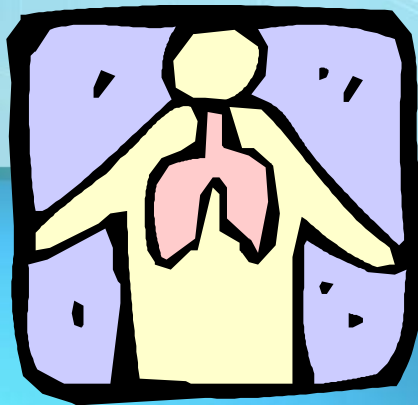
Stoma

# The Structures of a Heart (Animal Organ)



# System

- Several organs and tissues work together to carry out a particular set of functions in a co-ordinated way
  - Human : digestive, respiratory, excretory, circulatory and reproductive systems
  - Plant : root and shoot systems

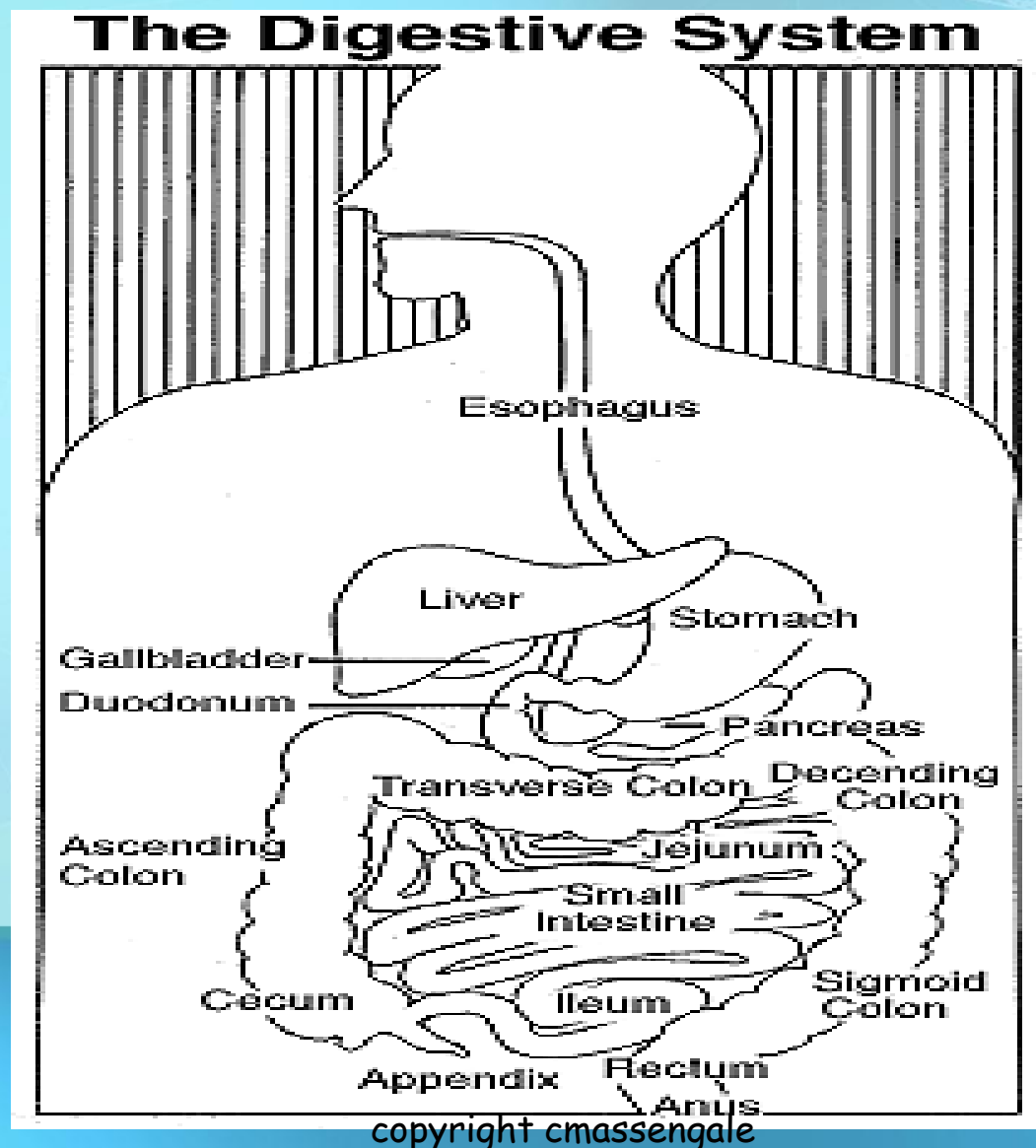


# Human Body Systems

Examples of systems :

- ◇ Digestive System
- ◇ Respiratory System
- ◇ Circulatory System
- ◇ Nervous System
- ◇ Reproductive System

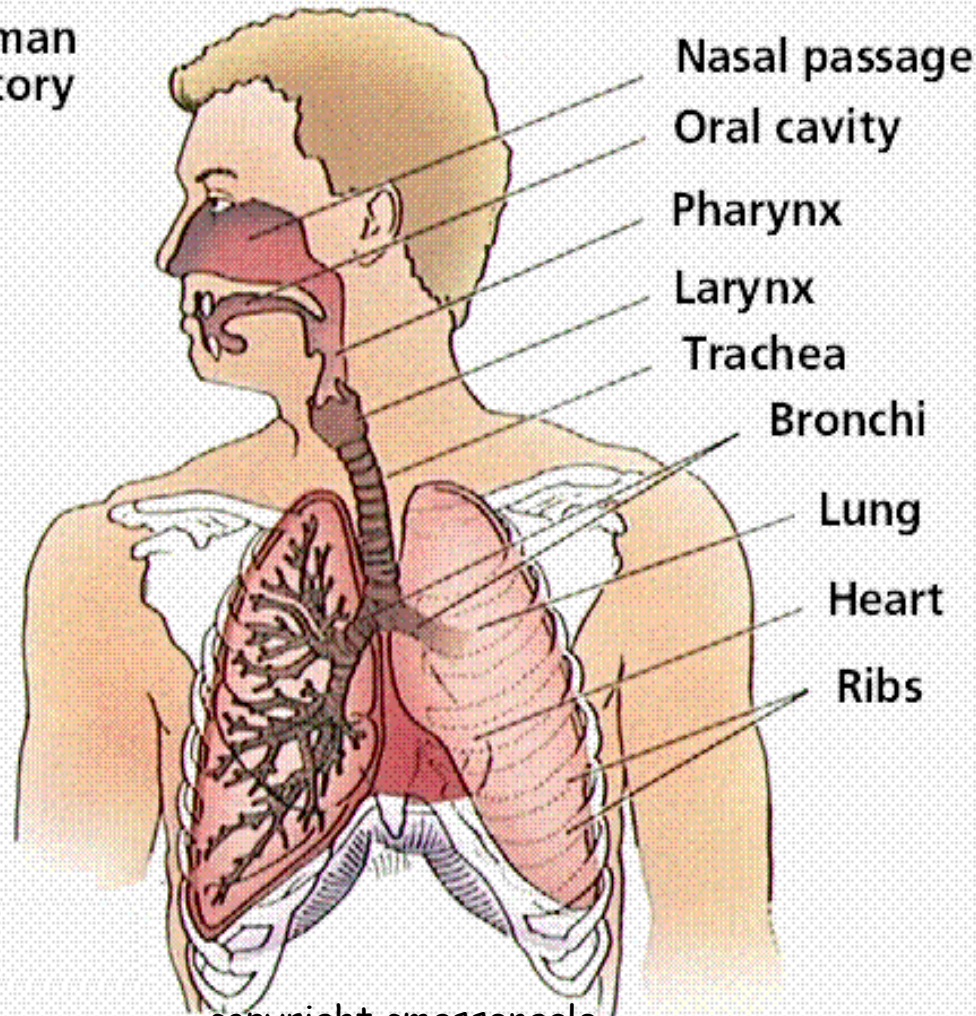
# Examples of a Human Body System



# Examples of a Human Body System

## *The Respiratory System*

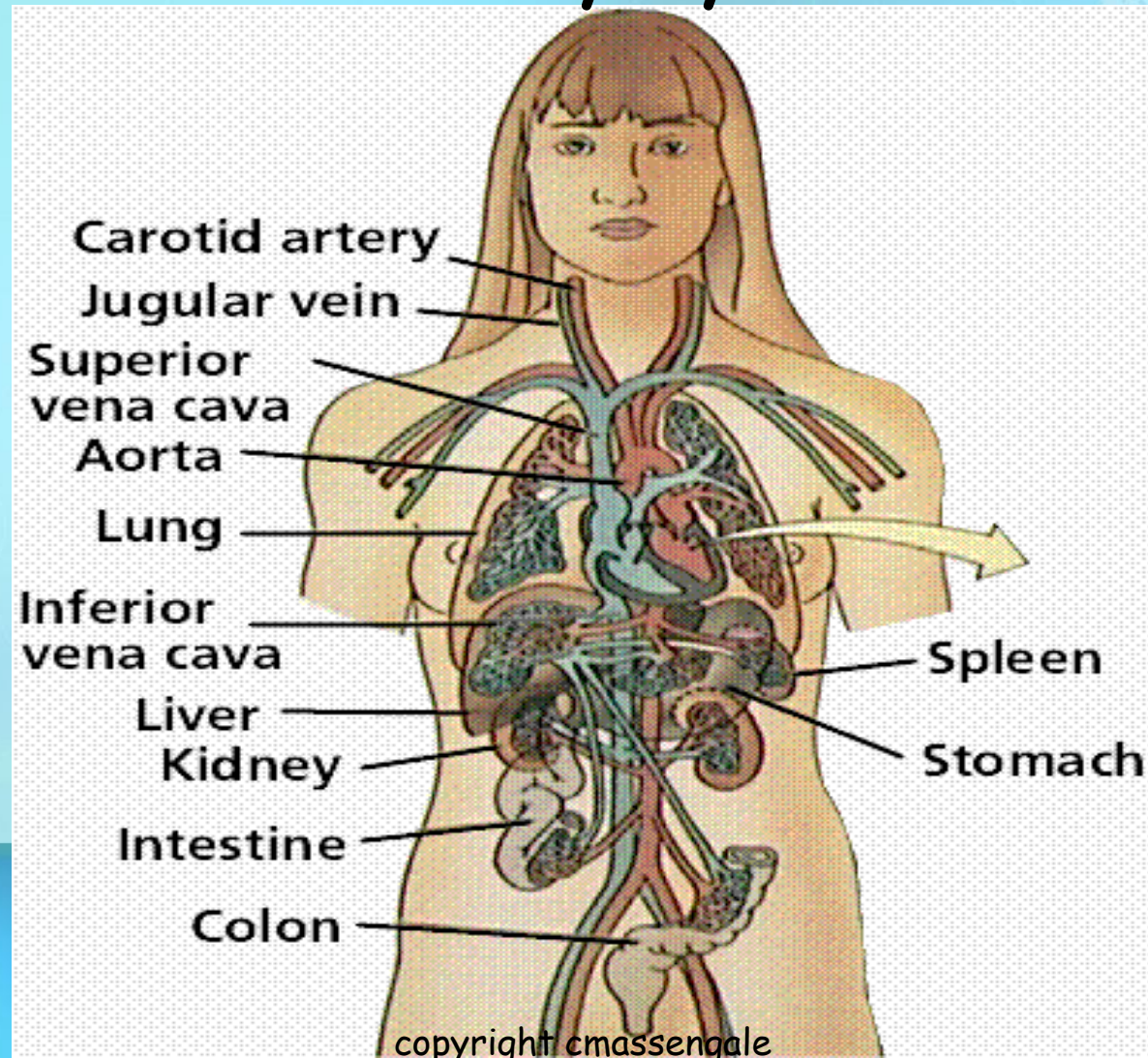
The Human  
Respiratory  
System



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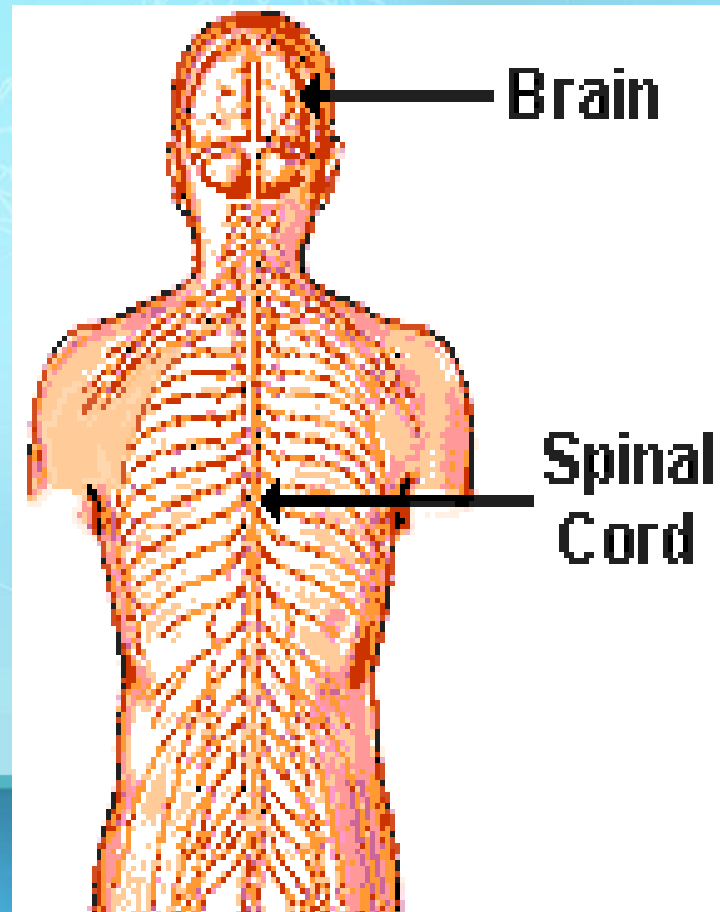
# Examples of a Human Body System

## Circulatory System



# Examples of a Human Body System

## Nervous System



# Levels of Organization

- ✧ **CELLS** (muscle cells, nerve cells)
- ✧ **TISSUES** (muscle, epithelium)
- ✧ **ORGANS** (heart, lungs, stomach)
- ✧ **SYSTEMS** (circulatory system)
- ✧ **ORGANISM** (human)

# It's You!

