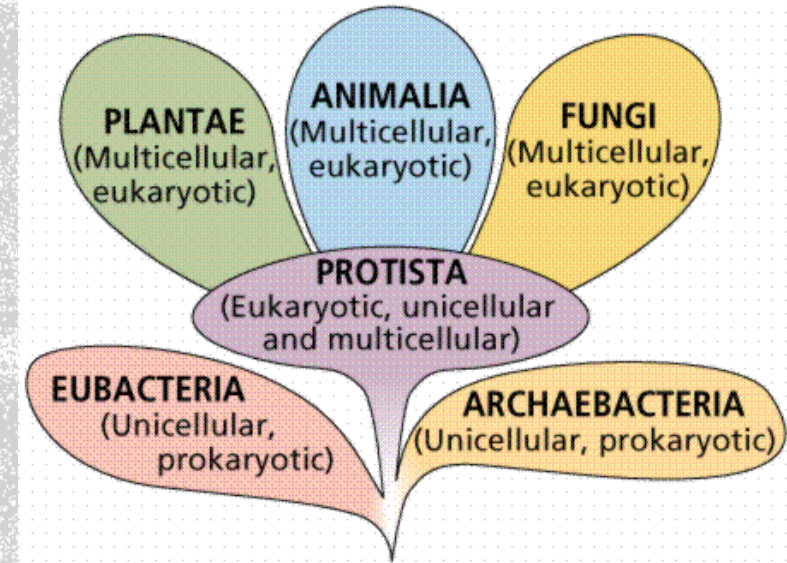
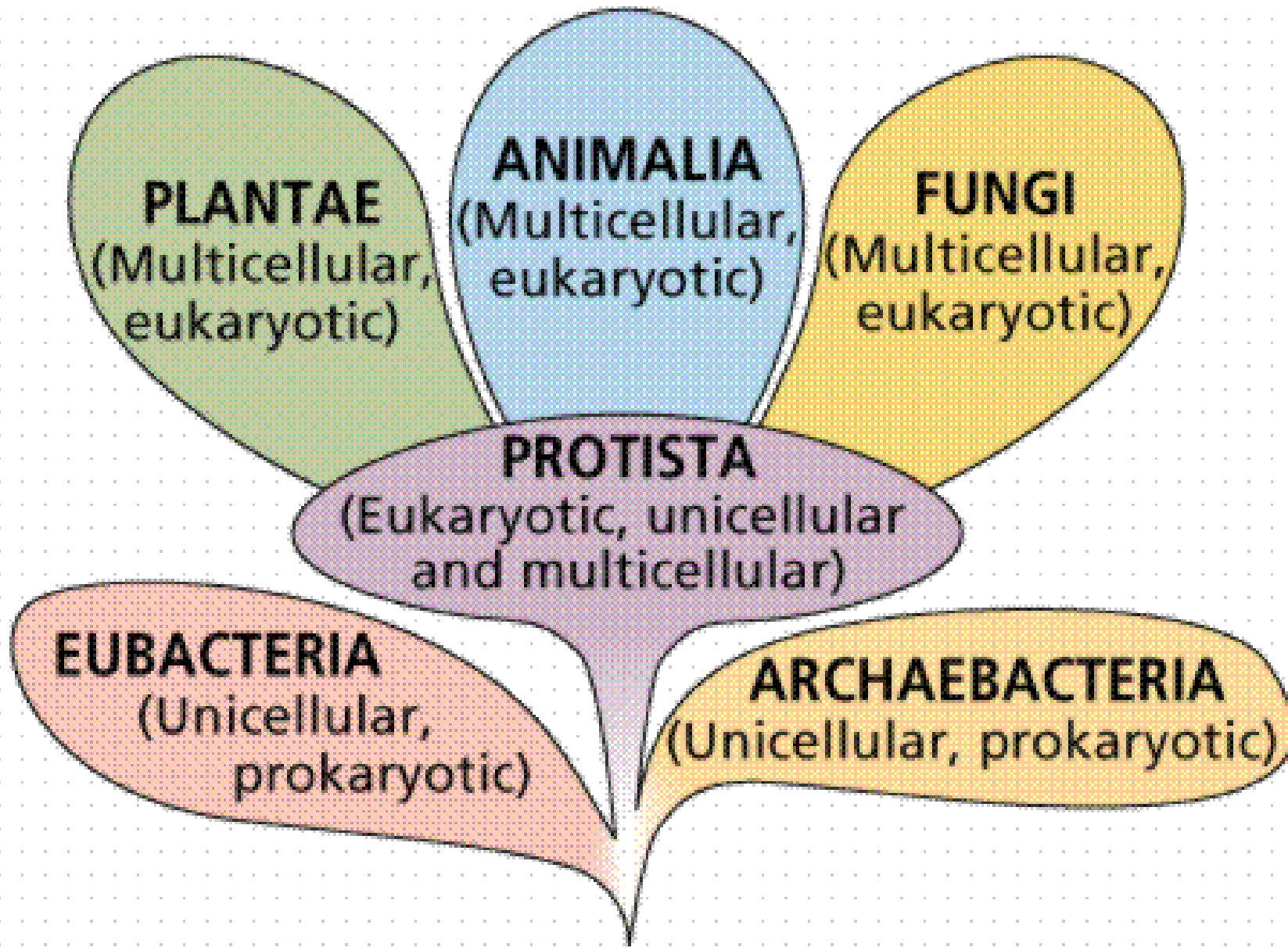


# TREE OF LIFE



Dr. Manu Smriti Singh  
Department of Biotechnology  
Bennett University





Archaeobacteria

## Archaeobacteria

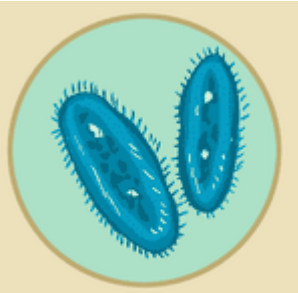
- Do not have nuclei, can be found in deep ocean vents
- All are single celled organisms (Extremophiles).
- Form yellow rings around hot springs where temperatures are 90 degrees Celsius (194 degrees F)

## Eubacteria

- Do not have nuclei, some cause disease
- Escherichia coli (E. Coli)
- Prokaryotes that may be found in the human body
- All are single celled organisms



Eubacteria



Protista

## Protista

- All eukaryotes that are not plants, animals or fungi
- Most are single celled organisms (Protozoans)
- Algae
- Mostly microscopic and live in water

## Fungi

- Break down materials outside their bodies and then absorb the nutrients
- Mushrooms
- Molds



Fungi

## Plantae

- Use sun's energy to make sugar
- Usually green
- Pine Trees



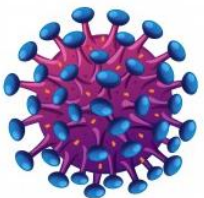
Plantae

## Animalia

- Complex organisms with no cell walls
- Have specialized sense organs



Animalia

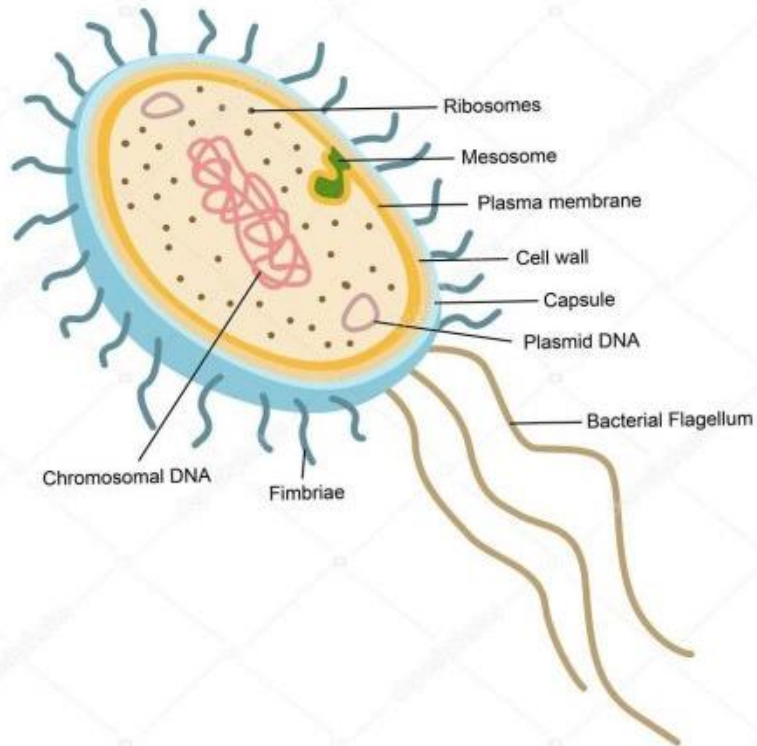




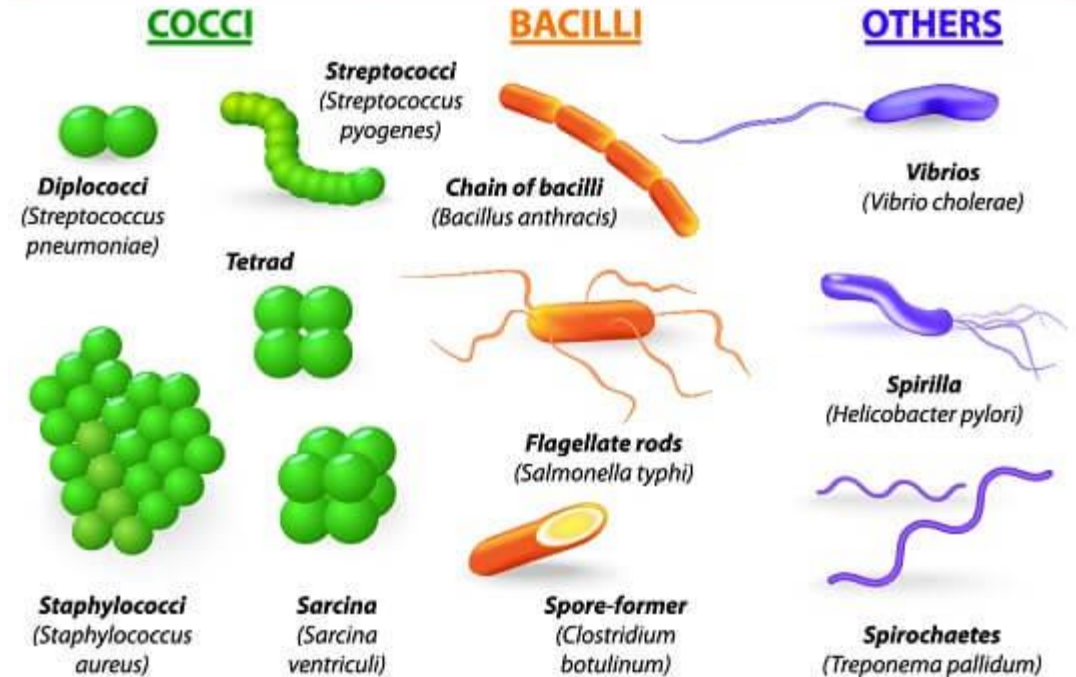


# EUBACTERIA

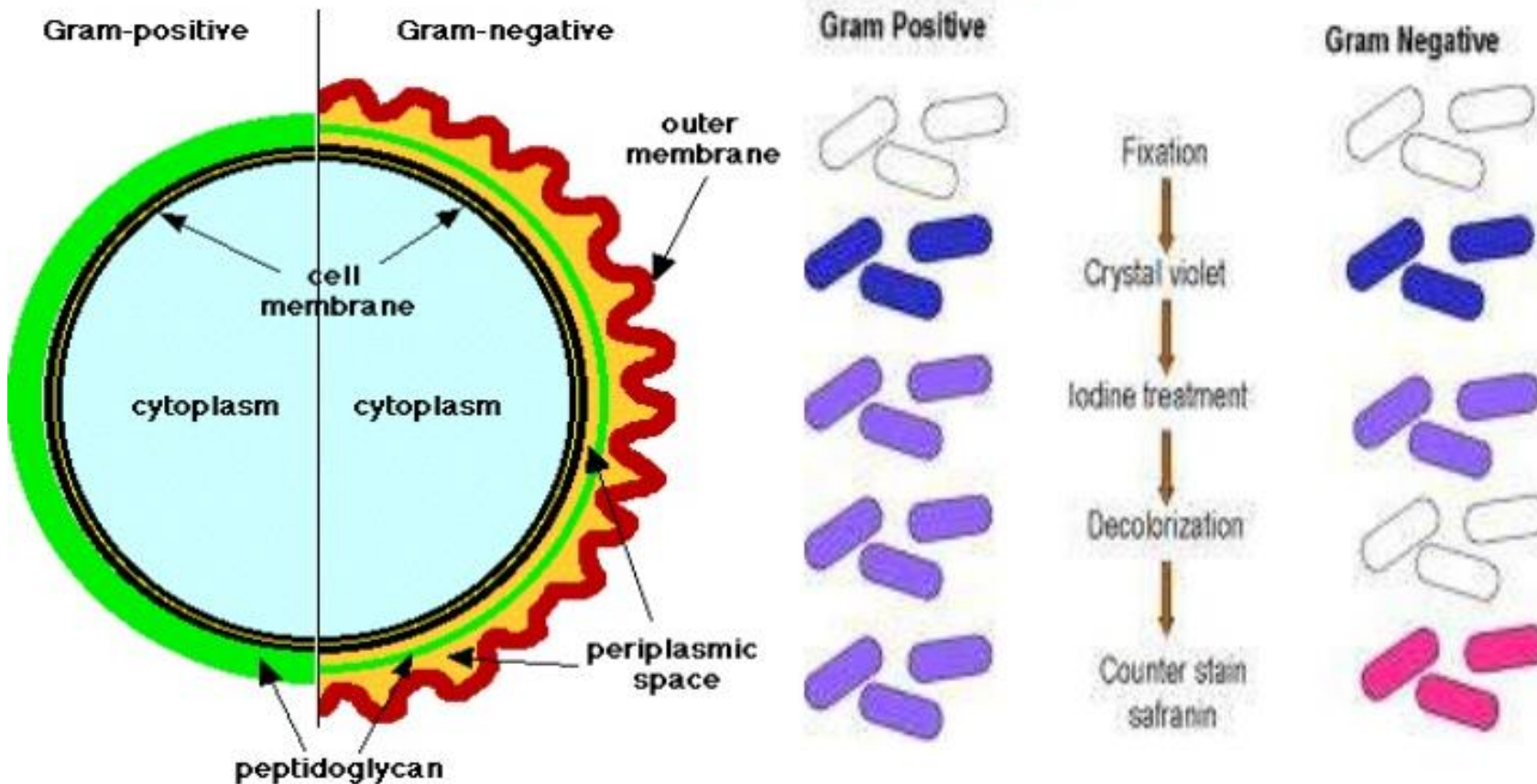
- Eukaryotes
- Microscopic
- Consumers/ Producers
- Reproduction- Asexual



## SHAPES OF BACTERIA



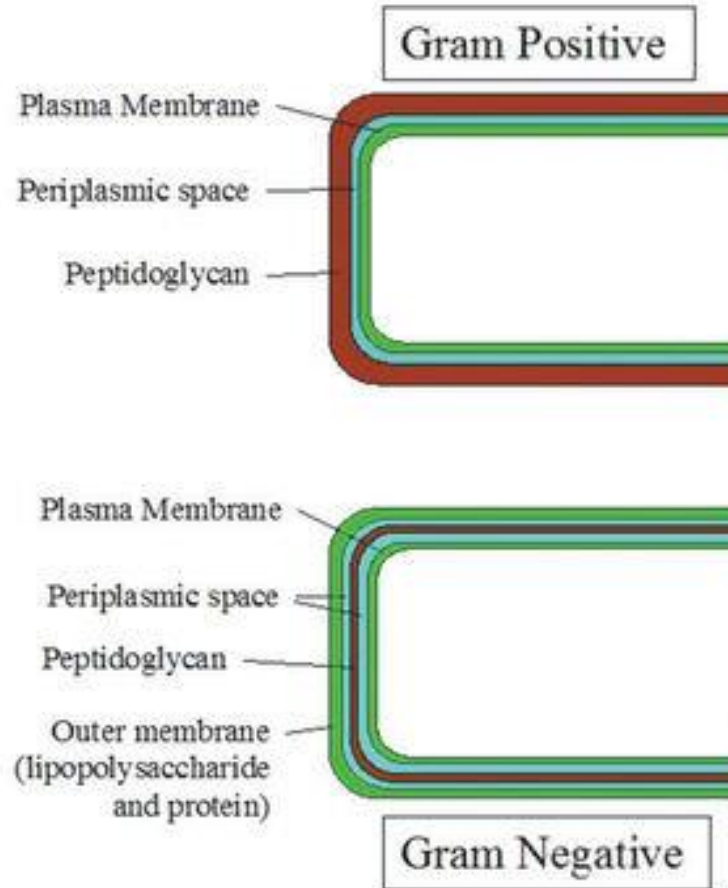
# Structure and Reactivity to Gram Staining.



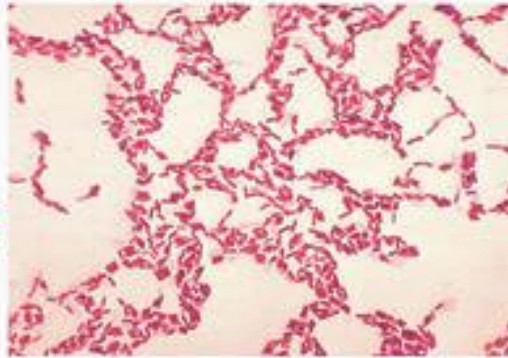
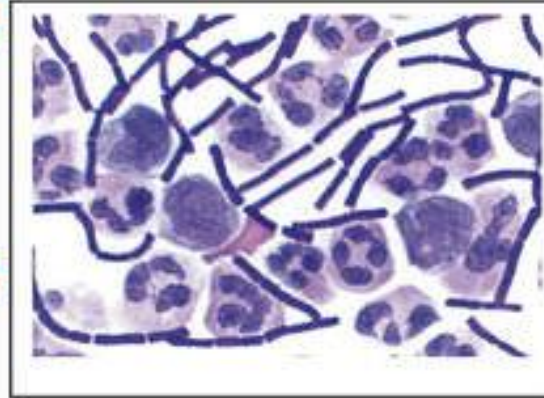
Gram negative- Outer membrane Lipopolysaccharide (LPS)

Pneumoniae  
Clostridium  
Listeria

Vibrio cholerae  
Helicobacter pylori



**Gram-positive bacteria** stain purple with Gram stain. This is because they have a thick cell wall without an outer membrane. Example: cyanobacteria



**Gram-negative bacteria** stain red with Gram stain. This is because they have a thin cell wall with an outer membrane. Example: Salmonella.

Gram indeterminate bacteria  
Mycobacterium  
*M. leprae*  
*M. tuberculosis*



# EUBACTERIA

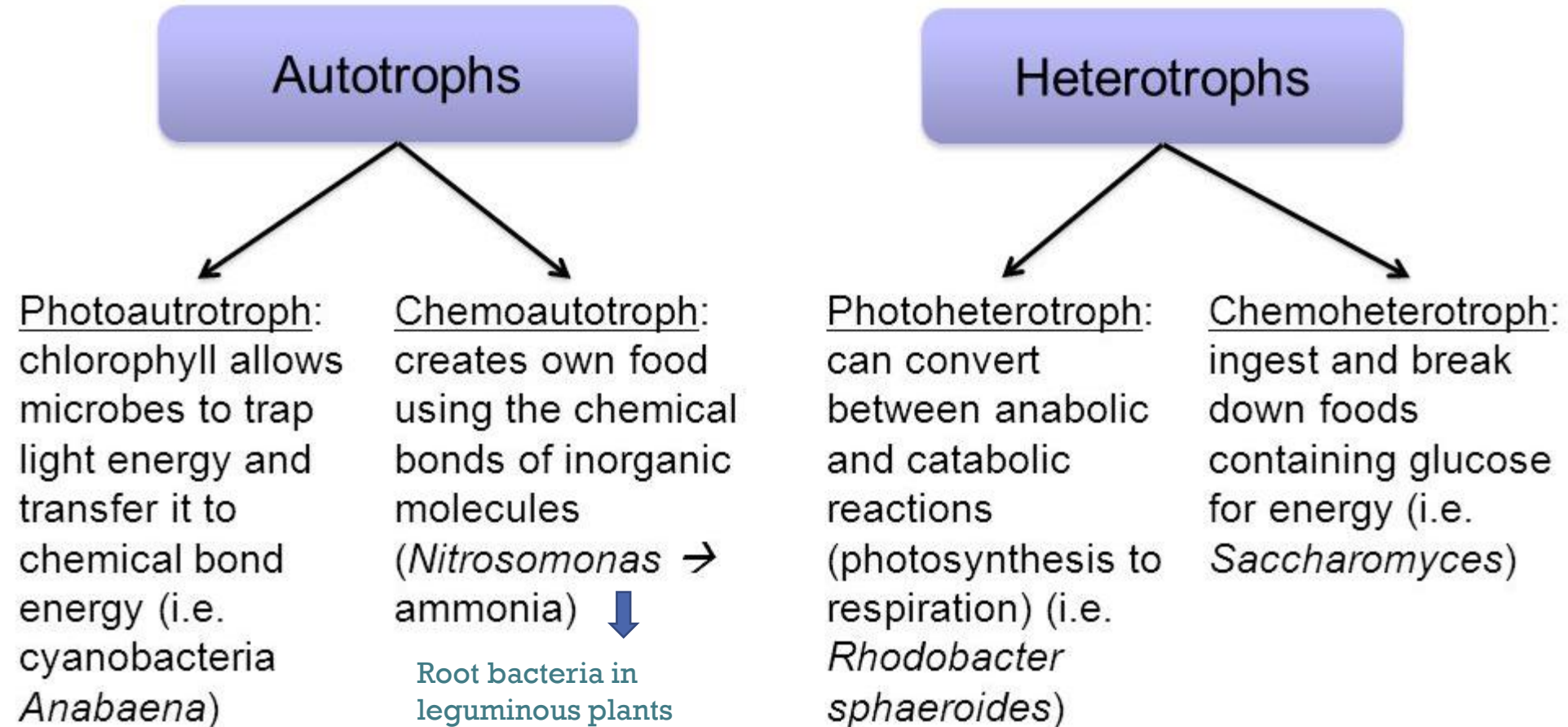
Food

## AUTOTROPHS VERSUS HETEROTROPHS

|   |  |
|---|--|
| Autotrophs produce their own food               | Heterotrophs do not produce their own food               |
| Are at the primary level in a food chain        | Are at the secondary and tertiary levels in a food chain |
| Produce their own food for energy               | Eat other organisms in order to obtain their energy      |
| Are either photoautotrophs or chemoautotrophs   | Are either photoheterotrophs or chemoheterotrophs        |
| Plant, algae and some bacteria are the examples | Herbivores, omnivores, and carnivores are the examples   |



# AUTOTROPH VS HETEROTROPH



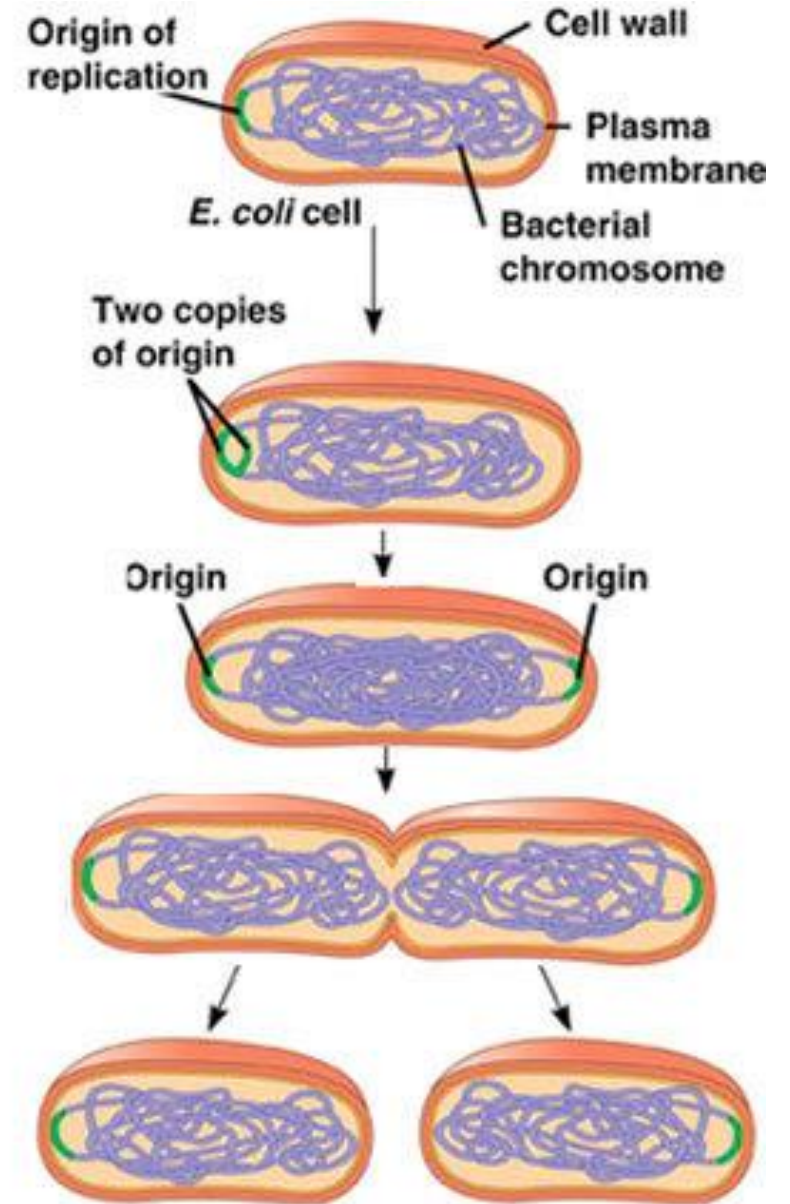




# EUBACTERIA

Reproduction- Asexual

- 1** Chromosome replication begins. Soon thereafter, one copy of the origin moves rapidly toward the other end of the cell.
- 2** Replication continues. One copy of the origin is now at each end of the cell.
- 3** Replication finishes. The plasma membrane grows inward, and new cell wall is deposited.
- 4** Two daughter cells result.



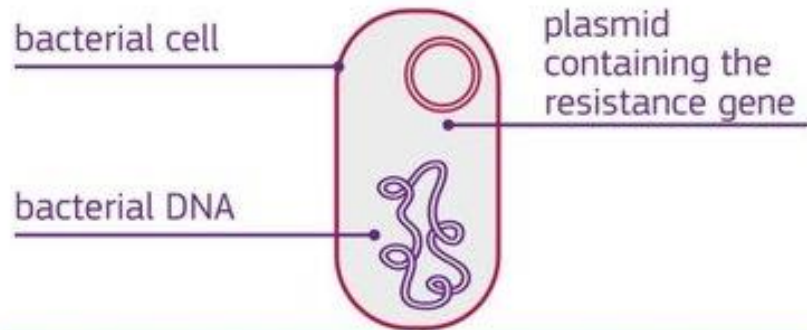


Eubacteria

# EUBACTERIA

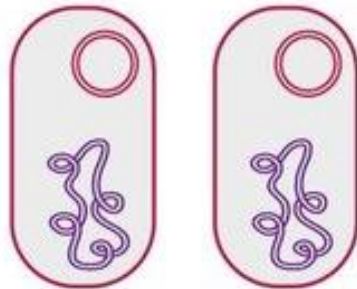
## Reproduction

### A: Vertical Transmission

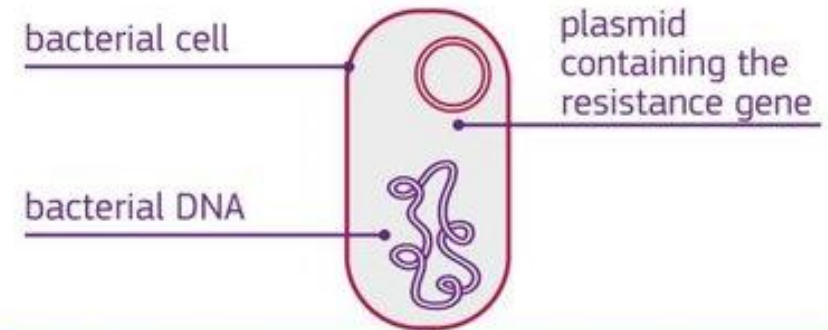


Plasmid transferred during replication to daughter cells

Daughter cells

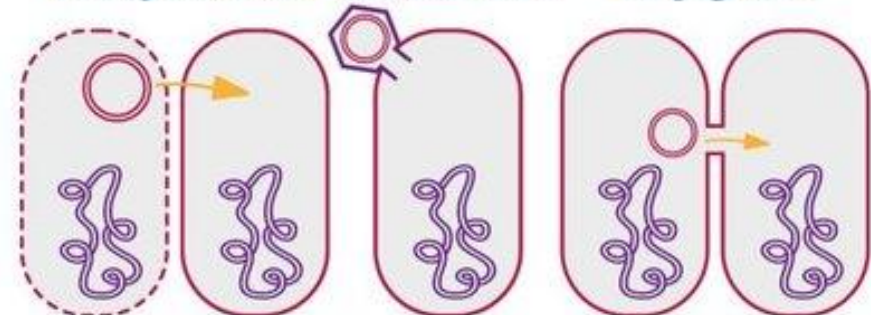


### B: Horizontal Transmission



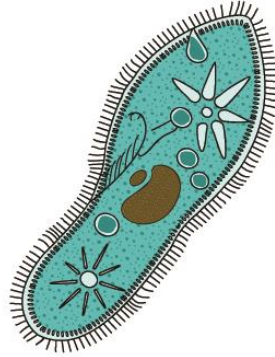
Plasmid transferring to other bacteria of the same generation

Transformation Transduction Conjugation





# PROTISTA



## Characteristics

- Eukaryotes
- Unicellular mostly.
- Multicellular- Exception- Kelp: Do not show cellular specialization or differentiation into tissues.

Most have mitochondria.

They can be parasites.

They all prefer aquatic or moist environments.







# PROTISTA

## Classification of Protists

- Animal-like protists, which are heterotrophs and have the ability to move.
- Plant-like protists, which are autotrophs that photosynthesize.
- Fungi-like protists, which are heterotrophs, and they have cells with cell walls and reproduce by forming spores. (Eg. Slime molds)

Slime mold



Amoeba



Euglena



Dinoflagellate



Paramecium



Diatom



Macroalga

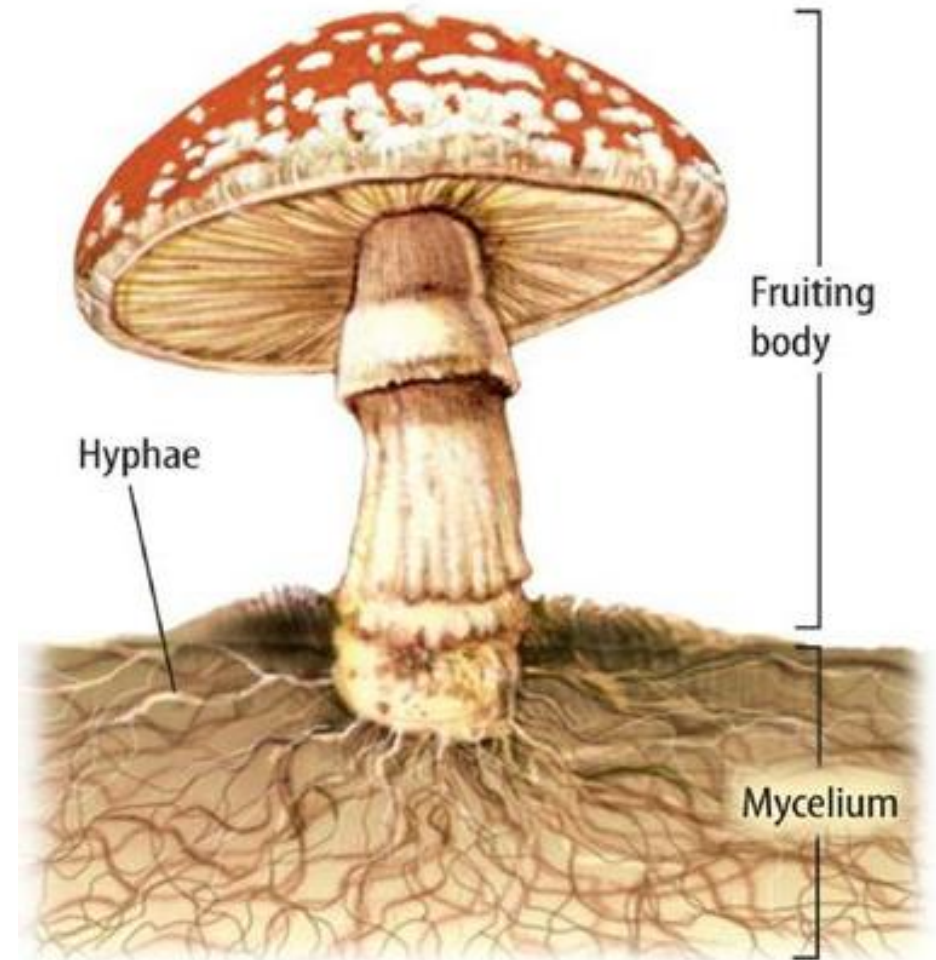






# FUNGI

- Eukayota
- Single cell (yeast) to multicellular (mushroom)
- Osmotrophs- Absorb nutrients from decaying matter or bodies or body of hosts
- In other words- digest food outside and then absorb within
- Cell wall made up of chitin
- They grow hyphae threads to form mesh network called mycelium to absorb nutrients

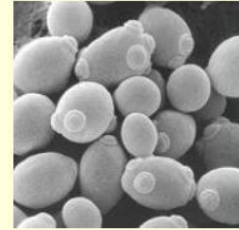




# FUNGI

## Examples of Fungi

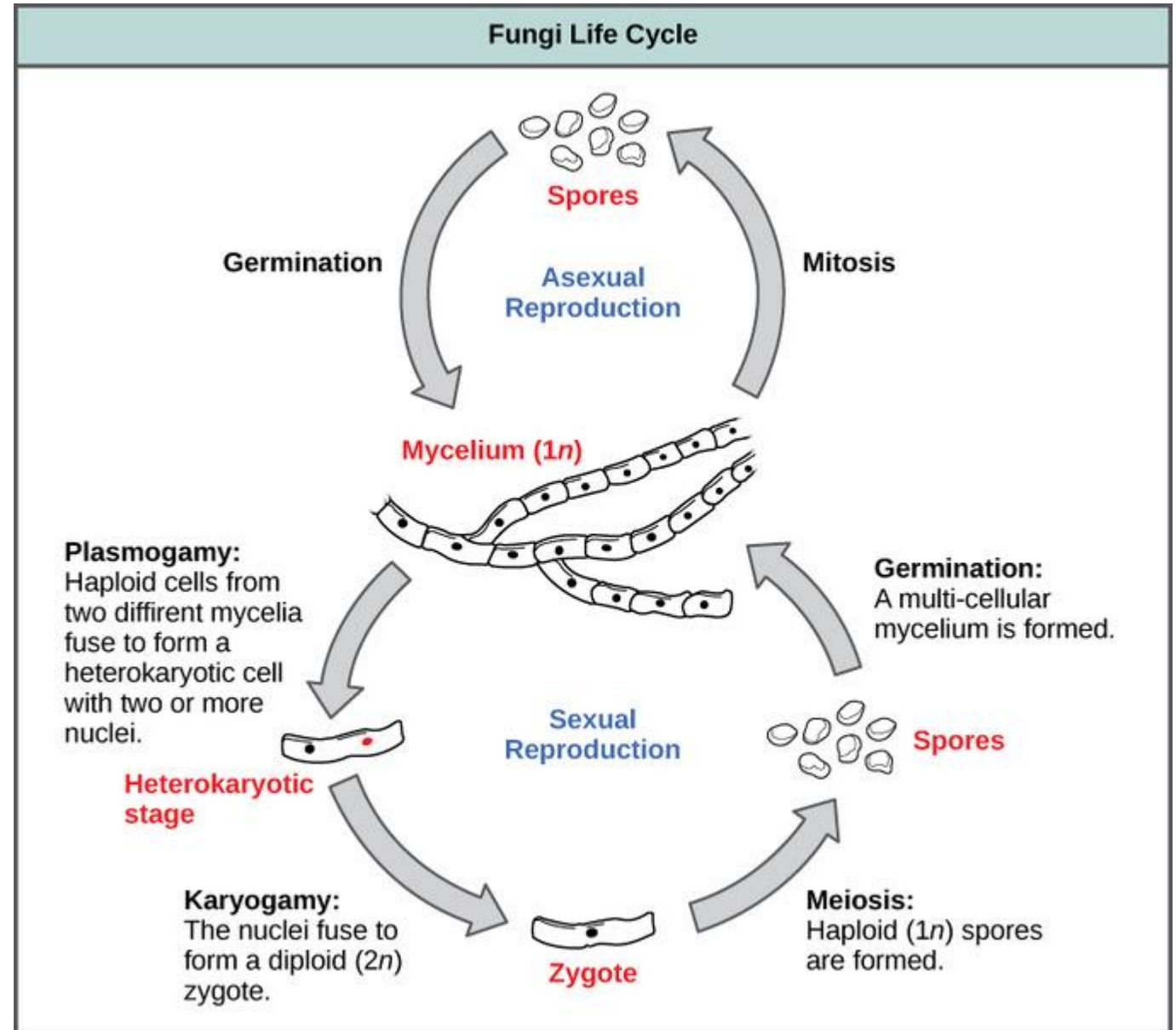
- Mushrooms
- Molds
- Mildews
- Smuts
- Rusts
- Yeasts





# FUNGI

Reproduction:  
Asexual- spores  
Sexual- plasmogamy





# PLANTAE

- ◉ Plants have both organs and organ systems.
- ◉ They obtain their energy from sun through photosynthesis.
- ◉ Plants reproduce both by sexual and asexual.
- ◉ Plants develop a self defense mechanism to protect them from being destroyed by animals, fungi and other plants
- ◉ Organisms within Kingdom Plantae are multicellular, eukaryotic and autotrophic
- ◉ They lack motility.

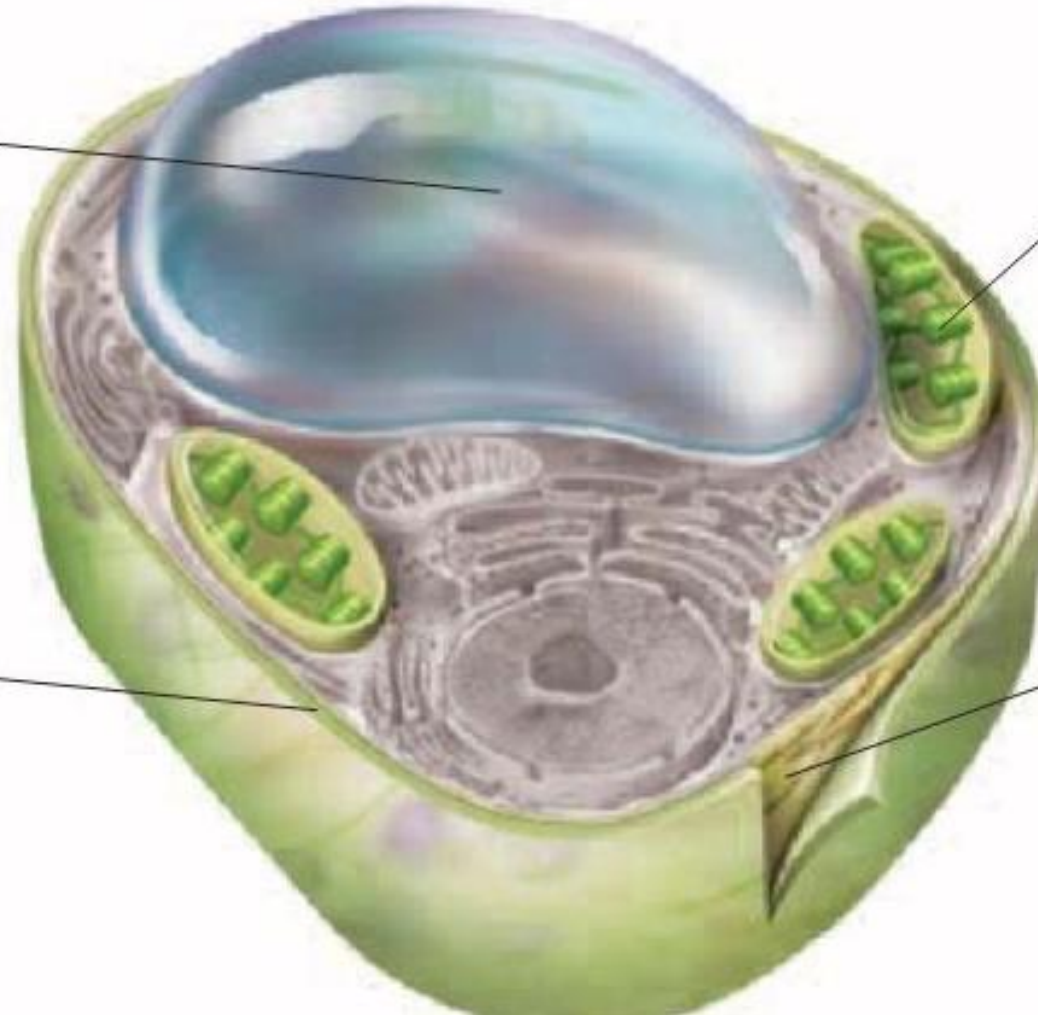




# PLANTAE

**Large Central Vacuole** A vacuole stores water, helps support the cell, and plays a role in many other cell functions.

**Cell Wall** The cell wall surrounds the cell membrane. The cell wall supports and protects the plant cell.



**Chloroplast** Chloroplasts contain chlorophyll. Chlorophyll captures energy from the sun. Plants use this energy to make food.

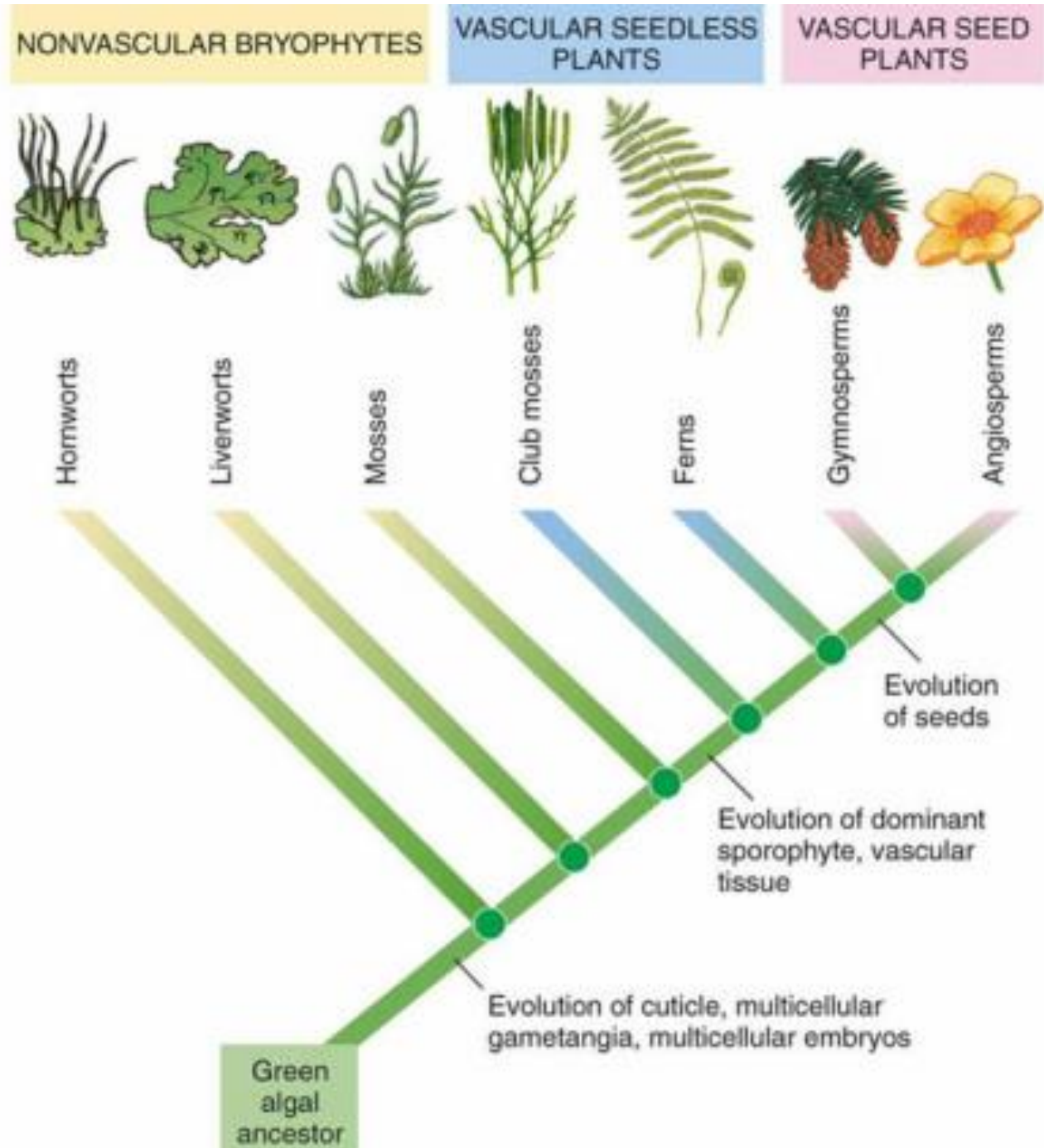
**Cell Membrane** The cell membrane surrounds a plant cell and lies beneath the cell wall.



# PLANTAE

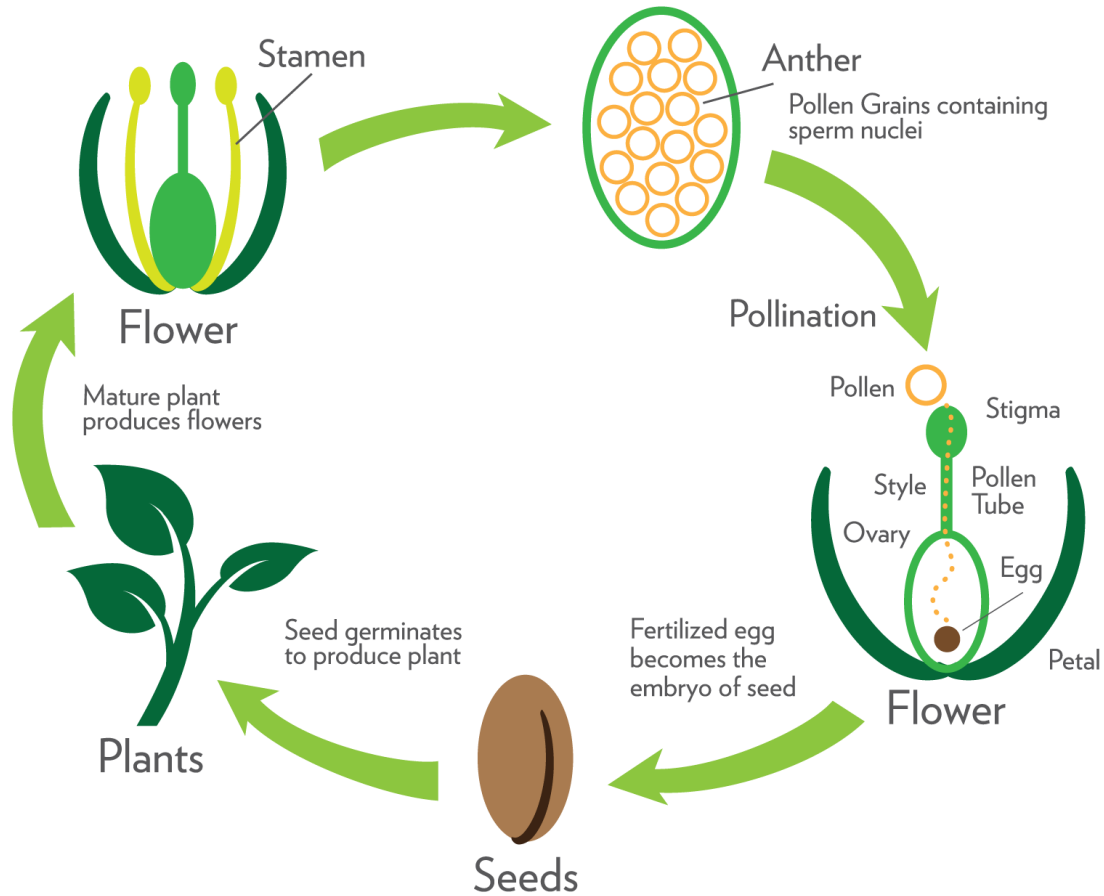
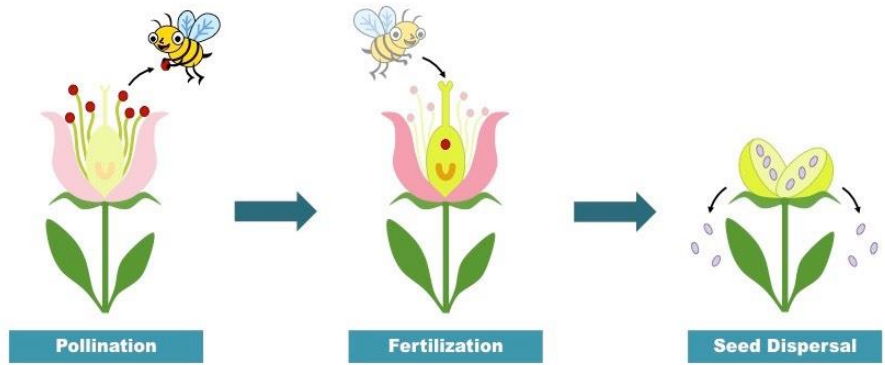


Mat of moss growing in forest





# PLANTAE





# Angiosperms

VS

# Gymnosperms



90% plants





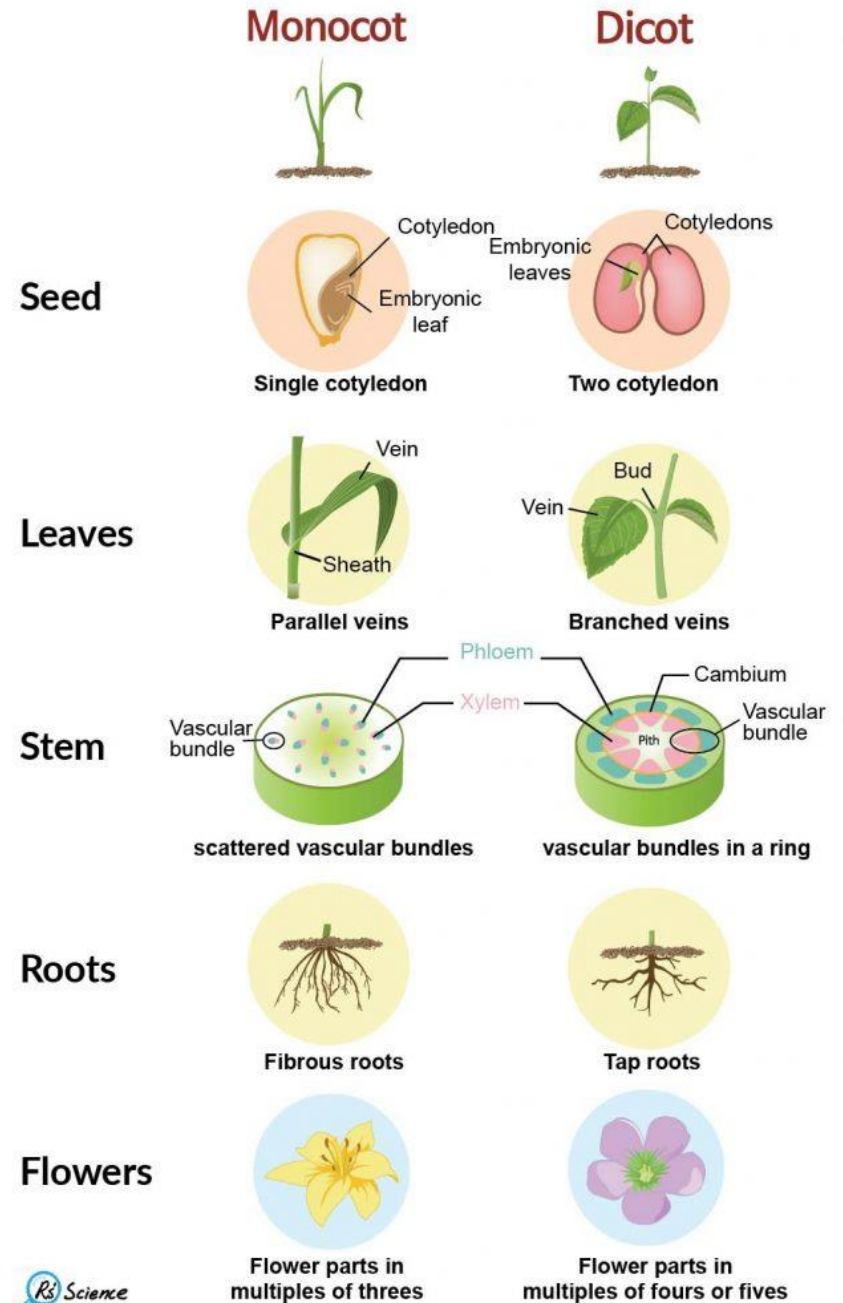
# PLANTAE

## Monocotyledons:

Garlic, onions, wheat, corn and grass

## Dicotyledons:

Beans, cauliflower, apples and pear



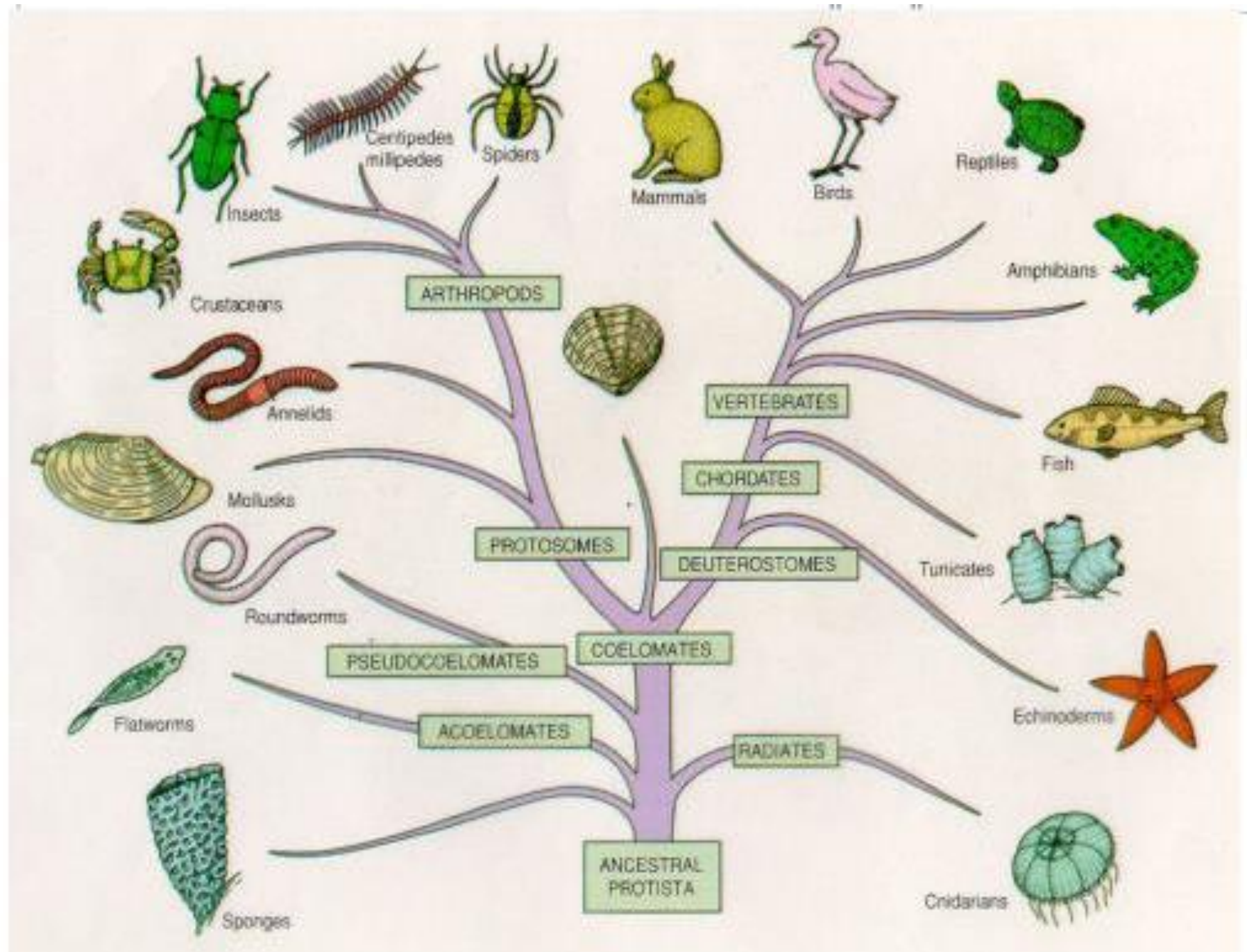
# ANIMALIA

1. Multicellular
2. Eukaryotic
3. Heterotrophic
4. Have to digest food
5. Lack cell walls
6. Ability to move

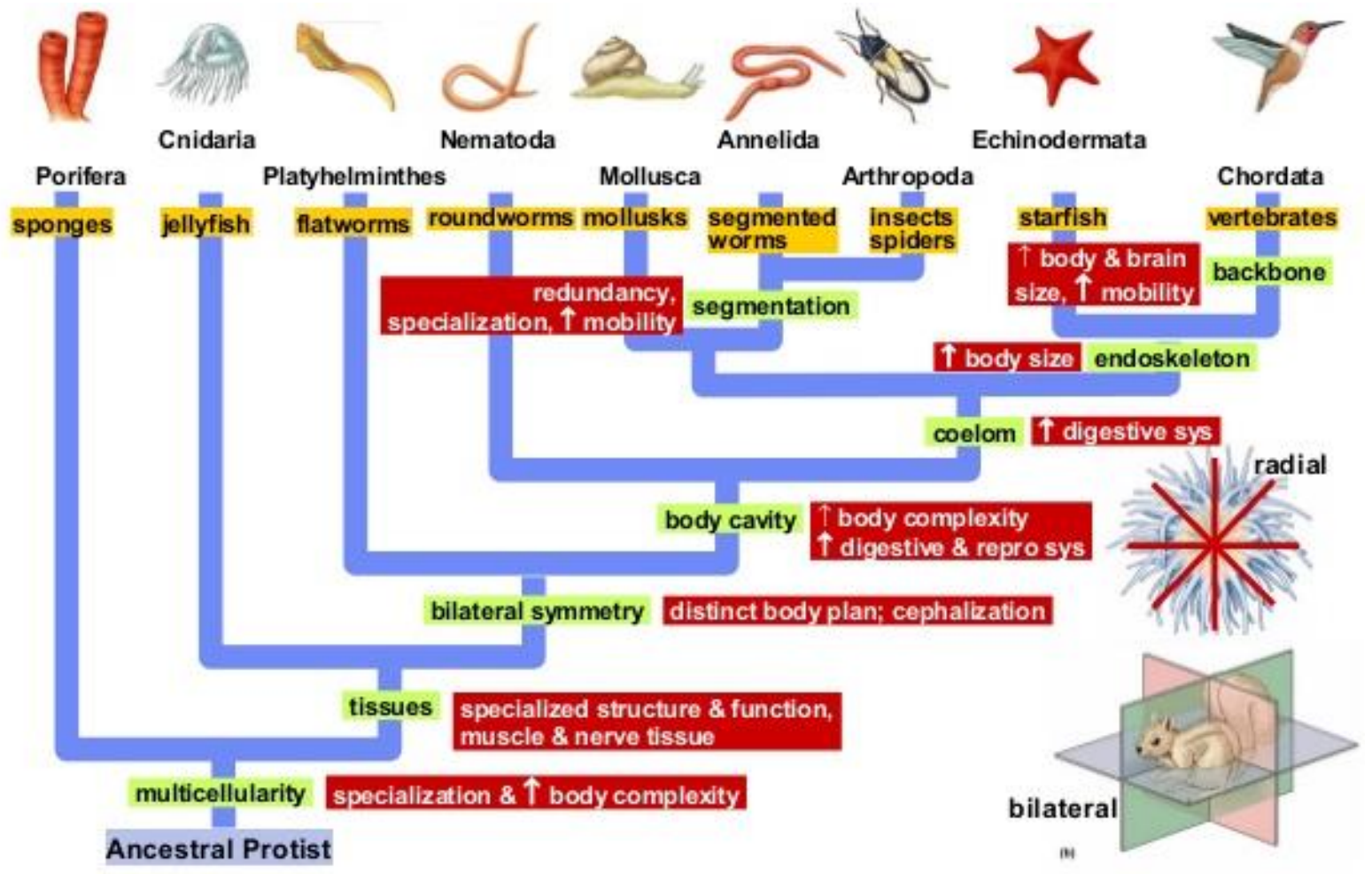
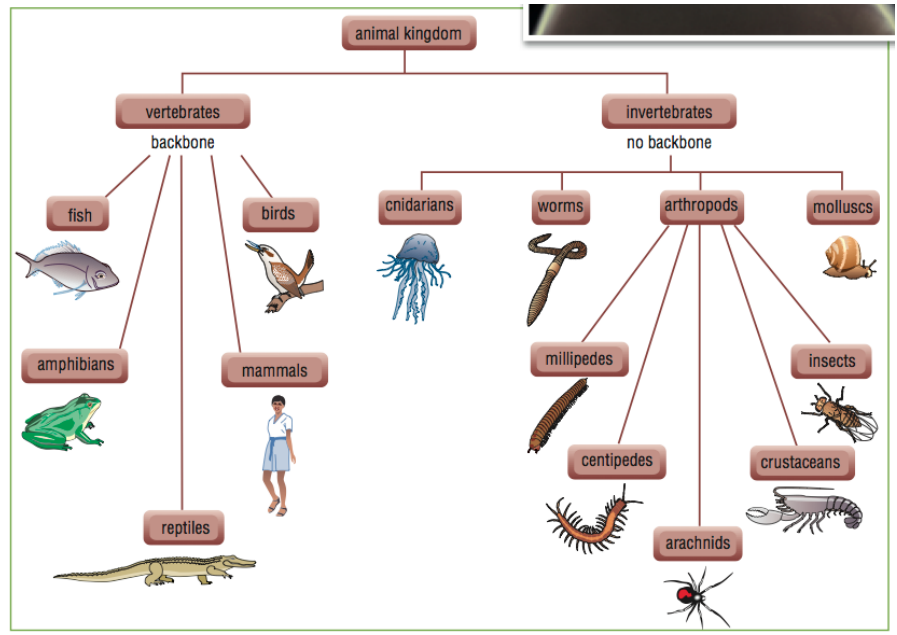




# ANIMALIA



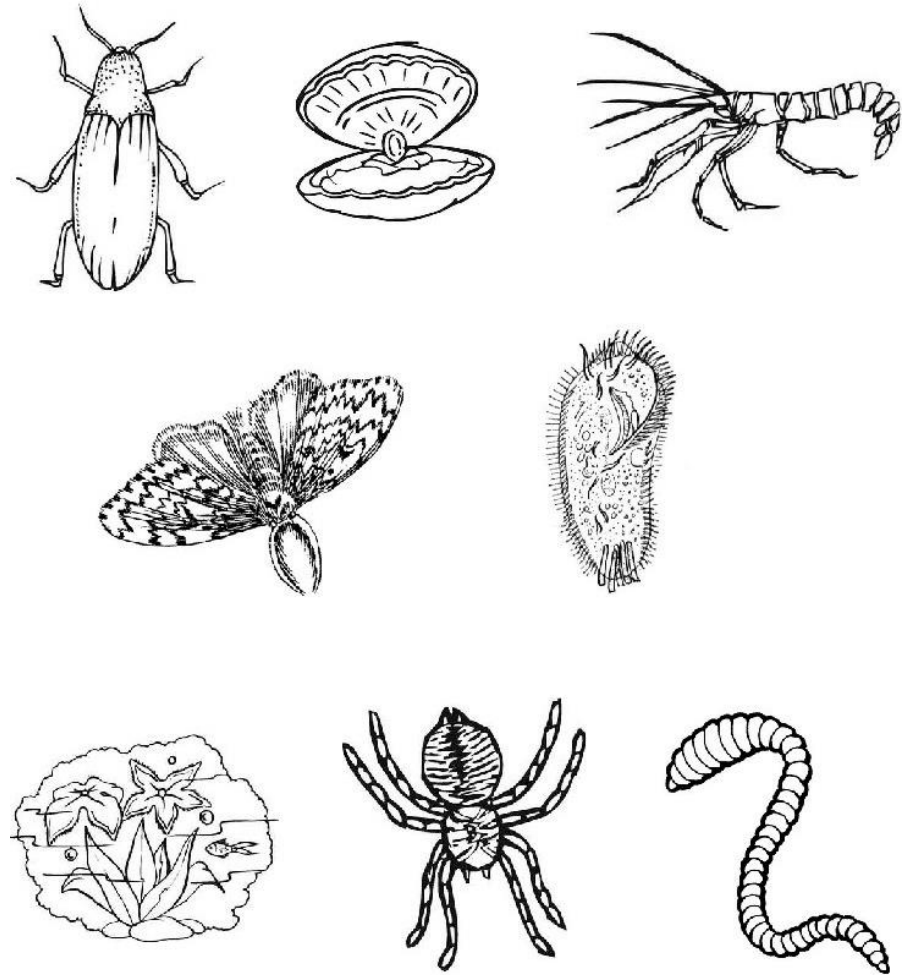
# ANIMAL EVOLUTION



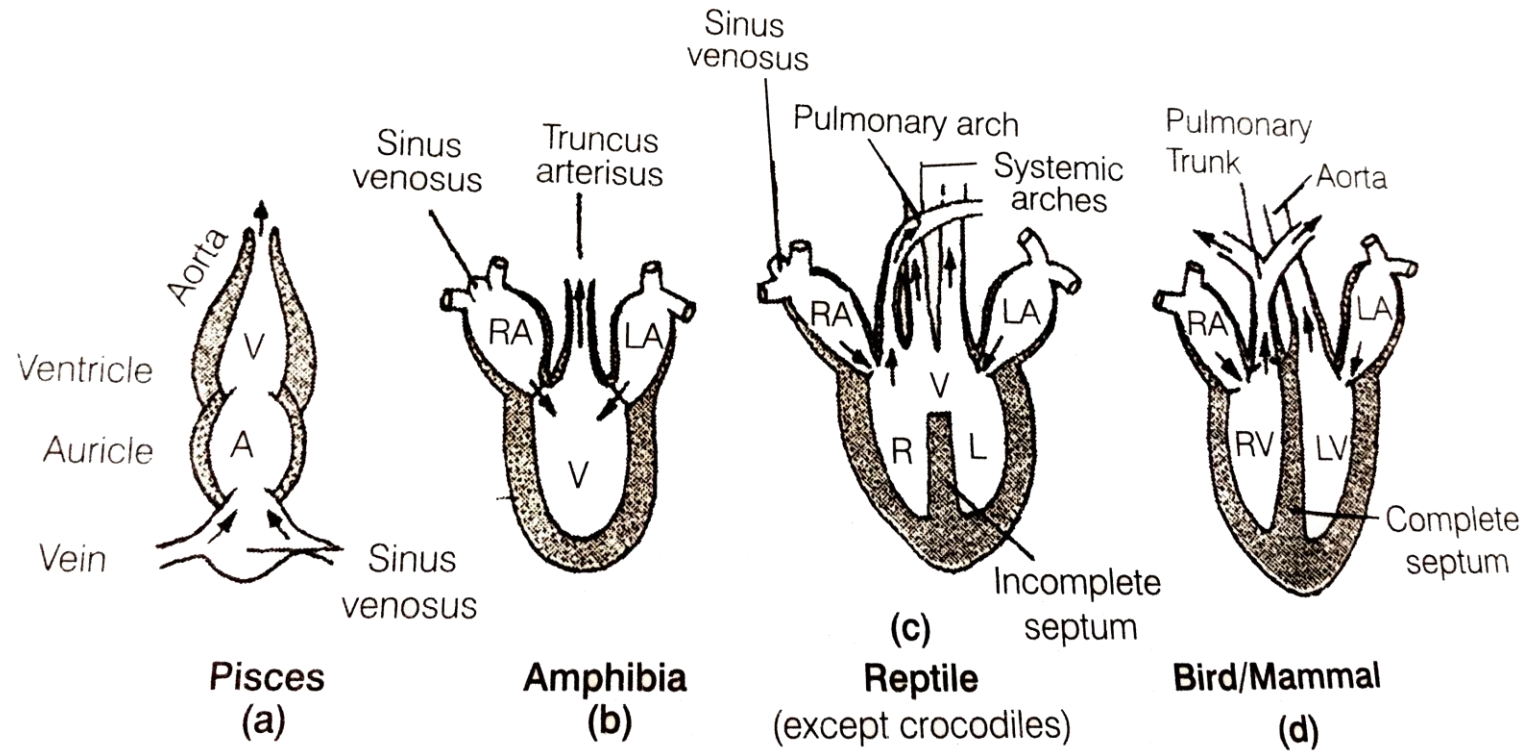


# Phylum Arthropoda

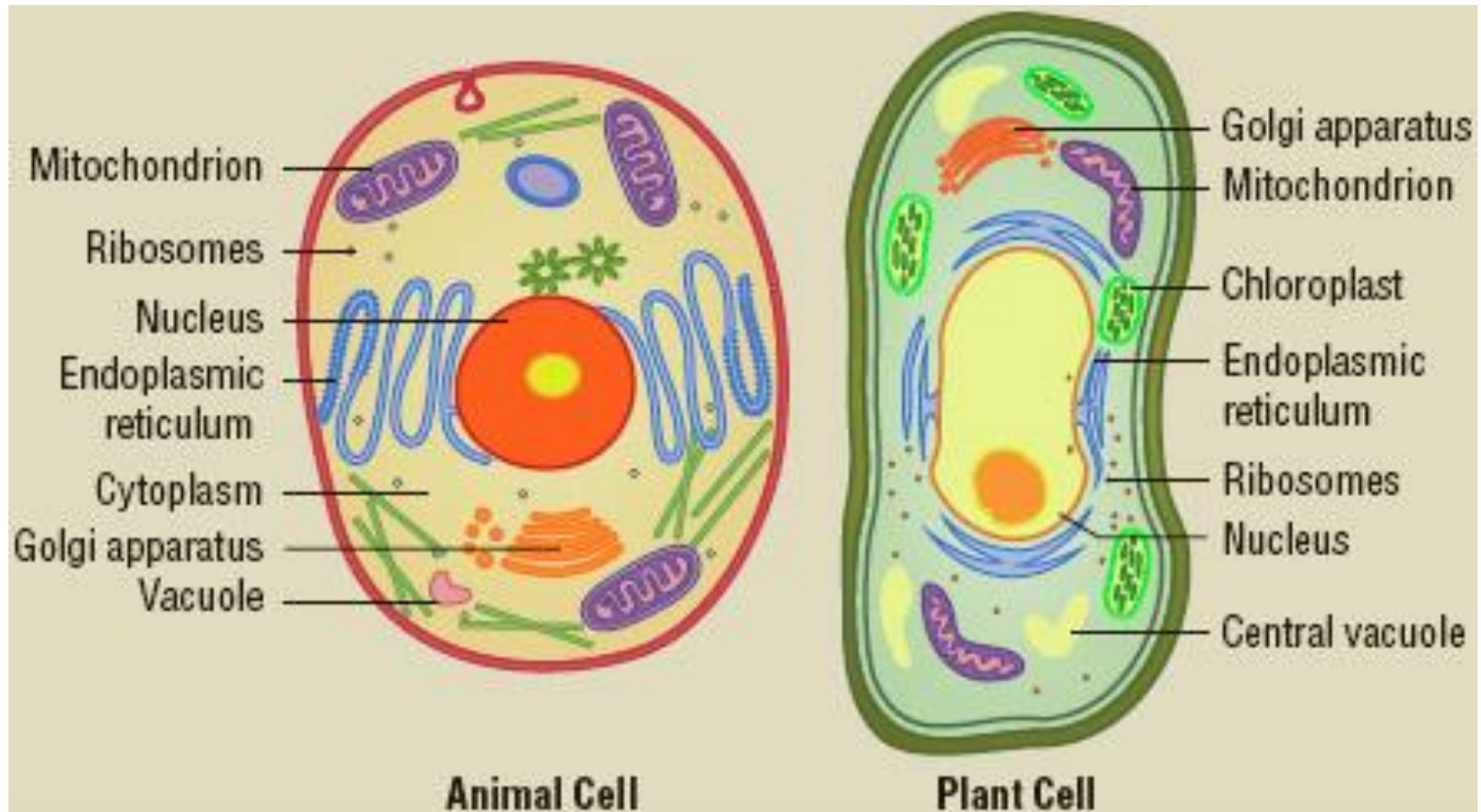
- 1. Most biologically successful and abundant animal group on earth.
- 2. There are more arthropod species than all other species combined.
- 3. There are 1 million known species.
- 4. Symmetry is bilateral.
- 5. Small coelom.
- 6. Jointed appendages for efficient locomotion.



# ANIMALIA- EVOLUTION OF HEART



# ANIMAL VS PLANT CELL

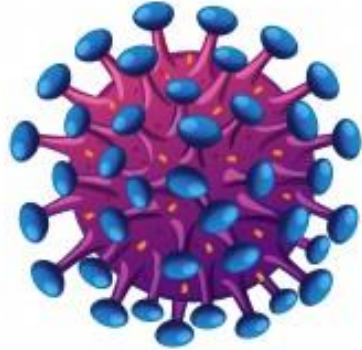




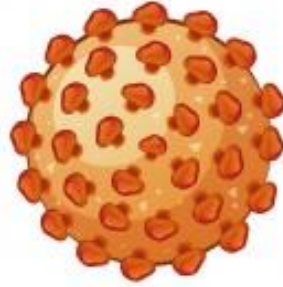
# VIRUS

- ✓ Viruses have an inner core of nucleic acid surrounded by protein coat known as an envelope
- ✓ Most viruses range in sizes from 20 – 250 nm
- ✓ Viruses are inert (nucleoprotein ) *filterable* Agents
- ✓ Viruses are *obligate intracellular parasites*
- ✓ Virus occupy a space in between living and non-living, because they are *crystallisable* and *non-living outside the body of host*.
- ✓ Viruses depend fully on the host's cell machinery to continue their life – *metabolically inefficient*.
- ✓ They are responsible for a number of dreadful diseases in human and plants.

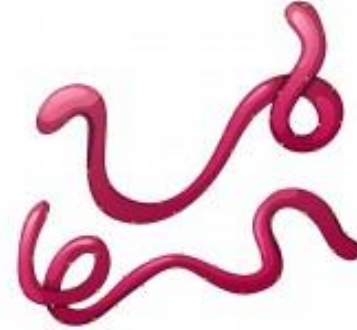
# VIRUS



HIV



Hepatitis B



Ebola Virus



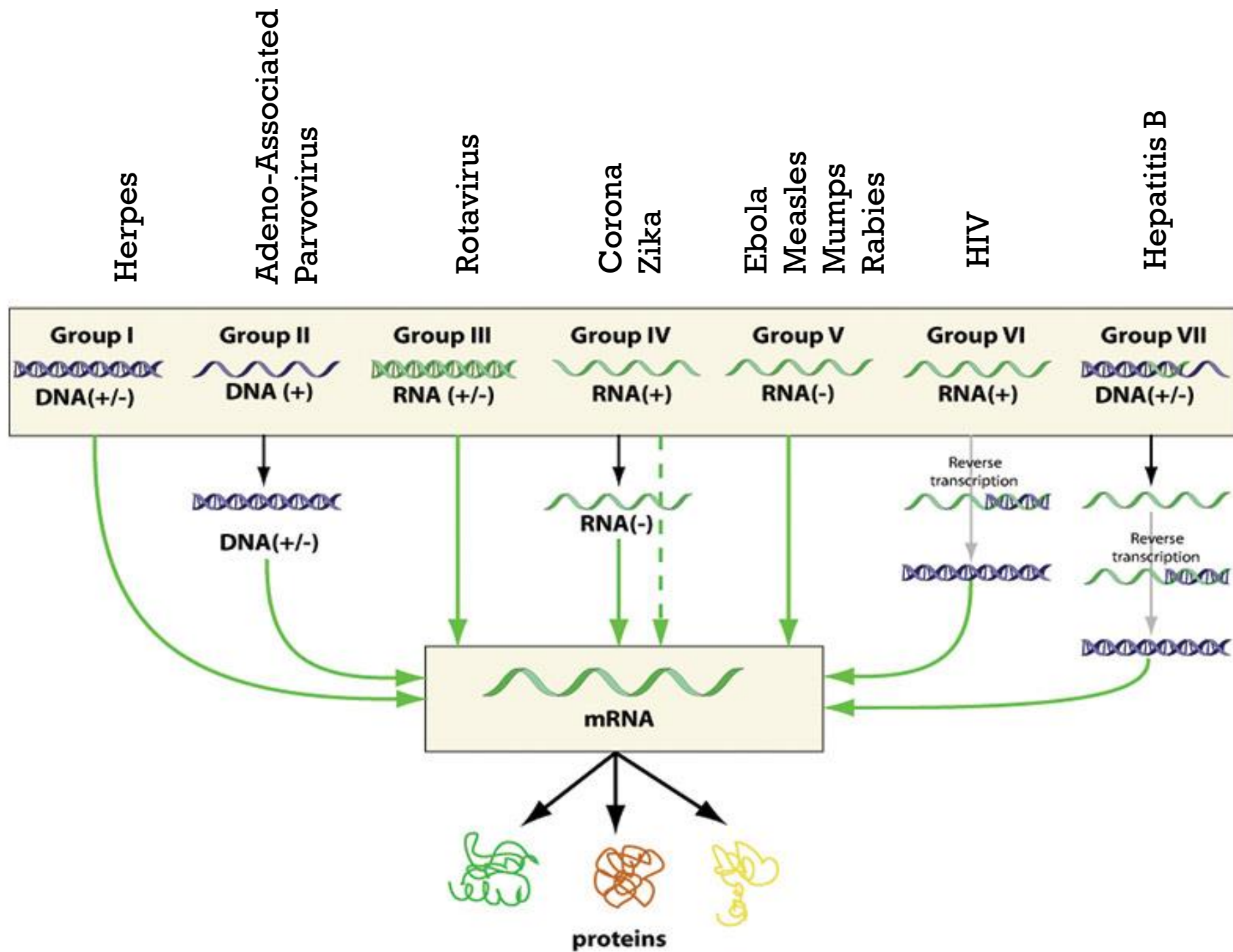
Adenovirus



Influenza



Bacteriophage







## Archaeobacteria

- Do not have nuclei, can be found in deep ocean vents
- All are single celled organisms (Extremophiles).
- Form yellow rings around hot springs where temperatures are 90 degrees Celsius (194 degrees F)

## Eubacteria

- Do not have nuclei, some cause disease
- Escherichia coli (E. Coli)
- Prokaryotes that may be found in the human body
- All are single celled organisms



## Protista

- All eukaryotes that are not plants, animals or fungi
- Most are single celled organisms (Protozoans)
- Algae
- Mostly microscopic and live in water

## Fungi

- Break down materials outside their bodies and then absorb the nutrients
- Mushrooms
- Molds



## Plantae

- Use sun's energy to make sugar
- Usually green
- Pine Trees

## Animalia

- Complex organisms with no cell walls
- Have specialized sense organs

