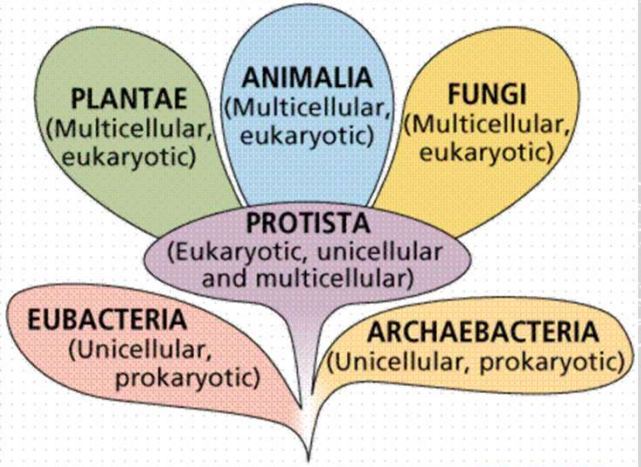
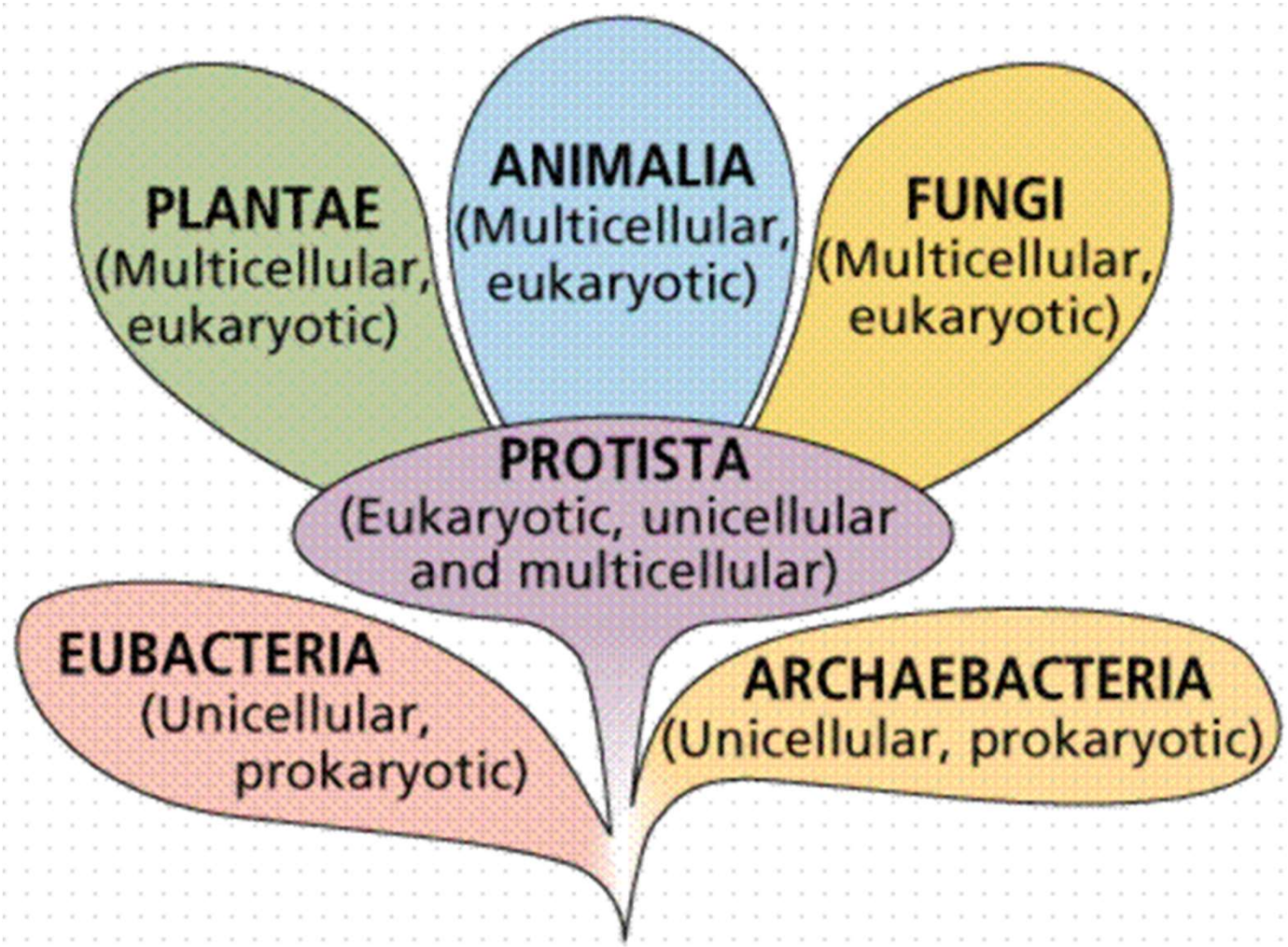
TREE OF LIFE



Dr. Manu Smriti Singh

Department of Biotechnology

Bennett University


PLANTAE
(Multicellular, eukaryotic)
ANIMALIA
(Multicellular, eukaryotic)
FUNGI
(Multicellular, eukaryotic)
PROTISTA
(Eukaryotic, unicellular and multicellular)
EUBACTERIA
(Unicellular, prokaryotic)
ARCHAEBACTERIA
(Unicellular, prokaryotic)

Archaebacteria

- 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

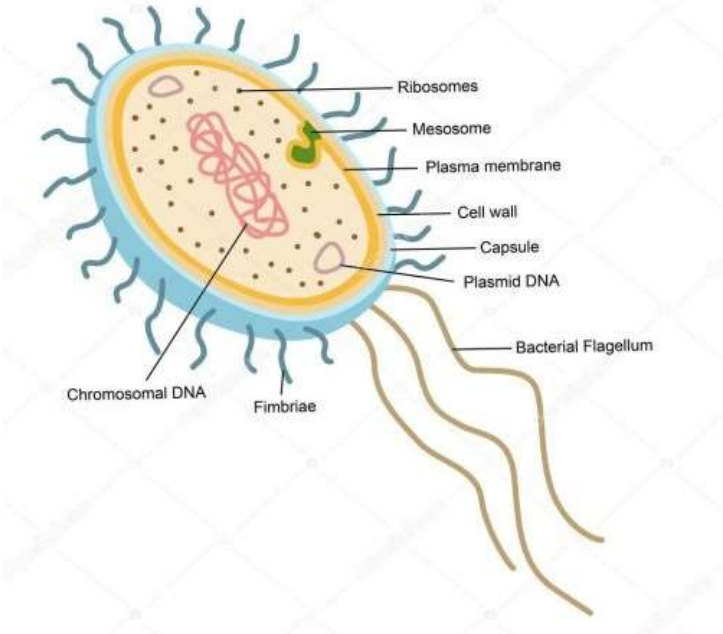
- Use sun's energy to make sugar
- Usually green
- Pine Trees

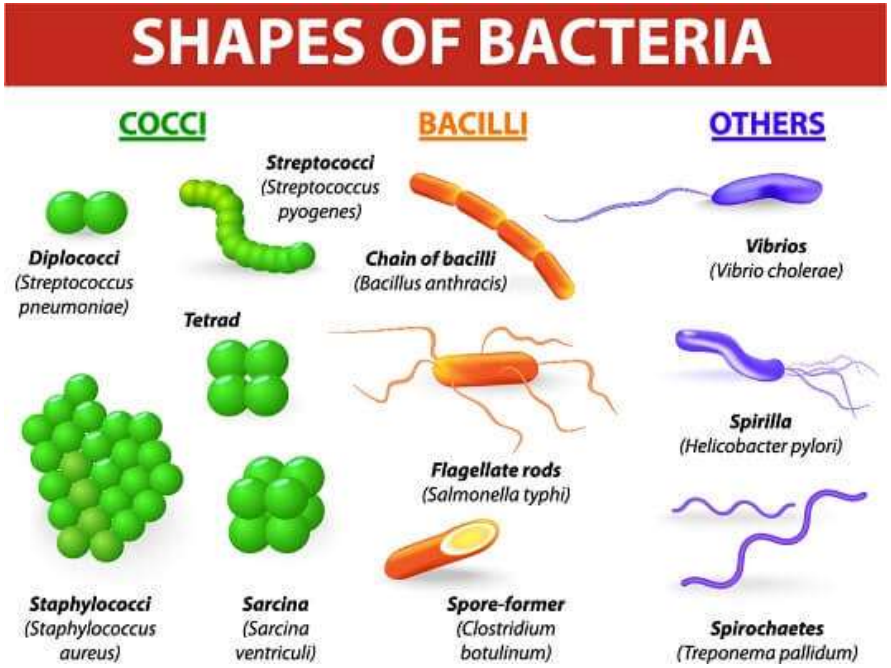
Animalia

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

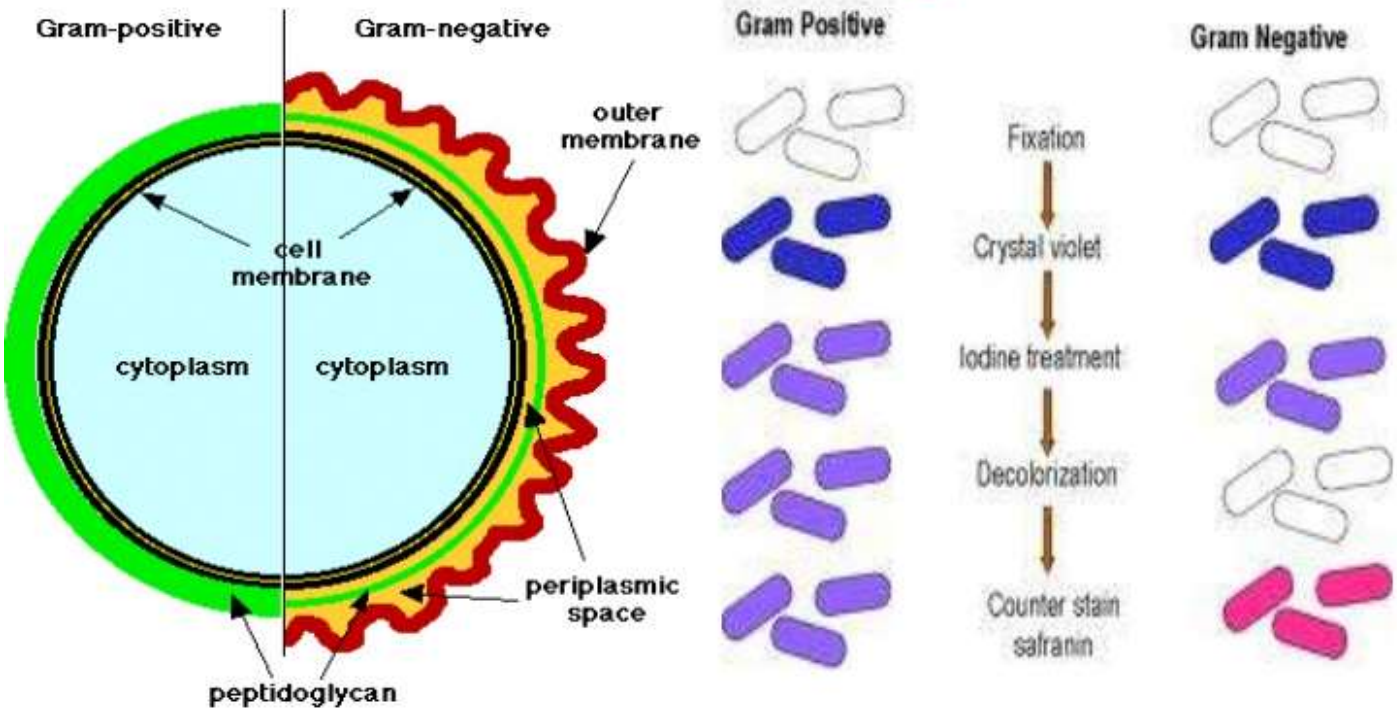
EUBACTERIA

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



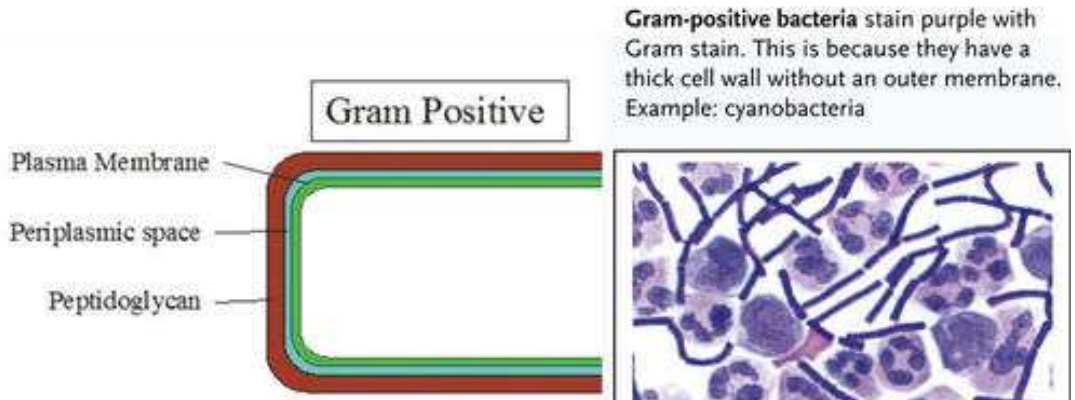


Structure and Reactivity to Gram Staining.



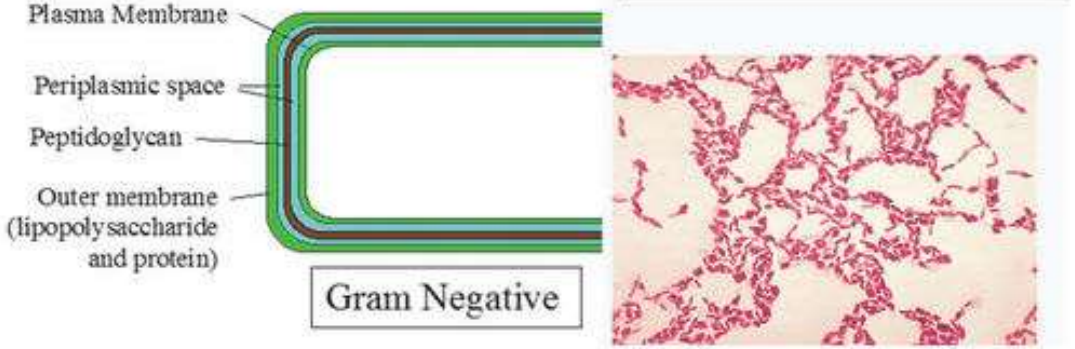
Gram negative- Outer membrane Lipopolysaccharide (LPS)

Pneumoniae
Clostridium
Listeria



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

Vibrio cholerae
Helicobacter pylori



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

<u>Gram indeterminate</u> bacteria
Mycobacterium
M. leprae
M. tuberculosis

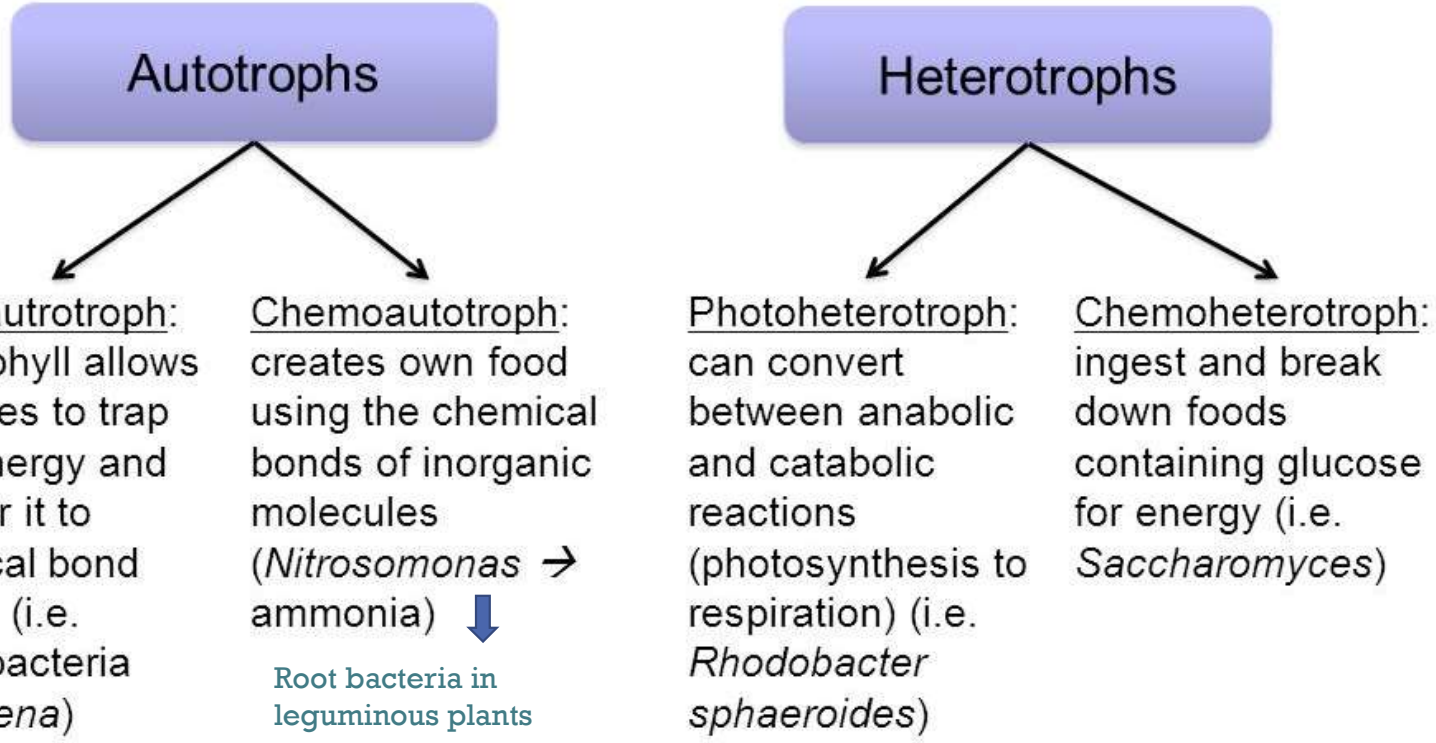
EUBACTERIA

Food

AUTOTROPHS VERSUS HETEROTROPHS

AUTOTROPHS	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

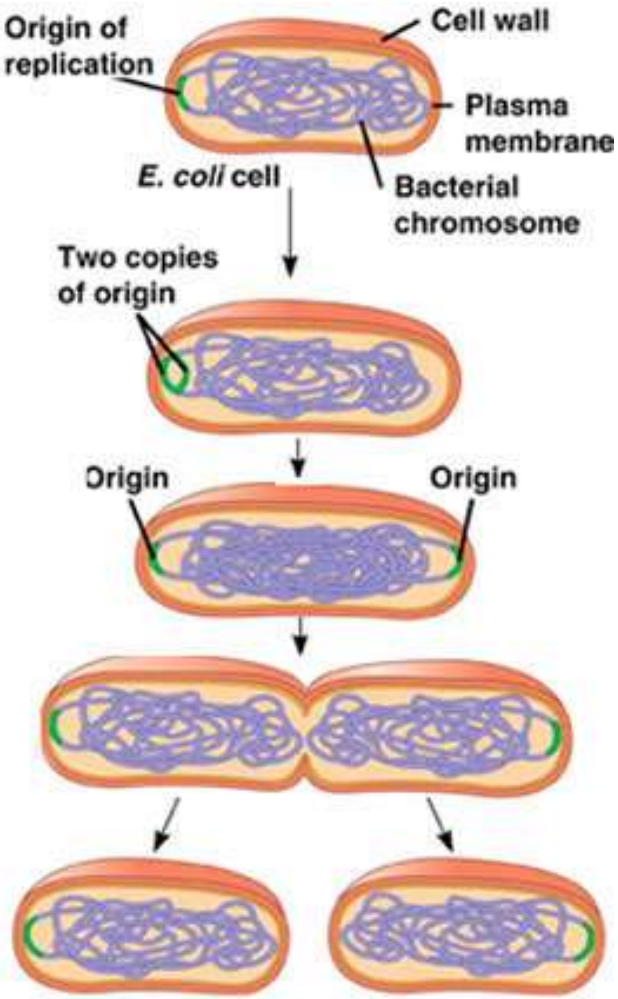
AUTOTROPH VS HETEROTROPH



EUBACTERIA

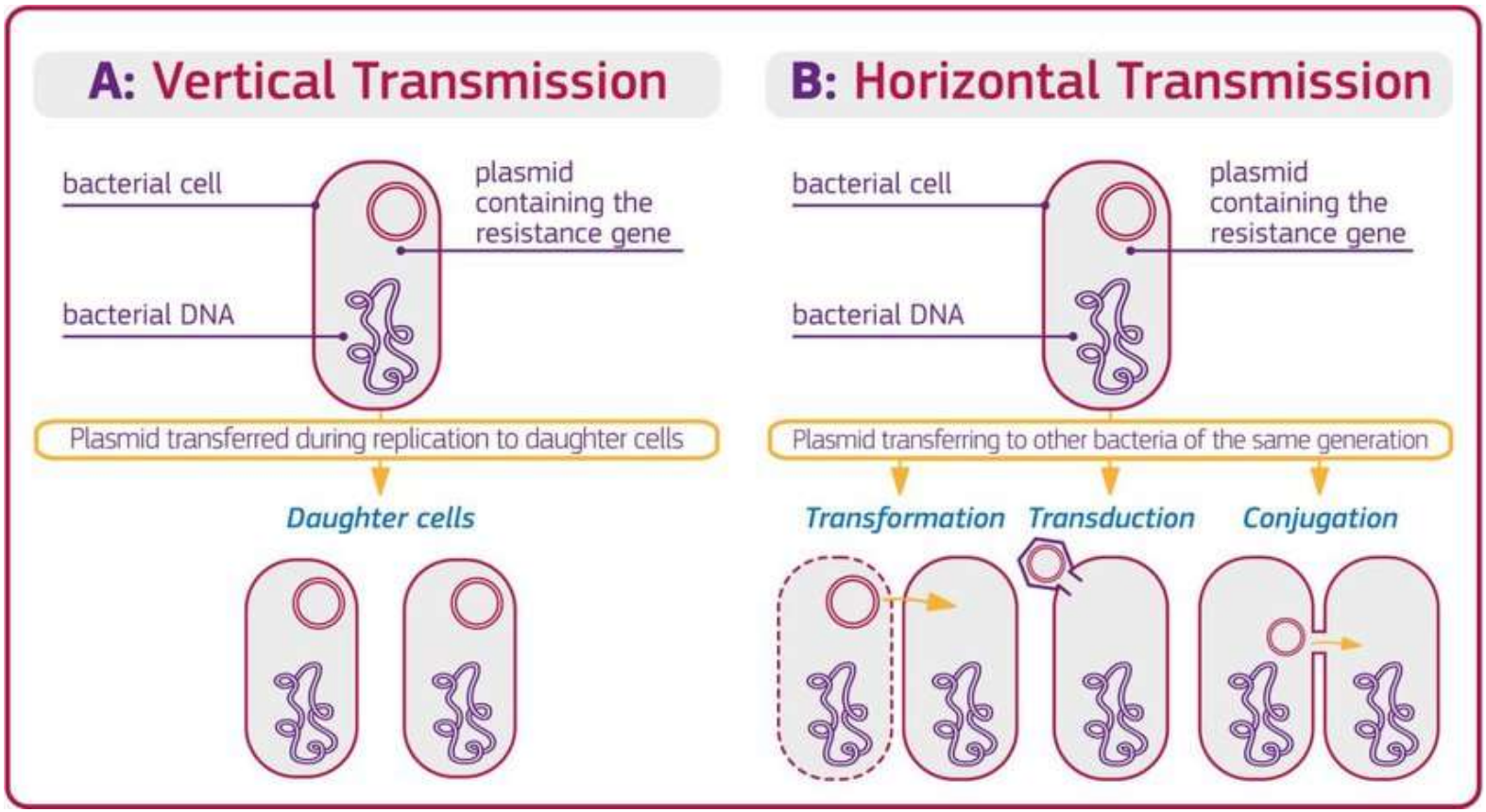
Reproduction- Asexual

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.

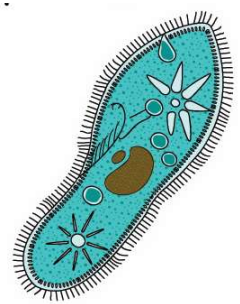


EUBACTERIA

Reproduction



PROTISTA



Characteristics

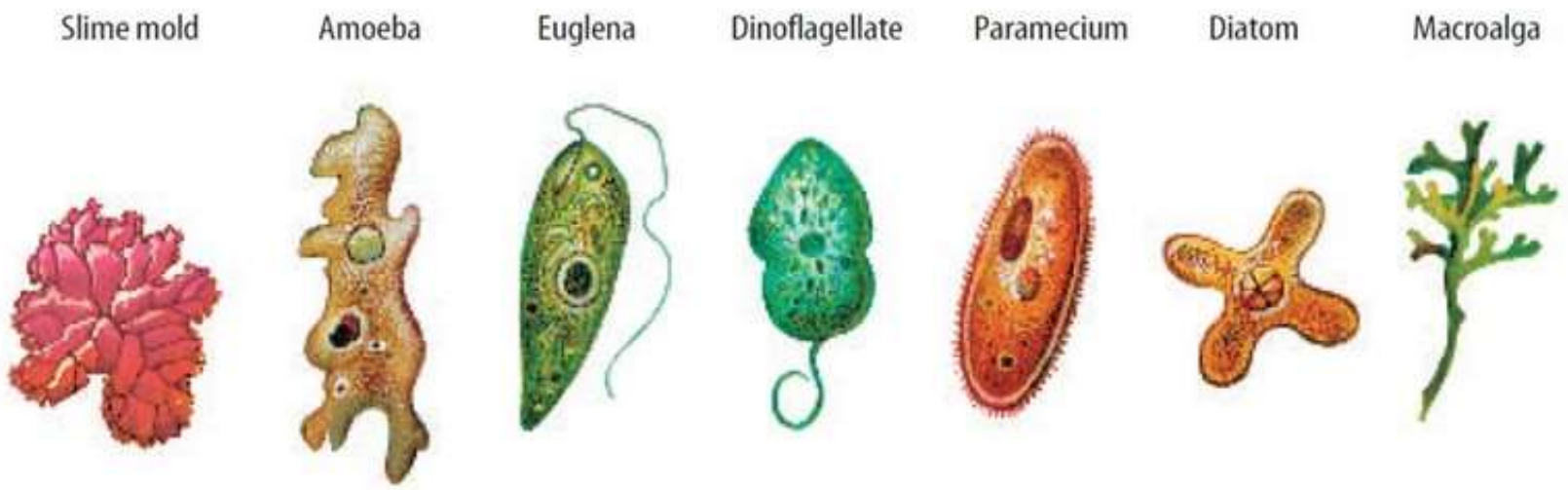
- Eukaryotes
- Unicellular mostly.
- Multicellular- Exception- Kelp: Do not show cellular specialization or differentiation into tissues.

Most have mitochondria.
They can be parasites.
They all prefer aquatic or moist environments.

PROTISTA

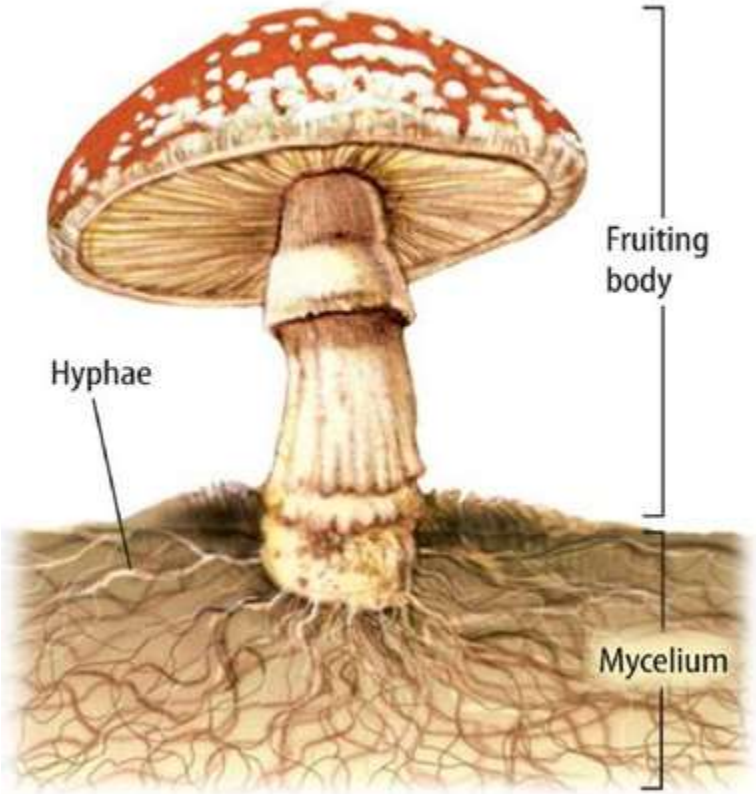
Classification of Protists

- 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)



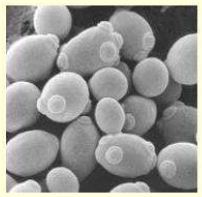
FUNGI

- 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

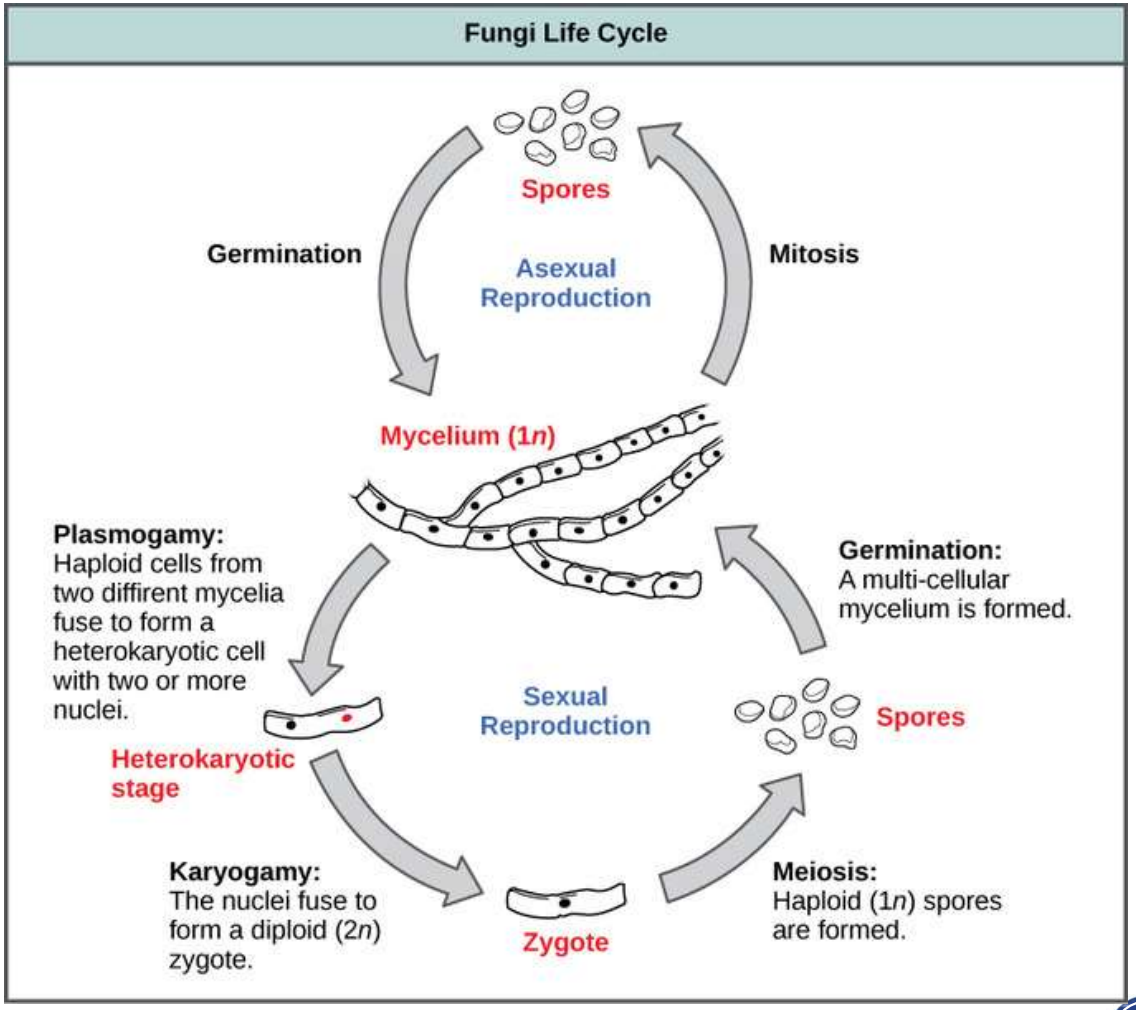
Examples of Fungi



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

FUNGI

Reproduction:
Asexual- spores
Sexual- plasmogamy



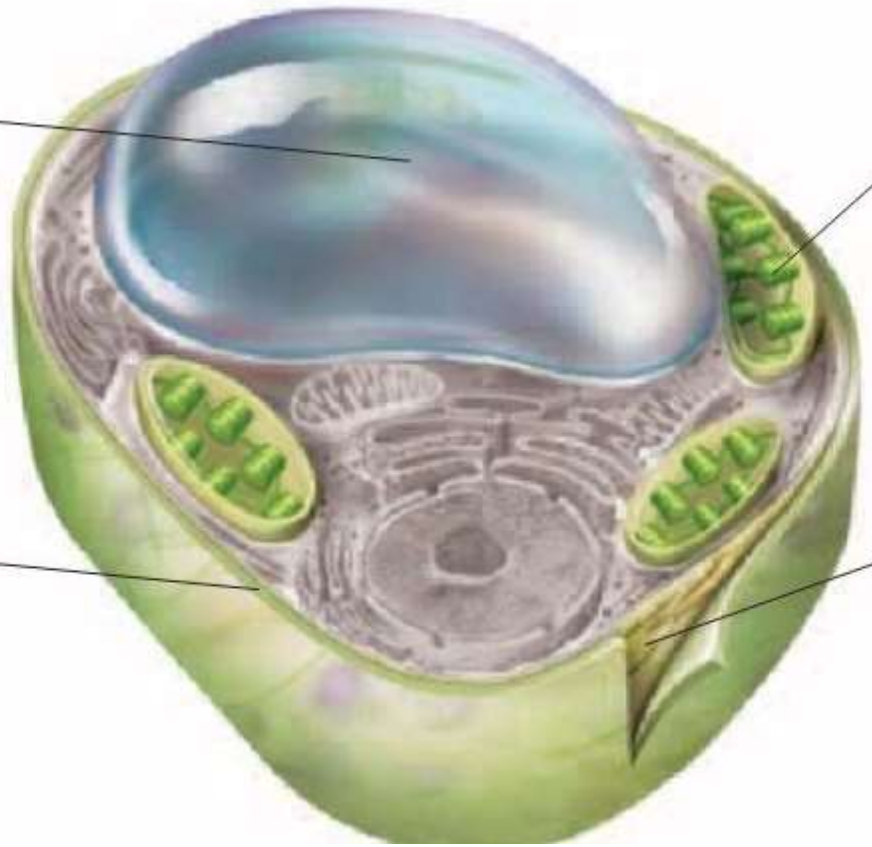
PLANTAE

- 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.

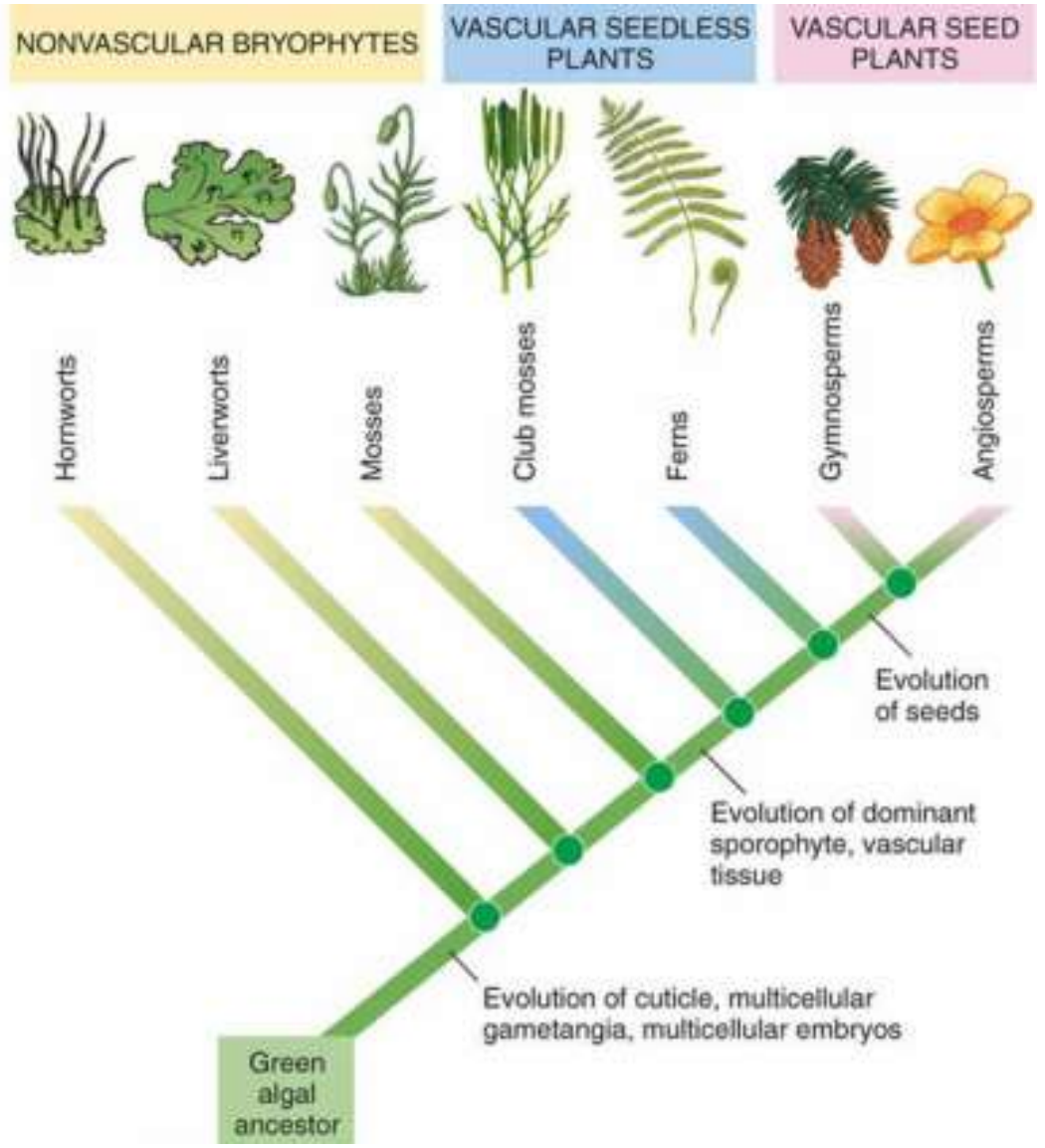


Chloroplast Chloroplasts contain chlorophyll. Chlorophyll captures energy from the sun. Plants use this energy to make food.

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

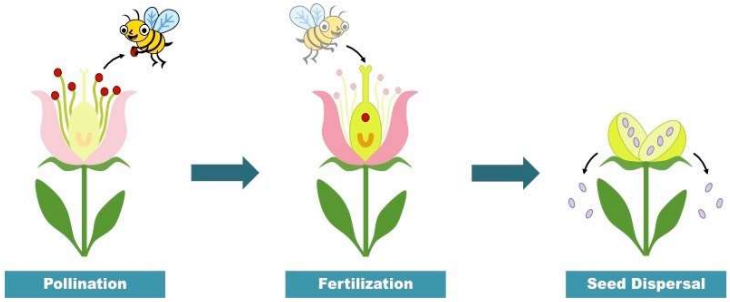

Plantae

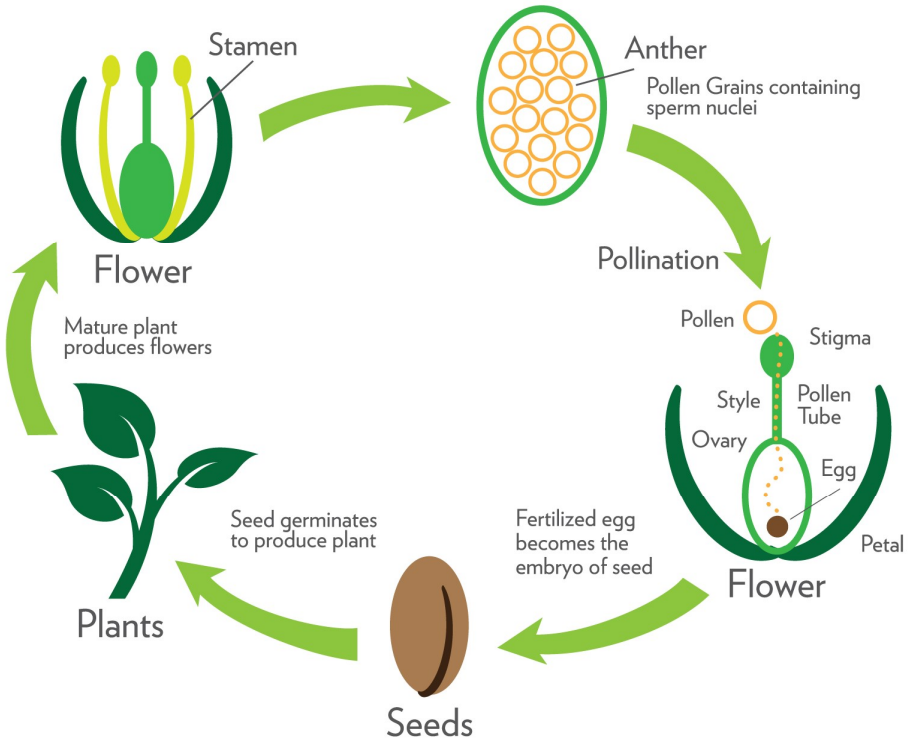
PLANTAE


NONVASCULAR BRYOPHYTES
VASCULAR SEEDLESS PLANTS
VASCULAR SEED PLANTS
Hornworts
Liverworts
Mosses
Club mosses
Ferns
Gymnosperms
Angiosperms
Evolution of seeds
Evolution of dominant sporophyte, vascular tissue
Evolution of cuticle, multicellular gametangia, multicellular embryos
Green algal ancestor


Plantae

PLANTAE

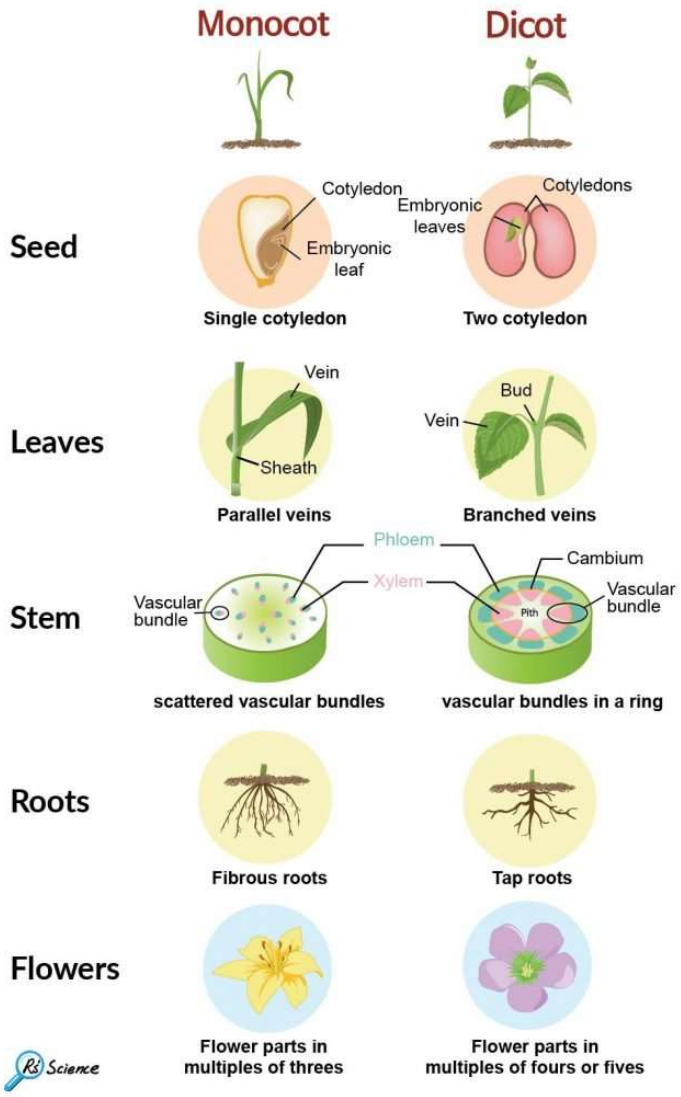

Pollination
Fertilization
Seed Dispersal


Stamen
Flower
Anther
Pollen Grains containing sperm nuclei
Pollination
Pollen
Stigma
Style
Pollen Tube
Ovary
Egg
Petal
Flower
Fertilized egg becomes the embryo of seed
Seeds
Seed germinates to produce plant
Plants
Mature plant produces flowers

PLANTAE

Monocotyledons:
Garlic, onions, wheat, corn and grass

Dicotyledons:
Beans, cauliflower, apples and pear

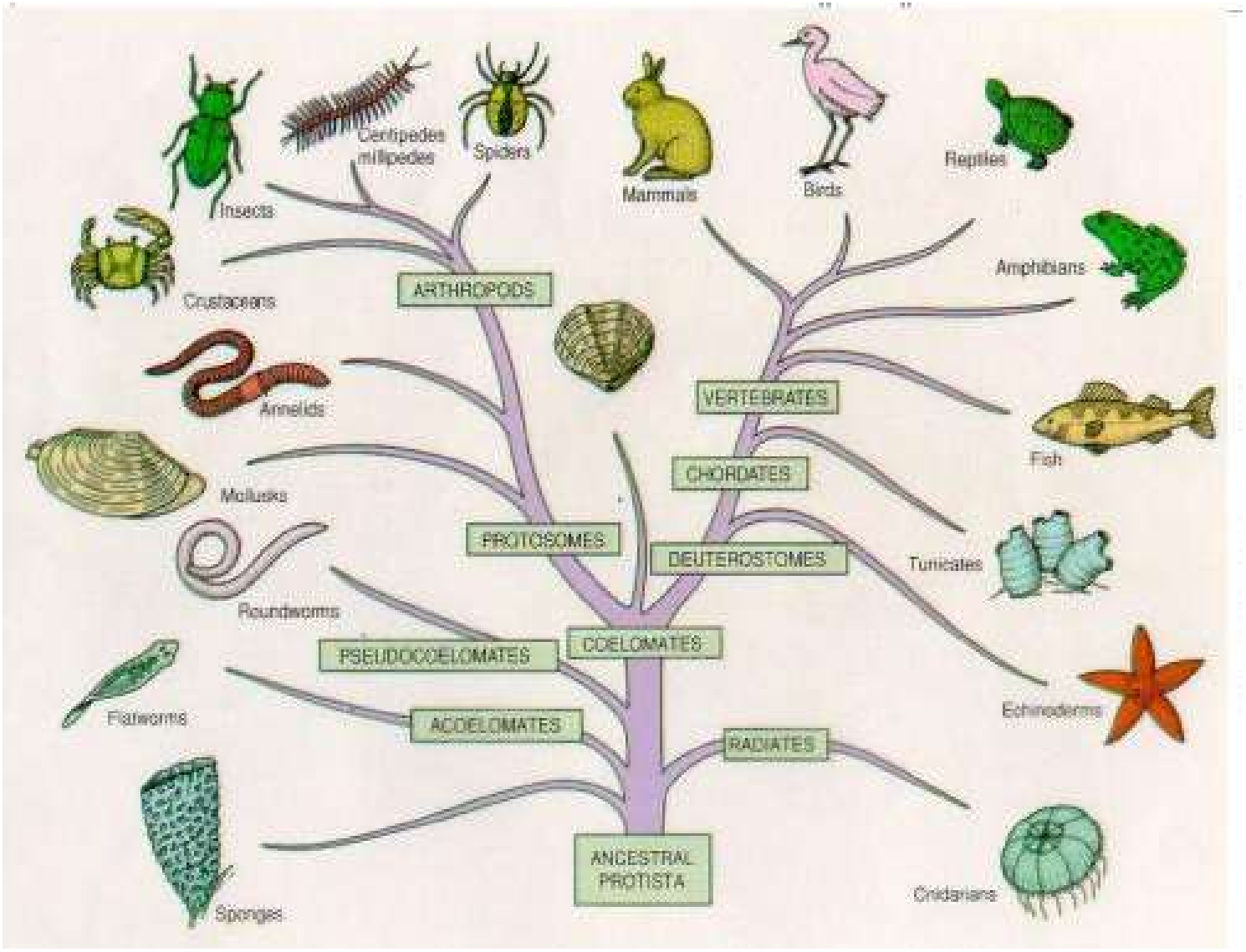


ANIMALIA

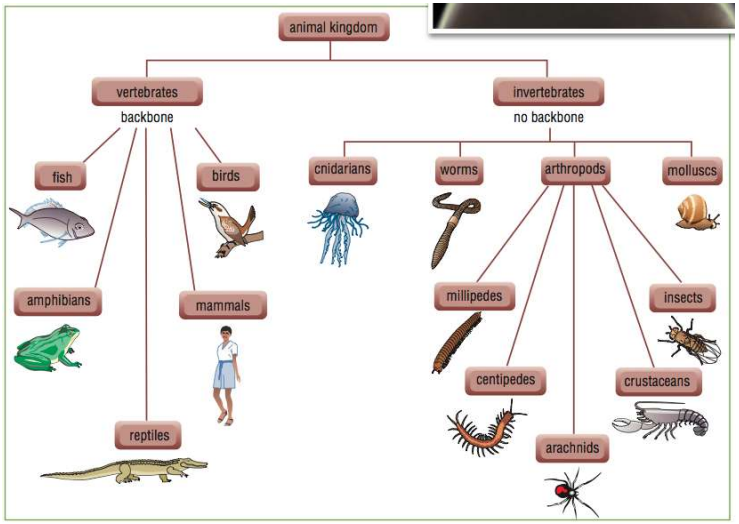
1. Multicellular
2. Eukaryotic
3. Heterotrophic
4. Have to digest food
5. Lack cell walls
6. Ability to move

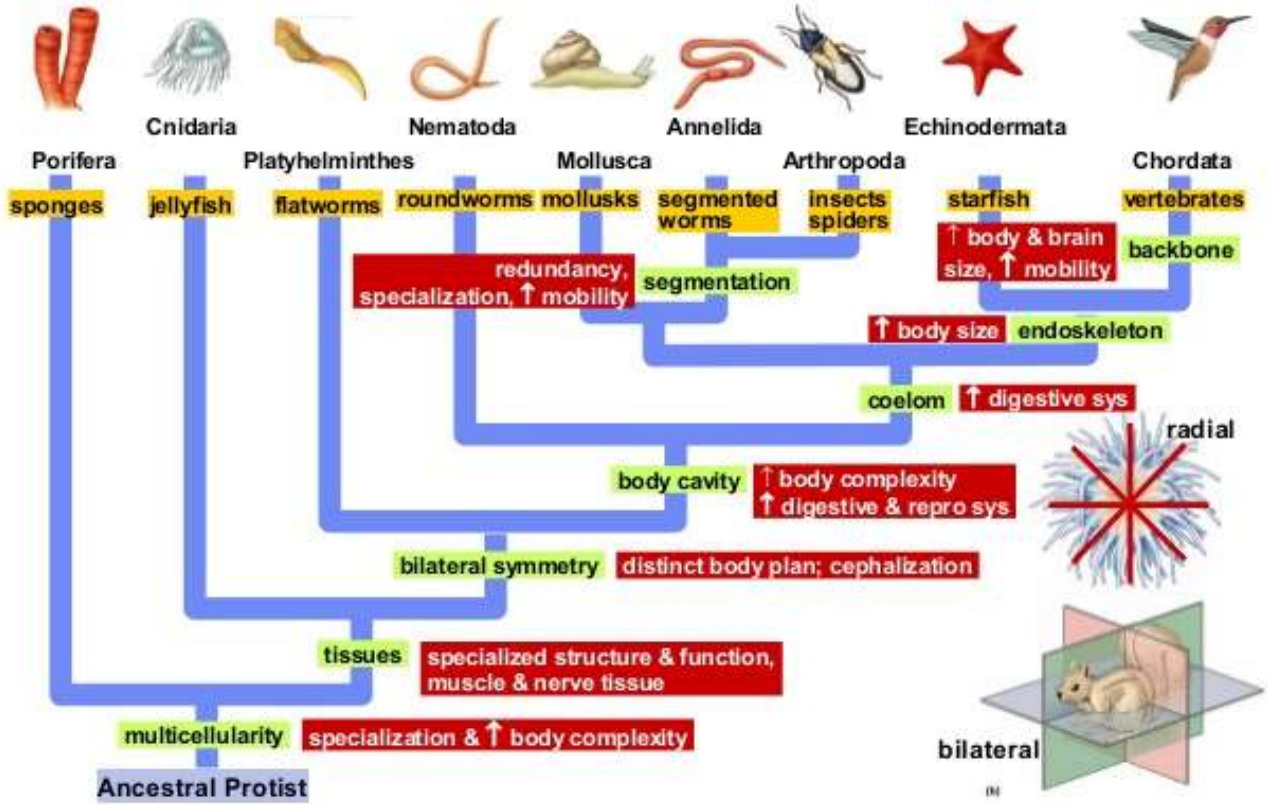
ANIMALIA


Animalia

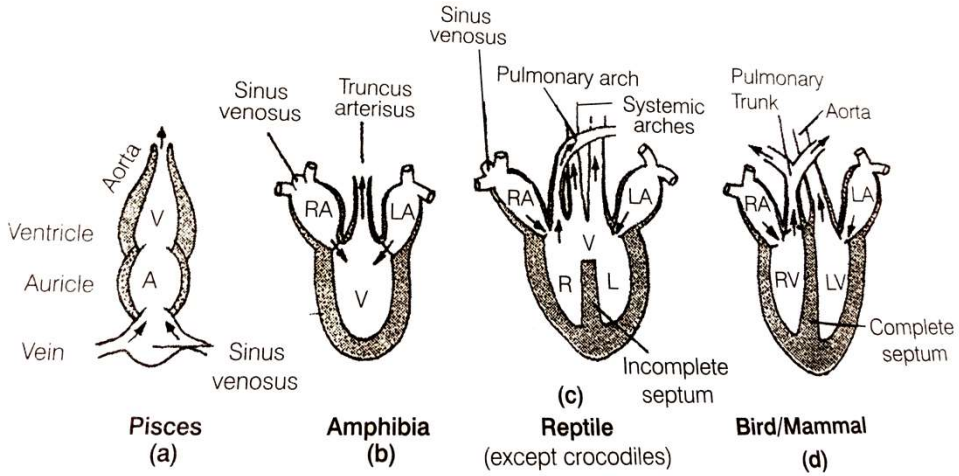

Insects
Centipedes
millipedes
Spiders
Mammals
Birds
Reptiles
Crustaceans
ARTHROPODS
Amphibians
Annelids
VERTEBRATES
Fish
CHORDATES
Molluscs
PROTOSTOMES
DEUTEROSTOMES
Tunicates
Roundworms
COELOMATES
PSEUDOCOELOMATES
Flatworms
ACOELOMATES
RADIATES
Echinoderms
ANCESTRAL
PROTISTA
Sponges
Cnidarians

ANIMAL EVOLUTION

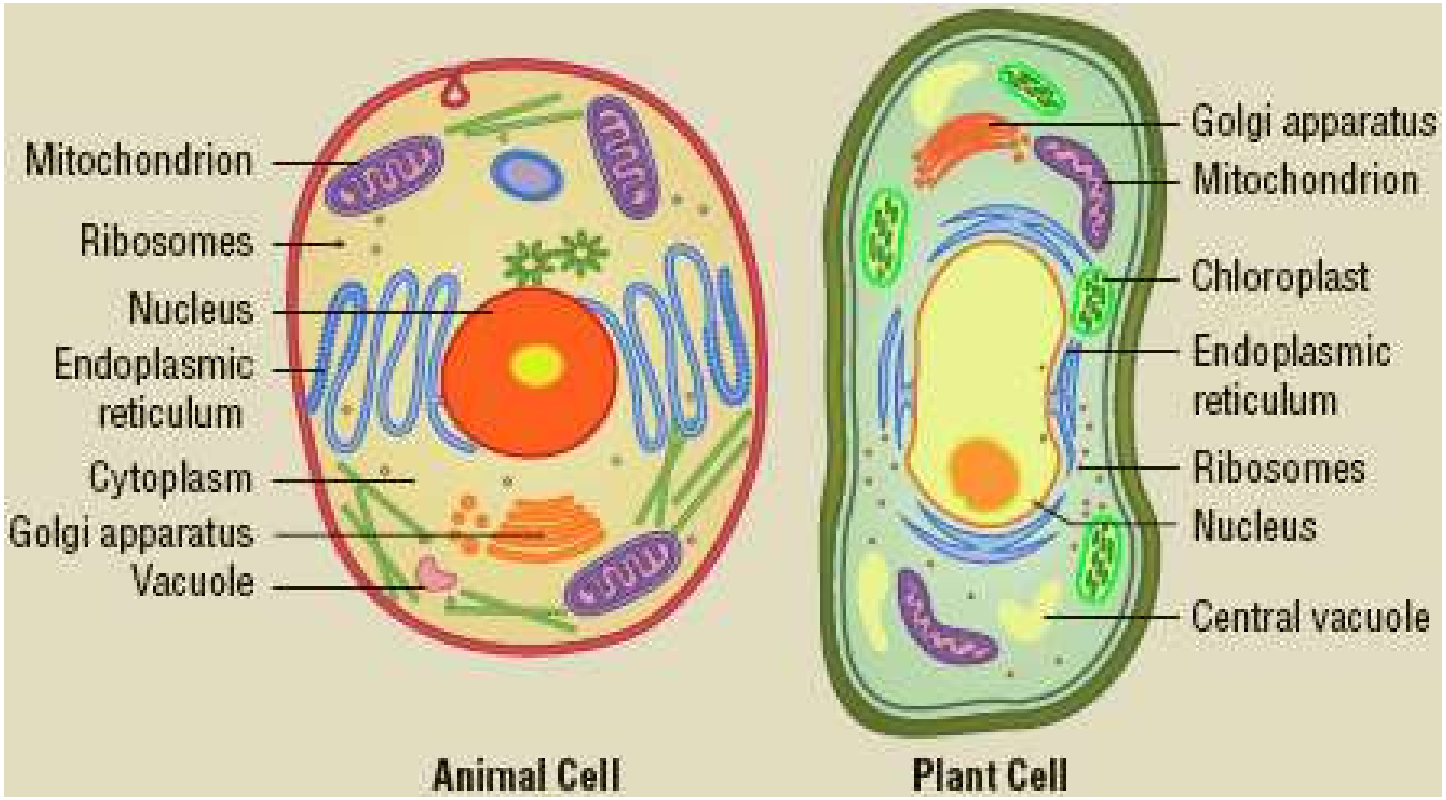




ANIMALIA- EVOLUTION OF HEART



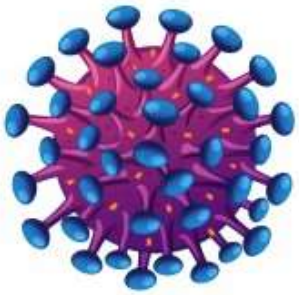
ANIMAL VS PLANT CELL



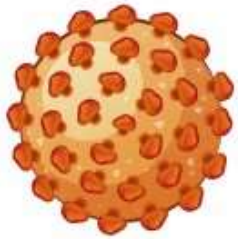
VIRUS

- ✓ 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



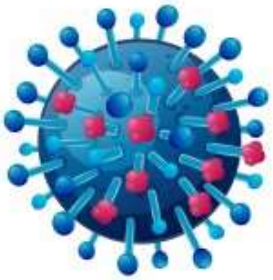
HIV



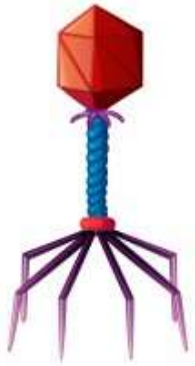
Hepatitis B

Ebola Virus

Adenovirus

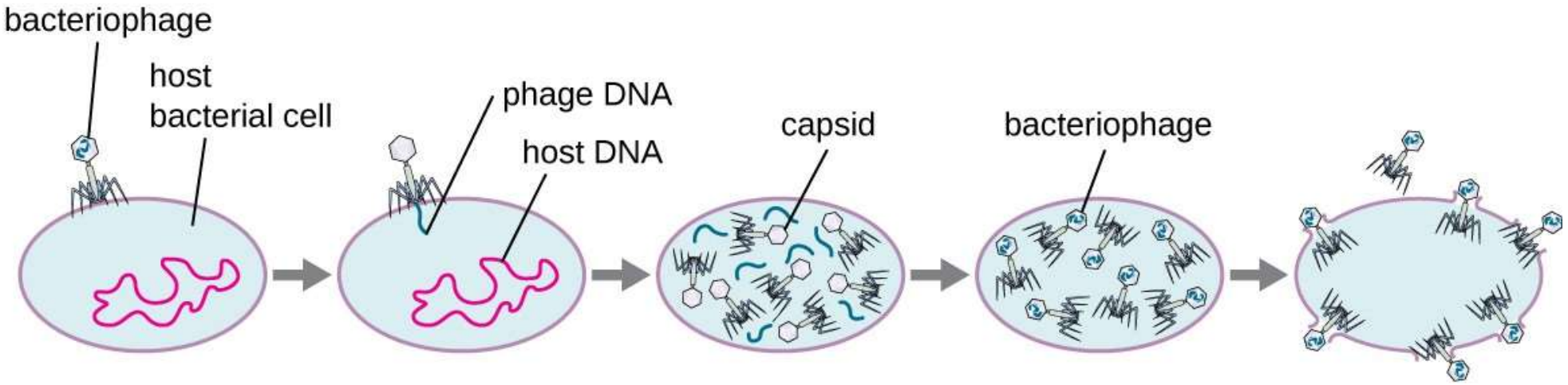


Influenza

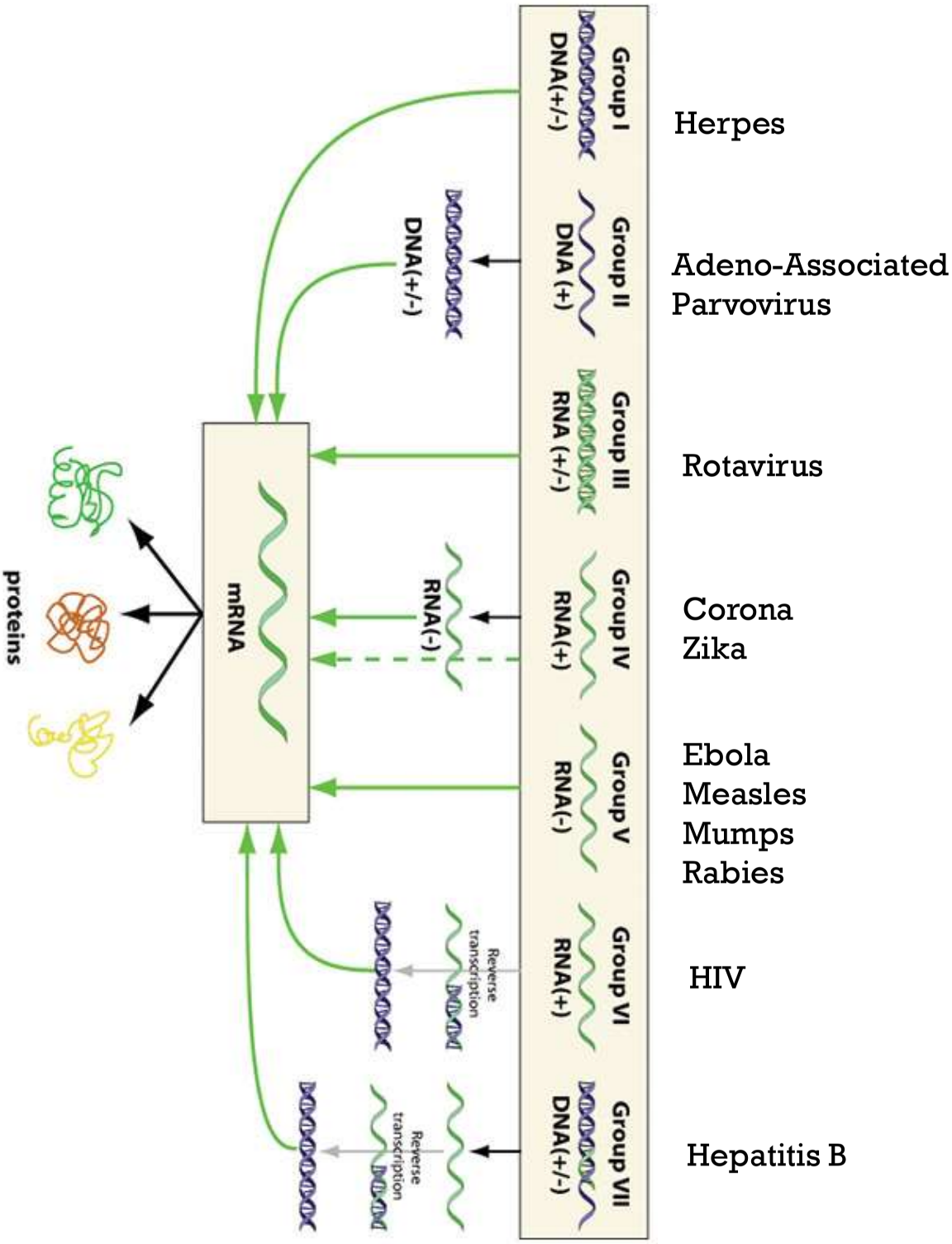


Bacteriophage

VIRUS- LYTIC CYCLE



1. **Attachment** The phage attaches to the surface of the host.
2. **Penetration** The viral DNA enters the host cell.
3. **Biosynthesis** Phage DNA replicates and phage proteins are made.
4. **Maturation** New phage particles are assembled.
5. **Lysis** The cell lyses, releasing the newly made phages.


Group I
DNA(+/-)
Group II
DNA (+)
Group III
RNA (+/-)
Group IV
RNA(+)
Group V
RNA(-)
Group VI
RNA(+)
Group VII
DNA(+/-)
DNA(+/-)
RNA(-)
mRNA
proteins
Reverse transcription
Reverse transcription
Herpes
Adeno-Associated Parvovirus
Rotavirus
Corona
Zika
Ebola
Measles
Mumps
Rabies
HIV
Hepatitis B