

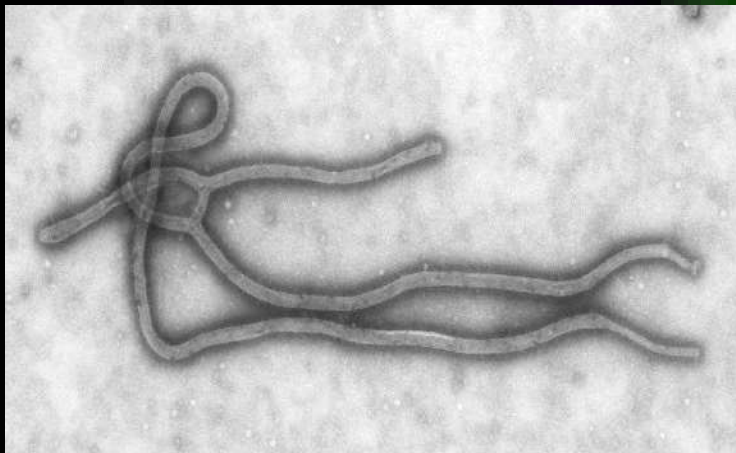
Chapter 20

Bacteria, Viruses & The Immune System

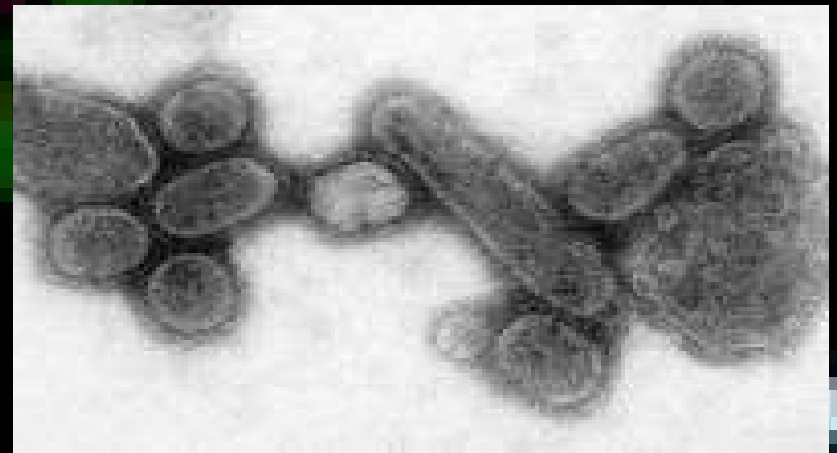


Viruses

- Viruses are pieces of nucleic acid(DNA or RNA) surrounded by a protein coat
- Viruses are Non-Living infectious agents



Ebola virus

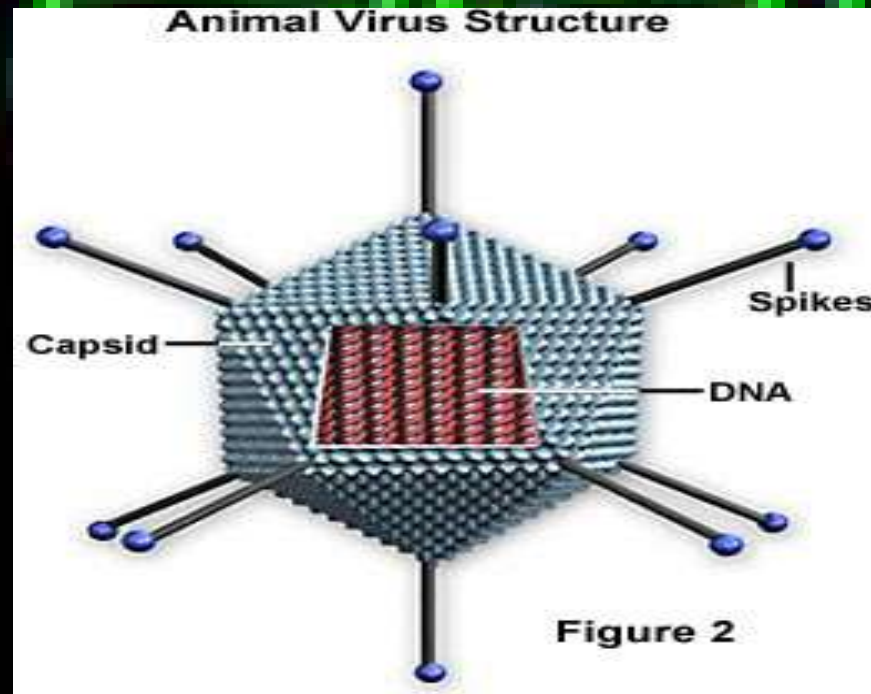


Flu virus

Viral Structure

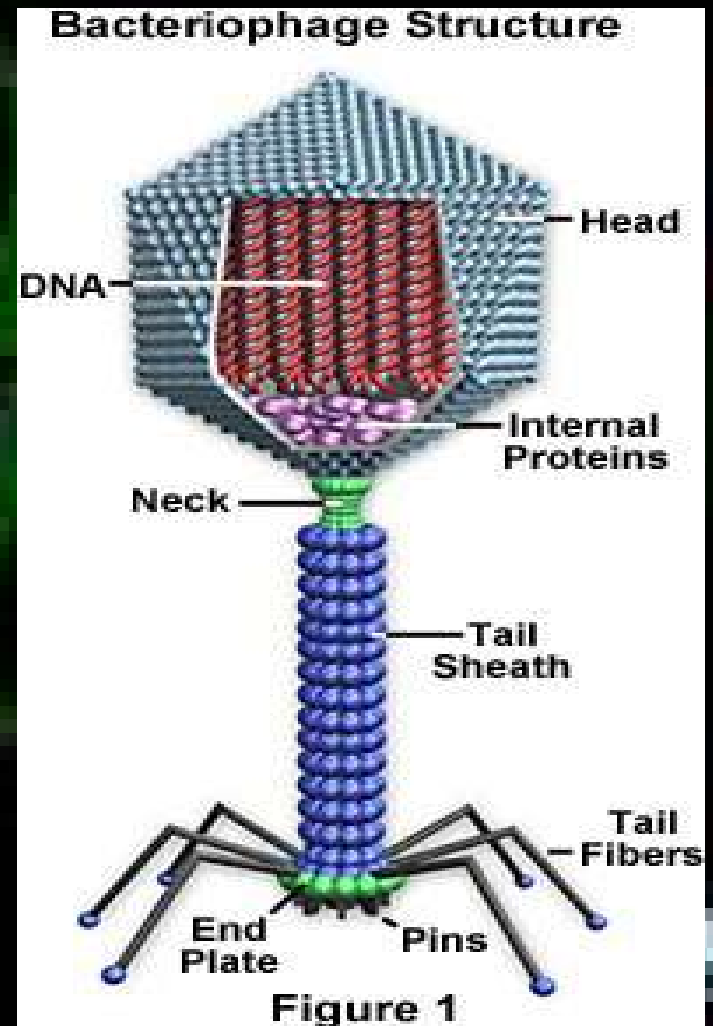
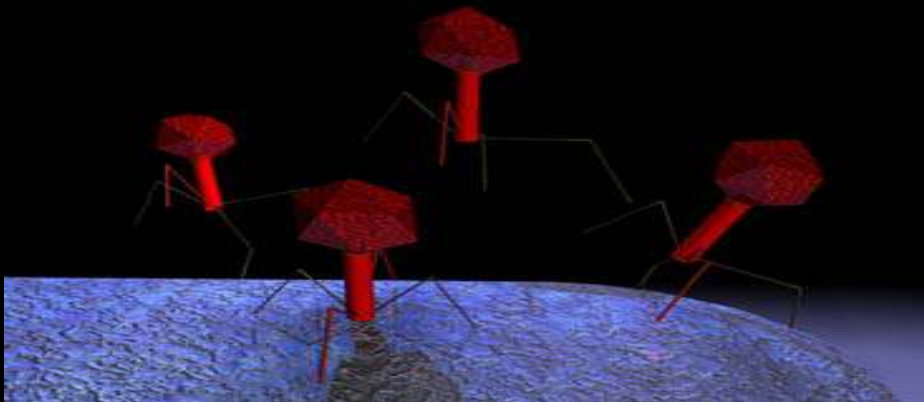
- **Animal Virus**

- Capsid: outer protective protein layer(coat)
- Nucleic Acid: DNA or RNA inside virus



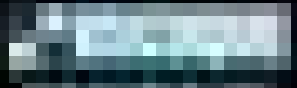
Bacteriophage

- Bacteriophage are viruses that attack and kill bacteria
- Bacteriophage are usually not harmful to humans



Spread of Viruses

- **Airborne-** spread through the air
 - Ex: measles, common cold, flu
- **Food & Water-** spread through contaminated food & water
 - Ex: hepatitis
- **Animal or Insect Bites-** spread by an infected animal or insect to another animal
 - Ex: rabies, encephalitis



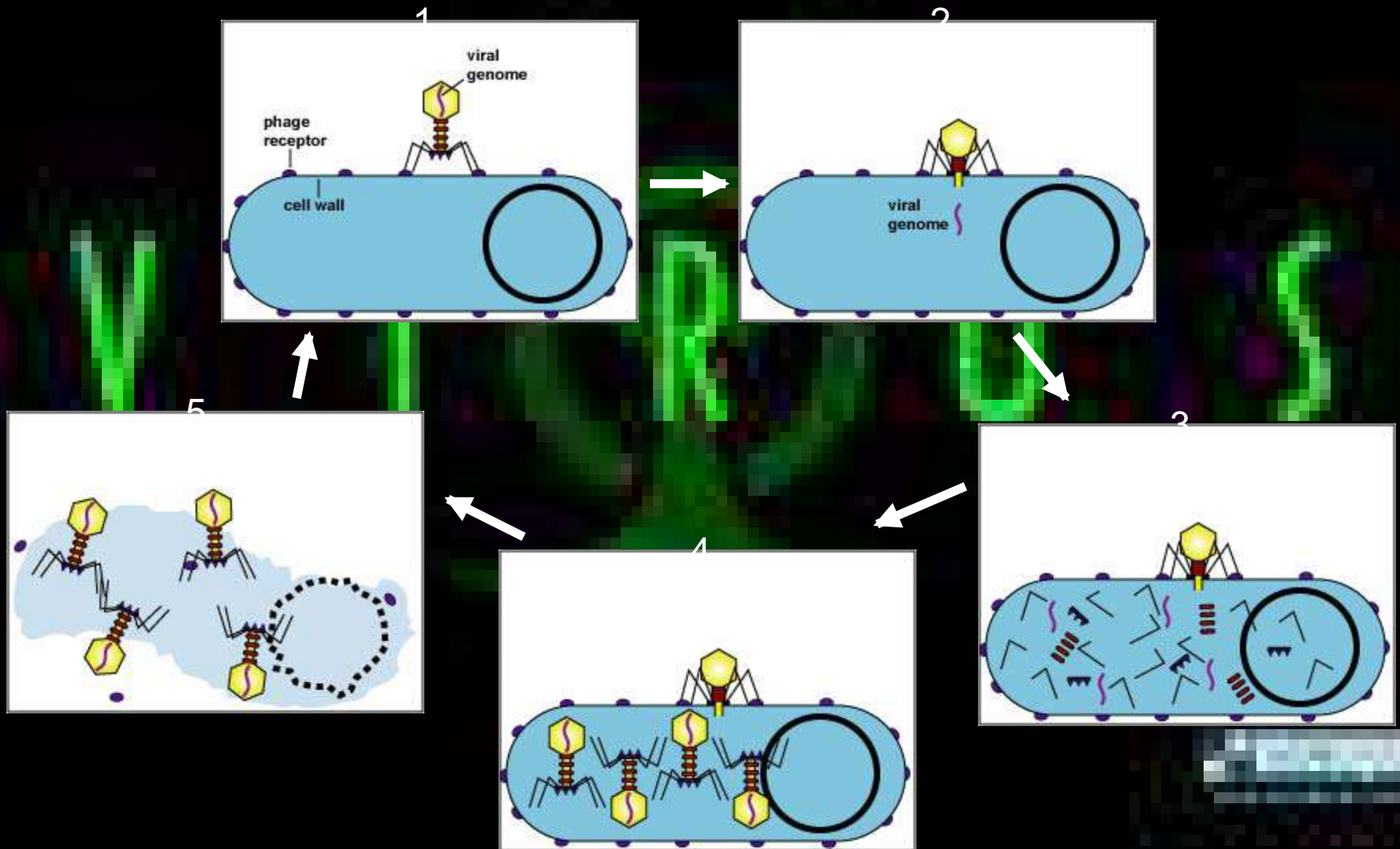
Viral Replication

- Viral replication is the process by which viruses reproduce inside other living cells

Stages of Viral Replication:

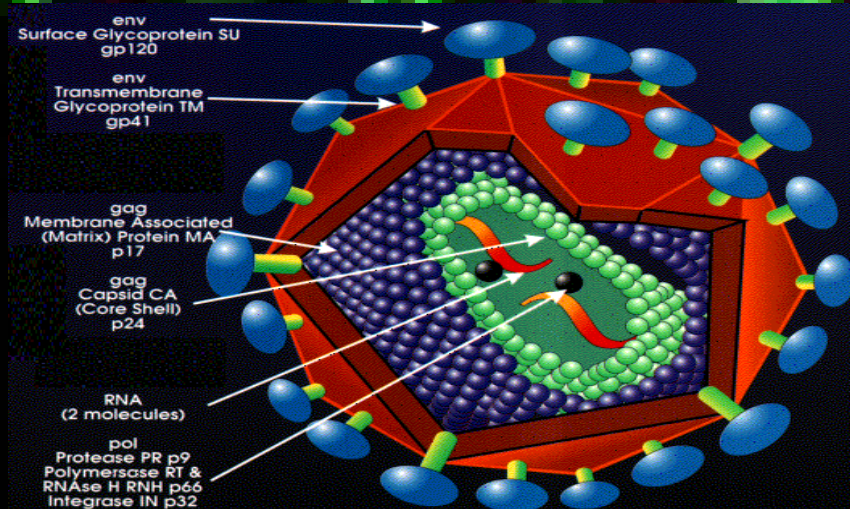
- 1) Virus attaches to host cell
- 2) Virus injects nucleic acid into host cell
- 3) Viral DNA takes control of host cell and create new virus parts
- 4) New viruses are build inside the host cell
- 5) The viruses burst out of the host cell to look for new hosts

Viral Replication



AIDS- Acquired Immune Deficiency Syndrome

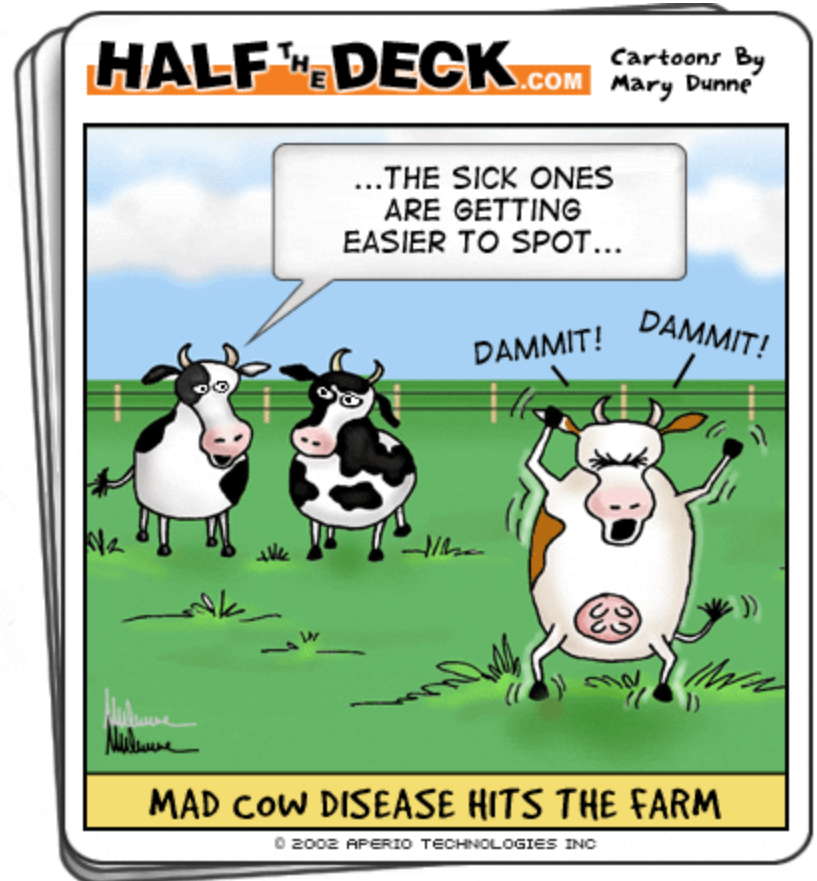
- Caused by the HIV virus
- Prevents the body's immune system from functioning properly
- Transmitted through blood and bodily fluids



“Virus-Like” of Pathogens

- Viroids- short pieces of nucleic acid without a capsid that can cause disease in some plants
- Prions- small proteins that cause disease in animals
 - Ex: Mad Cow Disease





Bacteria

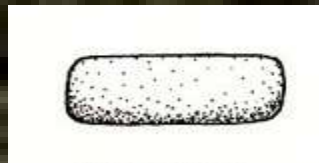
- Bacteria are single celled Monerans (prokaryotes) with NO Nucleus

- Shapes of Bacteria:

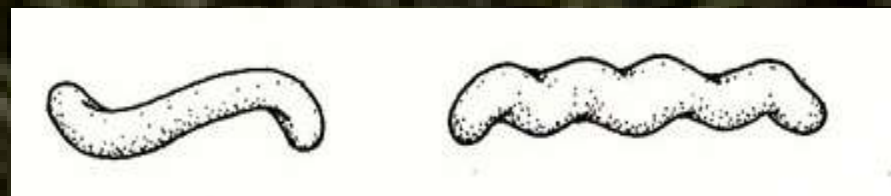
- Coccus(ball):



- Bacillus(rod):

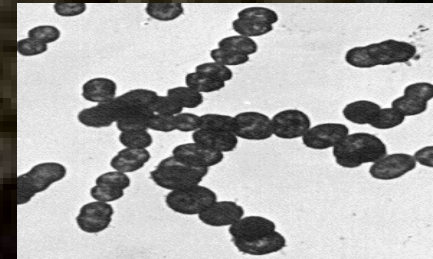


- Spirillum(spiral):



Examples of Bacterial Diseases

- **Streptococci-** causes strep throat



- **Bacillus anthracis-** causes anthrax



- Cholera



- Syphilis



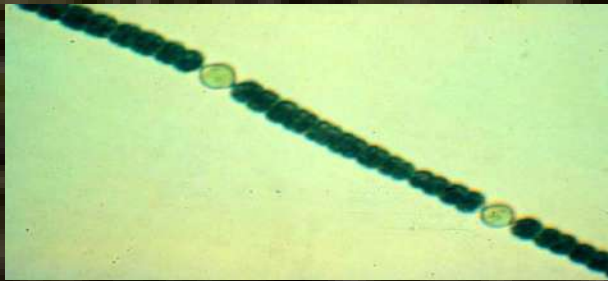
Antibiotics

- Antibiotics are substances that kill bacteria and prevent their growth
- Ex: Penicillin Streptomycin



Unusual Bacteria

- **Blue-Green Bacteria-** these bacteria use photosynthesis to make their own food

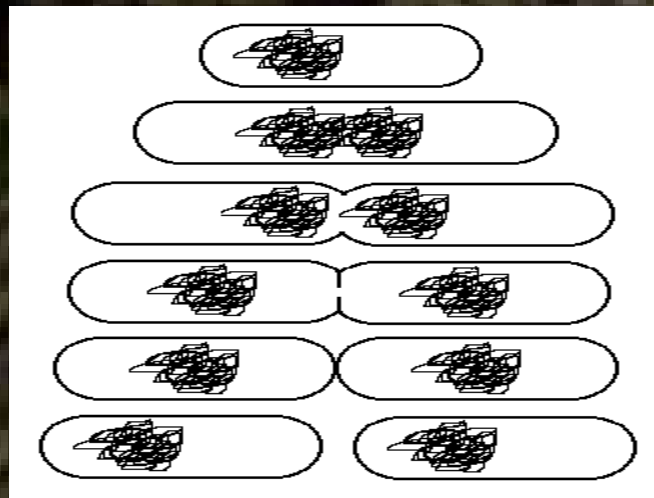


- **Rickettsia-** can only live within a host
 - spread by ticks & lice and cause Rocky Mountain Spotted Fever



Bacterial Reproduction

- Bacteria reproduce using a process called **Binary Fission**
 - One cell divides into 2 identical cells
 - Asexual reproduction
 - It takes about 20 min. for bacteria to reproduce

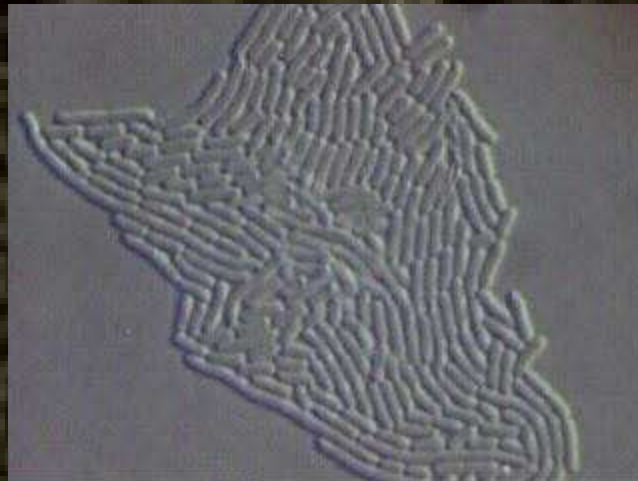


Bacterial Population Growth

Time: 0 min → 20 min → 1 hr → 2 hr → 24 hr

of : 1 → 2 → 8 → 64 → over

Bacteria 1 million

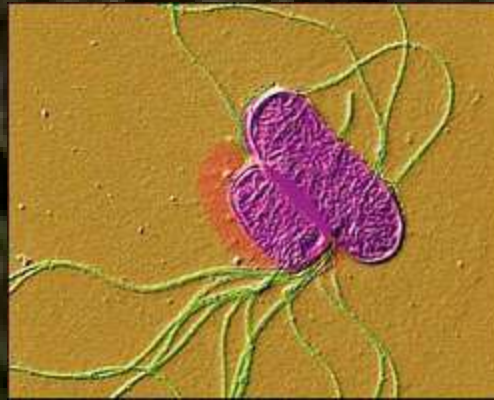


Importance of Bacteria

- **Decomposers**- feed on remains of dead organisms and recycle materials back into the environment
- **Make Foods**- bacteria are used to make dairy products like yogurt and cheese
- **Medicines**- some bacteria are used to make antibiotics, others are used to make insulin
- **Live on Plant Roots**- help plants absorb nitrogen in the soil(nitrogen fixation)
- **Live in the Intestine**- break down undigested material and make vitamin K

Harmful Bacteria

- Some bacteria cause disease in plants and animals ex: E. coli
- Some bacteria produce poisons that harm plants and animals ex: Botulism toxin
- Some bacteria cause food to spoil
- Some bacteria cause food poisoning ex: salmonella



Infectious Diseases

- Infectious diseases are caused by a virus or bacteria that enters the body and causes disease
- **Contagious Disease-** can spread from one organism to another
- **Toxins-** poisons released by bacteria that harm other organisms

Spread of Disease

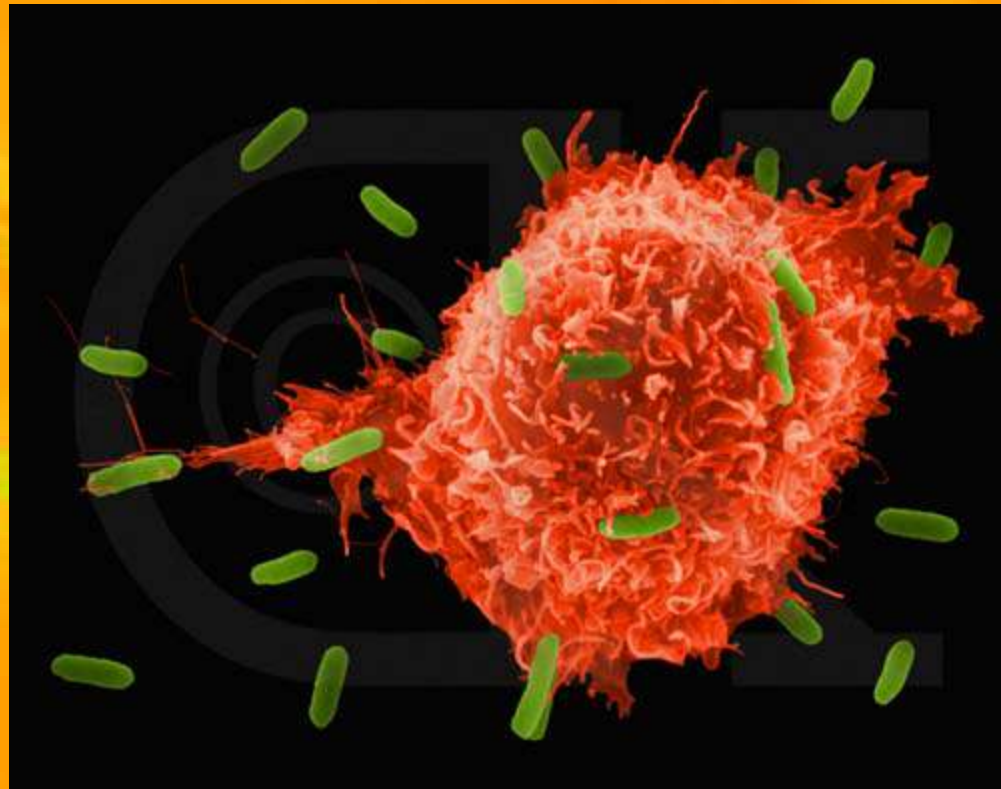
- Air
- Water
- Insect Bites
- Spoiled Food
- Bodily Fluids

Food Poisoning

- Food poisoning is caused by the growth of bacteria in improperly stored or packaged foods
- Ways to Prevent Food Poisoning:
 - Canning- in cans or jars
 - Freezing- prevents bacterial growth
 - Drying- drying foods kills bacteria ex: raisins
 - Curing- storing foods in preservatives
 - Cold Storage- refrigeration
 - Irradiation- use UV or Gamma Rays to kill bacteria in foods

The Immune System

- The immune system protects the body against pathogens (harmful invaders)



Immune System

- **First Line of Defense:**
 - **Skin:** protective layer against pathogens
 - **Nose Hair:** filters out bacteria before it enters the body
 - **Cilia:** trap bacteria in esophagus

Immune System

- **Second Line of Defense:**

- **Phagocytes:** white blood cells



- **Interferon:** a chemical that stops viruses from reproducing in the body

- **Antibodies:** proteins made by the body that stick to and kill pathogens

- **Antibiotics:** drugs that kill bacteria in the body

Immunity

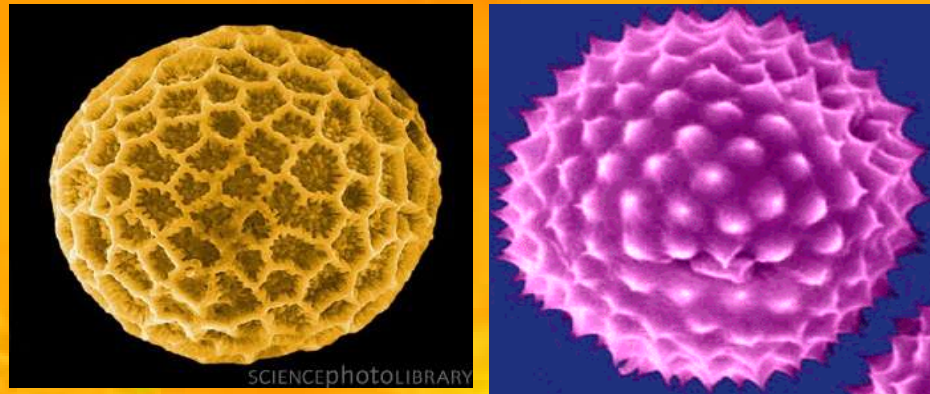
- Immunity is the resistance to a specific disease

Types of Immunity:

- **Natural Immunity:** immunity you are born with
- **Acquired Immunity:** immunity that you gain after you have had a sickness once ex: chicken pox
- **Passive Immunity:** receiving a injection(shot) with antibodies to give you immunity to a disease
- **Vaccines:** injections made from dead or weakened bacteria and viruses that cause acquired immunity

Chronic Disorders

- **Allergies-** an abnormal reaction to a substance in the environment
 - Ex: pollen



Allergen- a substance that causes an allergic reaction

Hepatitis

- Hepatitis is caused by a virus that infects the liver
 - **Hepatitis A:** spread through contact with a contaminated person, food, or water



- **Hepatitis B:** spread through contaminated blood

Cancer

- Cancer cells begin as normal cells that divide abnormally to form tumors
 - Rapid growth and division of cancer cells leads to the formation of tumors
 - Chemicals and radiation can slow and kill cancer cells
 - Cancer can be caused by viruses, radiation, and exposure to chemicals

Histoplasmosis

- Histoplasmosis is a disease caused by a fungus that grows on pigeon feces
- Contact with feces can transmit the disease to humans
- Causes respiratory problems



END OF CHAPTER 20 NOTES!!!