

Lecture Note Handout – Chapters 7 and 8

Chap 8: Viruses & bacteria,

I. Viruses

A. What is a virus

1. A very small (so small they cannot be seen even w/ a compound microscope. They must use an electron microscope) nonliving particle that invades and then reproduces inside a living cell
2. **Non living** because:
 - a. Not made up of cells
 - b. Do not utilize energy
 - c. Do not respond to surroundings
 - d. The only life function they perform is reproduction
3. Viruses are **parasites**: lives on or in a host organism and **causes harm** to the host

B. Structure

1. Protein coat and genetic material
2. Head
3. Tail
4. Tail fiber
5. Capsid
6. Genetic material

C. Life Cycle

1. Invade/Infect

- a. Chance contact w/ host cell
- b. Protein coat attaches to cell
And injects its genetic material

2. Growth

- a. Viral DNA takes over the cells functions,
- b. Shuts down the cellular DNA,
- c. Causes the cell to make viral mRNA and then viral proteins

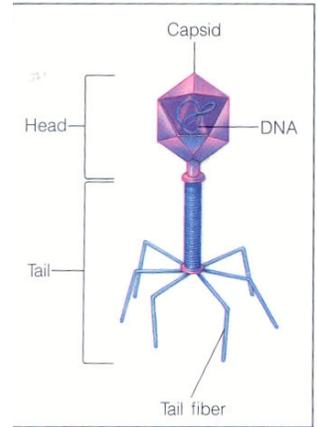
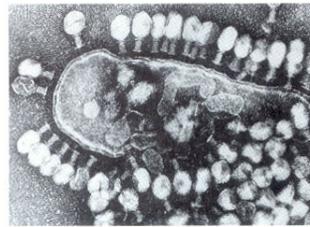
3. Replication

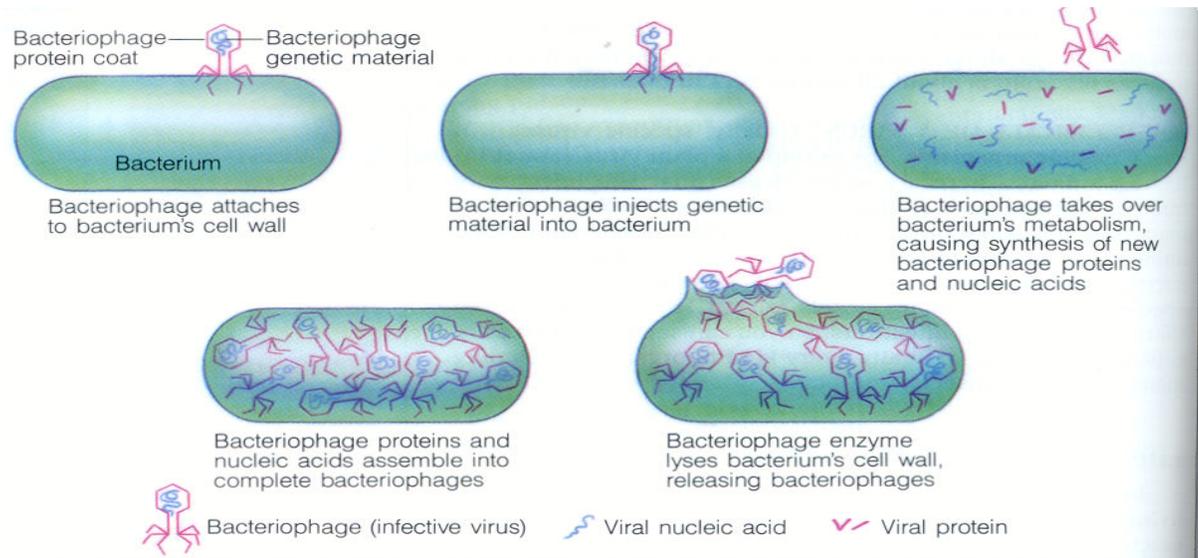
- a. Viral DNA cause the cell to replicate the viral protein coat and copies of the viral DNA thousands of times

4. Release

- a. Once the virus has utilized the host cellular material, the viruses produce a lysing agent to explode the cell outwardly spreading the thousands of new viruses to new hosts

Figure 17-5 This electron micrograph shows bacteriophages attacking the bacterium E. coli. How do viruses attach themselves to the bacterium?





D. Viruses are not given scientific names because they are not considered “Living organisms”. They are usually named for the disease they cause

1. **Measles, Mumps, Rabies, AIDS, Colds** and the flu to name only a few
2. Usually **very specific** as to its host – viruses that infect animals usually can't infect people
3. Body protects itself from viruses:
 - a. Skin acts as a barrier
 - b. Immune system
 - i. Antibodies
 - ii. Interferon
4. **Vaccines** made by injecting dead or weakened viruses

II. Bacteria

A. **Prokaryotic:** unicellular organisms w/out an organized nucleus- no nuclear membrane

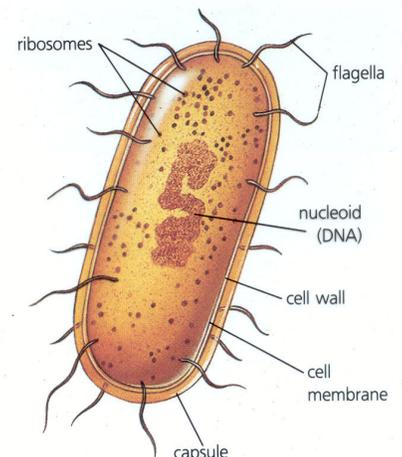
B. **Kingdom: Archaeobacteria:** “Ancient bacteria”

1. Called “**methanogens**” because they produce methane gas as a byproduct of respiration
2. Classified into their own kingdom because:
 - a. **Missing an important carbohydrate** found in other prokaryotes
 - b. Have **different type of lipid** in their membranes
 - c. Very **different gene sequences**
3. Live in very harsh environments **anaerobic** in nature (environments without oxygen)
 - a. Inside your digestive tract
 - b. Ocean floor in hot vents, geysers, very salty great salt lake

C. **Kingdom: Eubacteria:** “new bacteria” – **bacteria and blue-green algae**

1. Don't live in harsh environments but do live everywhere else
2. Both **autotrophs** and **heterotrophs**
3. Many lifestyles make them beneficial, harmful or harmless
4. Structure
 - a. **Cell Wall**- tough outside layer that protects and gives the bacteria its shape

19. The Structure of a Prokaryote



- b. **Cell membrane-** located just inside of the cell wall.
 - c. **Capsule:** slime coating for protection surrounding the cell wall
 - d. **Flagella;** whip-like hairs used for locomotion
 - e. **Nucleoid:** since no cell membrane, region the genetic material is concentrated
 - f. **Ribosomes** used during protein synthesis are located throughout cytoplasm
5. Identification by shape
- a. Round: **Coccus**
 - b. Rod-like: **Bacillus**
 - c. Spiral: **Spirillum**
6. Reproduction: two types
- a. Asexual: **binary fission-**
 - i. **Mitotic** cell division causes cell to simply divide into two daughter cells
 - ii. Results in two identical offspring – **genetically identical** to the mother cell.
 - b. Sexual: **Conjugation**
 - i. Two cells connect by a **cytoplasmic bridge**
 - ii. Part of genetic material from **donor** is transferred to the **recipient** cell
 - iii. Results in genetic diversity and increased survival possibilities.
7. Protection by **spore formation**
- a. Type of spore is an **endospore** which is thick protective internal wall
 - b. Produced during times of harsh unfavorable conditions.