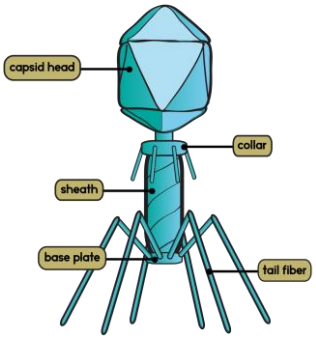
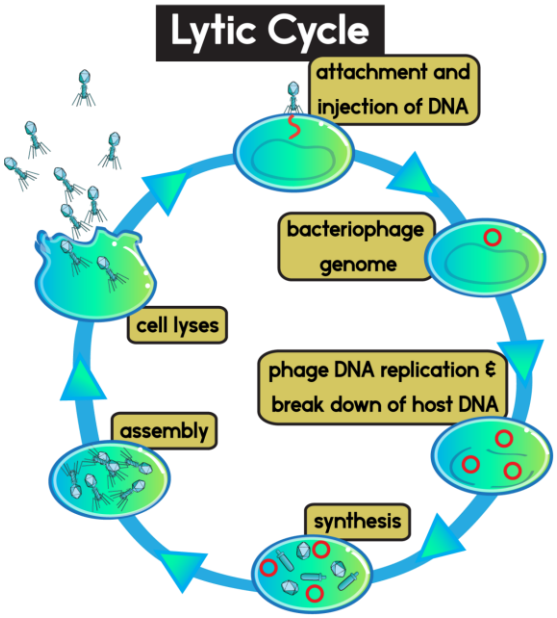
The Microbial World

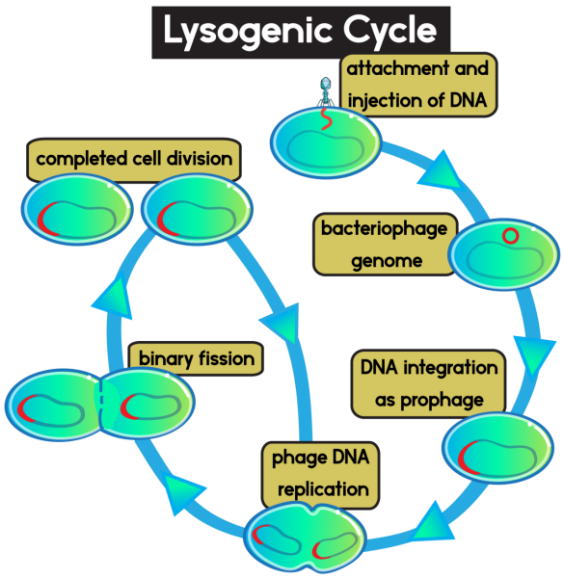
Section 2: Viruses



Viruses come in a variety of shapes and sizes but are so small they can only be seen with an electron microscope. They are found everywhere, and there is no cell type that is immune from their attack. A typical virus is composed of a core of either DNA or RNA, which is surrounded by a protein coat, or **capsid**. Viruses are particles of nucleic acid, protein, and in some cases lipids. They can only reproduce by infecting other living cells. When they infect a cell, they cause damage by making copies of themselves, which produces symptoms of a virus. Viruses are entirely dependent on living organisms for their survival. **Bacteriophages** are viruses that infect bacteria.

There are two patterns of viral infections called lytic infections and lysogenic infections. In a **lytic infection**, first the bacteriophage proteins and nucleic acids assemble into complete virus particles. Then, the cell lyses release new bacteriophage that can now attach to other cells. Bacteriophage then injects DNA into bacterium and bacteriophage DNA forms a circle. Next, prophage is able to exit the bacterial chromosome and enter the lytic cycle. Finally, bacteriophage takes over and begins synthesizing new virus proteins and nucleic acids. In other words, a virus enters the cell, makes copies of itself and causes the cell to burst, or lyse, releasing hundreds of viruses.





In a **lysogenic infection**, first the bacteriophage DNA forms a circle. Bacteriophage DNA (prophage) inserts itself into a bacterial chromosome. Prophage is viral DNA that is embedded in the host's cell during lysogenic infection. Radiation, heat, and chemicals can cause the prophase to become active. Then, prophage replicates with a bacterium. In some cases, the cell and prophage are reproduced for many generations. In other words, a virus enters DNA into the DNA of a host cell, and the viral genetic information replicates along with the host's DNA.

Section 2: Viruses Continued

Most viruses contain RNA instead of DNA. RNA casts a wide net ranging from a common cold, to cancer, and even HIV. AIDS (acquired immune deficiency syndrome) is caused by an RNA virus called HIV (Human Pamplona Virus). This group of viruses is called **retroviruses**, which is a virus that contains RNA that produces a DNA copy of their RNA upon infecting a cell.

Despite the fact that viruses are not living, they do have many characteristics of living things.

Differences between a Virus and a Cell		
Characteristic	Virus	Cell
Structure	DNA or RNA in capsid, core	Cell membrane, cytoplasm; eukaryotes contain nucleus/organelles
Reproduction	Only within a host cell	Independent cell division
Genetic Code	DNA or RNA	DNA
Growth & Development	No	Yes, in multicellular organisms
Obtain & Use Energy	No	Yes
Response to Environment	No	Yes
Change Over Time	Yes	Yes

Review:

1. How do viruses reproduce?
2. Compare a lytic infection to a lysogenic infection.
3. What is a retrovirus?