Viruses’ classification and Multiplication

**Multiplication of Bacteriophages**

**The lytic cycle**

Ends with the lysis and death of the host cell, whereas the host cell remains alive in the lysogenic cycle. Multiplication of T-even bacteriophages in their host, *E. coli,* as an example of the lytic cycle.

**Attachment, or adsorption** After a chance collision between phage particles and bacteria, *attachment,* or a*dsorption,* occurs. During this process, an attachment site on the virus attaches to complementary receptor site on the bacterial cell. This attachment is a chemical interaction in which weak bonds are formed between the attachment and receptor sites. T-even bacteriophages use fibers at the end of the tail as attachment sites. The complementary receptor sites are on the bacterial cell wall.

**Penetration** . After attachment, the T-even bacteriophage injects its DNA (nucleic acid) into the bacterium. To do this, the bacteriophage's tail releases an enzyme, phage lysozyme, which breaks down a portion of the bacterial cell wall. During the process of *penetration,* the tail sheath of the phage contracts, and the tail core is driven through the cell wall. When the tip of the core reaches the plasma membrane, the DNA from the bacteriophage's head passes through the tail core, through the plasma membrane, and enters the bacterial cell. The capsid remains outside the bacterial cell. Therefore, the phage particle functions like a hypodermic syringe to inject its DNA in to the bacterial cell

**Biosynthesis**. Once the bacteriophage DNA has reached the cytoplasm of the host cell, the biosynthesis of viral nucleic acid and protein occurs. Host protein synthesis is stopped by virus induced degradation of the host DNA, viral proteins that interfere with transcription, or the repression of translation. Initially, the phage uses the host cell's nucleotides and several of its enzymes to synthesize many copies of phage DNA.

**Maturation**. In the next sequence of events, *maturation* occurs. In this process, bacteriophage DNA and capsids are assembled into complete virions. The viral components essentially assemble into a viral particle spontaneously, eliminating the need for many nonstructural genes and gene products. The phage heads and tails are separately assembled from protein subunits, and the head is filled with phage DNA and attached to the tail.

**Release**. The final stage of viral multiplication is the *release* of virions from the host cell. The term lysis is generally used for this stage in the multiplication of T-even phages because in this case, the plasma membrane actually breaks open (lyses). Lysozyme, which is encoded by a phage gene, is synthesized within the cell. This enzyme causes the bacterial cell wall to break down, and the newly produced bacteriophages are released from the host cell. The released bacteriophages infect other susceptible cells in the vicinity, and the viral multiplication cycle is repeated within those cells.

Bacteriophage Lambda (A.): The Lysogenic Cycle In contrast to T-even bacteriophages, some viruses do not cause lysis and death of the host cell when they multiply. These *lysogenic phages* (also called *temperate phages)* may indeed proceed through a lytic cycle, but they are also capable of incorporating their DNA into the host cell's DNA to begin lysogenic cycle. In lysogeny, the phage remains latent (inactive).Upon penetration into an *E. coli* cell, the originally linear phage DNA forms a circle. This circle can multiply and be transcribed, leading to the production of new phage and to cell lysis.

**Latency**

The ability of pathogenic virus to lie dormant (latent) within the cell. However the viral genome is not fully eradicated. Virus can reactivate and begin producing large amount of viral progeny.