

Big Picture

Viruses are considered to be nonliving particles, although they are still capable of evolving. They lack many of the defining characteristics of life. Viruses do, however, have genetic material (DNA or RNA), which is housed within a capsid and sometimes within an envelope. Viruses require a host cell to replicate and often utilize the host cell's enzymes, ribosomes, and RNA molecules, ultimately killing the host cell after replication.

Key Terms

Virus: Tiny, nonliving particle that contains DNA but lacks other characteristics of living cells.

Virion: Individual virus particle.

Capsid: The protein coat that encloses the virus's genetic material.

Latency: The dormant state of a virus.

Characteristics of Viruses

Viruses lack many of the characteristics of living things. They are unable to self-reproduce or carry out metabolism. On a structural level, viruses lack organelles, a cytoplasm, and a cell membrane.

A **virion** is much smaller than a prokaryotic cell.

- Made up of genetic material contained within a **capsid**.
- Capsid shape is one of the classifying features of viruses. The capsid shape can be helical, icosahedral, or complex.
- Many but certainly not all viruses possess an envelope, which surrounds the capsid and is derived from the host's cell membrane. Envelopes help viruses evade the host's immune system and help facilitate the infection of the host's cells. The presence of an envelope or lack thereof also serves as a classifying feature of viruses.

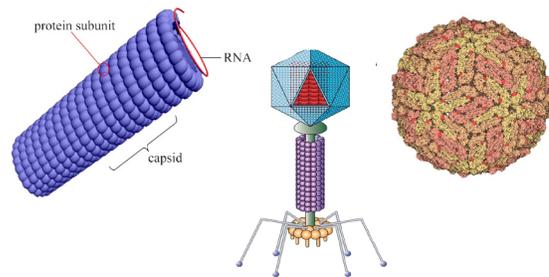


Figure: From left to right, helical, complex, icosahedral.

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Reproduction of Viruses

There are two parts of viral reproduction: lytic cycle and lysogenic cycle.

Lytic cycle

In this cycle, the virus infects the host cell, replicates and forms new viruses using the host cell's cellular machinery, and then ruptures, or *lyses*, the host cell, killing the host. Viruses that only undergo the lytic cycle are virulent.

Lysogenic cycle

The lysogenic cycle is the alternate cycle of viral infection. In the lysogenic cycle, the virus infects the host cell but lays dormant, or **latent**. All viruses that enter the lysogenic cycle will eventually enter the lytic cycle and kill their host cells.

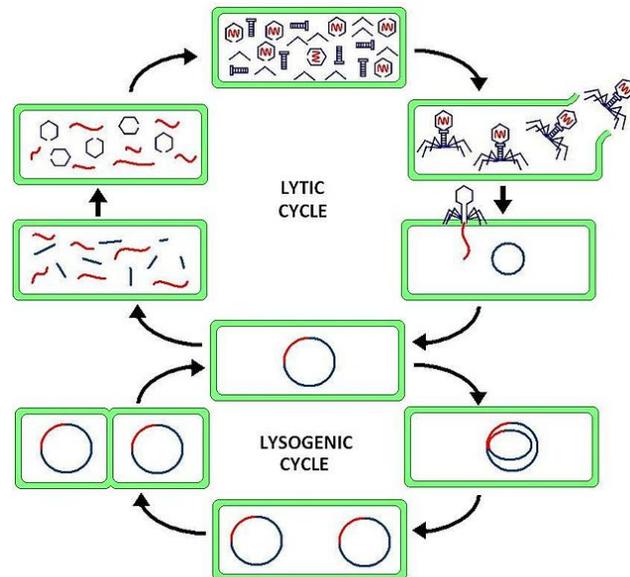


Figure: Virus lytic and lysogenic cycles

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Role of Viruses in the World

Viruses cause many common diseases, such as chicken-pox, shingles, polio, hepatitis, and HIV.

- Viruses also affect other organisms. A virus that infects bacteria is called bacteriophage.

Although viruses can be very hard to treat, one way society attempts to control the spread of disease is through vaccines. A vaccine exposes your body to non-infection variant of the viruses and allows your body to build up immunity to the virus.

Viruses also play an important role in cutting-edge science research.

- For example, in the study of cancer and basic biological processes. Viruses similarly have come to play important and beneficial roles in new medical technologies. For example, new forms of gene therapy employ viruses that incorporate new genes into existing cells to counter defective or harmful endogenous genes.