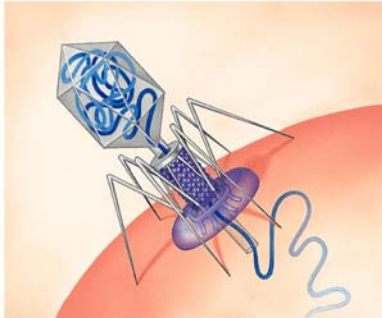


Viruses



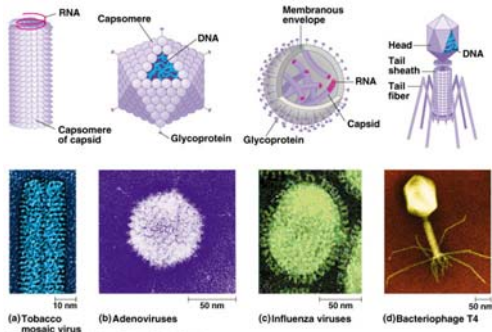
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Viruses Genes in Packages

- Viruses depend on their host cells for replication, transcription, and translation of their nucleic acid.

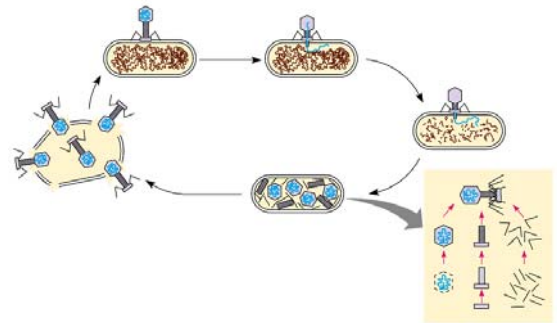
- Some bacterial phages are known to reproduce in two ways.

- (1) In the **lytic cycle**, a phage immediately directs the host cell to replicate the viral nucleic acid, transcribe and translate its protein-coding genes, assemble new viruses, and cause host cell lysis, releasing the reproduced phages.



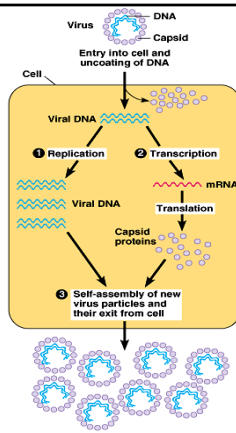
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Lytic Cycle



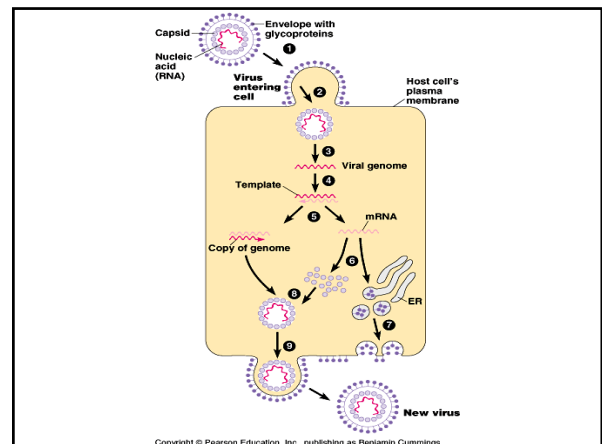
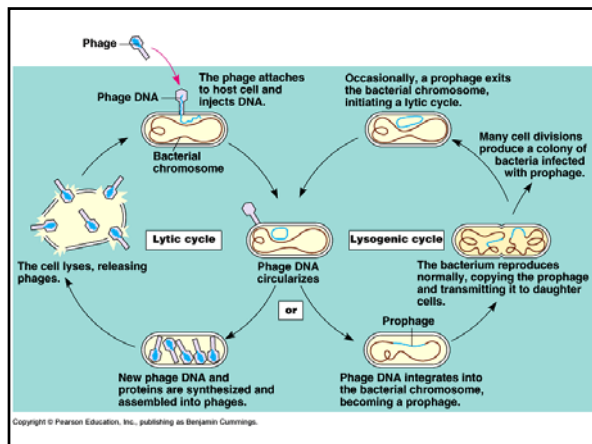
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Viral Reproduction



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- (2) In the **lysogenic cycle**, a phage's DNA is inserted into the host cell DNA by recombination and becomes a **prophage**. This DNA sequence is replicated with the host cell's DNA over many generations. Finally, some environmental cue directs the prophage to switch to the lytic cycle. Such prophages may cause the host cell to act differently than if the prophage were not there.



Many Viruses cause diseases in animals

•Viruses have a great variety of infectious cycles in eukaryotes. Those that infect plants or animals can cause disease.

Note: Organisms from all kingdoms have viruses that infect their cells.

•Other viruses of eukaryotes, such as the herpesviruses that cause chicken pox, shingles, mononucleosis, cold sores, and genital herpes, reproduce inside the host cell's nucleus and can insert a provirus in the host DNA, much like a prophage in the lysogenic cycle.

Note: Viruses that cause cold sores and genital herpes are a different strain.

•In one type (**enveloped RNA virus**, such as the virus that causes the mumps), the viral genes are in the form of RNA, which functions as a template to make complementary RNA.

•This RNA, in turn, functions either as mRNA to direct virus protein synthesis directly or as a template from which more viral RNA is made.

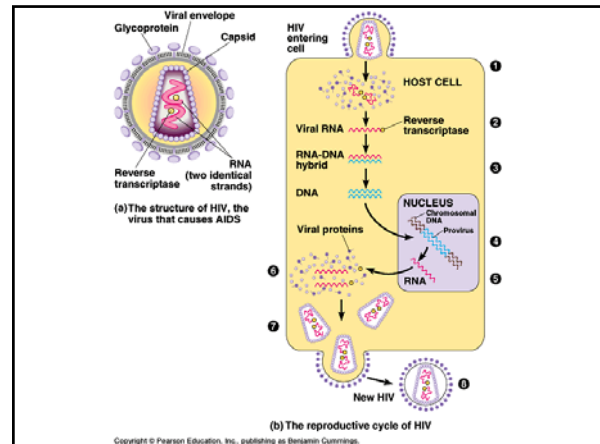
•Newly assembled viral particles leave the cell by enveloping themselves in host plasma membrane.

•Animals defend against viruses through their immune systems. Vaccines, which induce the immune system's delayed responses to viral coat molecules, offer a possible defense against future viral infection.

•Antibiotic drugs cannot be used to treat viral infections.

Plant viruses are serious agricultural pests

- Most plant viruses are RNA viruses.
- Insects, farmers, and gardeners may all spread plant viruses.
- Infected plants may pass viruses to their offspring.
- There are no cures for most viral diseases of plants. Research has focused on prevention and selective breeding of resistant varieties.



- HIV finally becomes active by using the host cell's machinery to direct its reassembly, much like a DNA virus.

NOTE: HIV infects cells involved in the human immune system.

Emerging viruses threaten human health

- The virus that causes AIDS is human immunodeficiency virus, **HIV**.
- HIV particles are enveloped, like those that cause mumps.
- Although they carry genes in the form of RNA, these genes are expressed by being first transcribed back to DNA (reverse transcription), at which they enter the host cell's chromosomes as a provirus and remain unexpressed for several years.

Virus Research and molecular genetics are intertwined

- On the one hand, virus research played an important early role in experiments on the molecular structure and activity of genes, and continues to do so.
- On the other hand, viruses cause some of the worst diseases we are dealing with today.