Viruses

Viruses, Viroids, and Prions
What is a virus?
- among the smallest biological particles that are capable of causing disease in living organisms.

What is a virus not?
- A virus is not bacteria, fungus, protist, plant or anima..
- They can not carry out cellular functions.
- A virus can not replicate without infecting cells or without using the organelles and enzymes of the cells of the host.
Two essential Features of a Virus:

1. A Nucleic Acid
   - could be DNA or RNA but not both

2. A Capsid
   - this is a protein coat that surrounds the nucleic acid.

Some viruses may also have spikes to help them attach to the host cell.

Most viruses infect only specific host cells.

Some viruses are enclosed in a protective envelope.
- HIV
- Influenza
- Chickenpox
- Herpes-simplex
Viruses

Two Types of Viruses:

A virus injects its genetic information into a host cell and then takes control of the cell’s machinery.

Both types can infect host organisms and cause disease. However, the ways that DNA and RNA viruses infect host cells and take over the cell’s biochemical machinery are different.

1. DNA

The contents of the virus enter the cell, travel to the nucleus and take over the cell’s biochemical machinery for DNA replication and transcription into RNA.

The RNA controls the formation of proteins needed by the virus to coat the viral DNA. This coating of viral DNA is known as a capsid. The capsids accumulate inside the cell until the cell reaches capacity and bursts open, releasing the newly-formed viruses to infect new host cells.

2. RNA

Viral RNA is released into the host cell's cytoplasm and uses the ribosomes to produce new viral proteins (like RNA normally would).

2a) Retrovirus (If the RNA virus wants to enter through the nucleus rather than the cytoplasm)

When these viruses enter a host cell, they must first convert their RNA into DNA. This process, called reverse transcription, enables the virus to inject its genetic material into the host cell and use the host's biochemical machinery, similar to a DNA virus.
Viroid

- smallest known particles able to replicate
- short single strand of RNA
- no capsid
- disrupts plant metabolism and may damage an entire crop.
Example: potato famine in Ireland resulted in 1 million deaths.

Prions

- infectious proteins
- normal body proteins that get converted into an alternate configuration by contact with other prion proteins
- have no RNA or DNA
- consist of 250 amino acids
- in human and mammal prion diseases, the protein is usually called PrP
Examples: scrapies in sheep
- mad cow disease in cattle
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Viruses: DNA or RNA

Viroids: RNA

Prions: No DNA or RNA