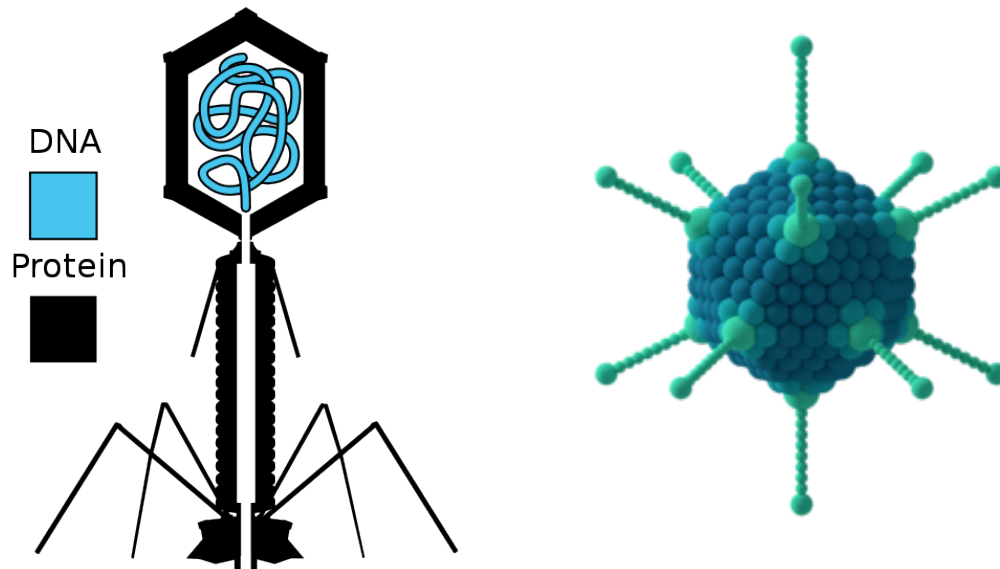


CONCEPT: VIRUS STRUCTURE

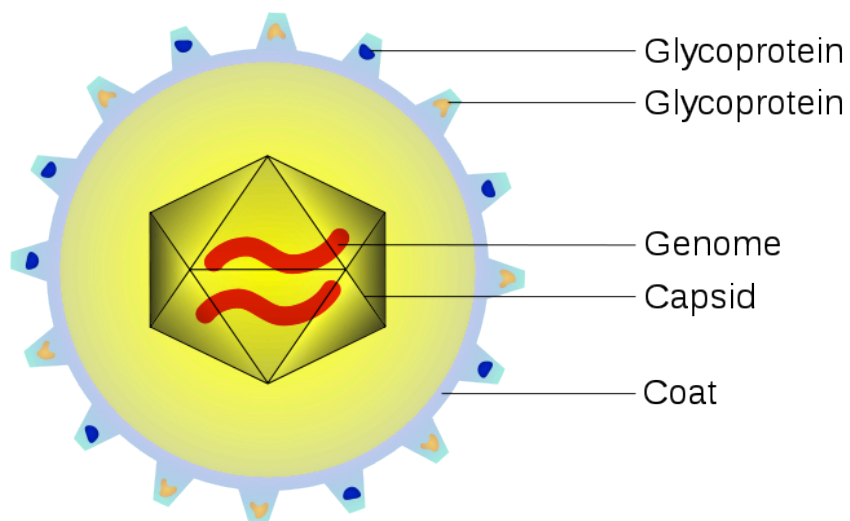
- Viruses are significantly smaller than cells, which act as their host, and are like vessels for genetic material
 - **Capsid** – the protein coat covering the viral genome that may take many different forms
 - **Capsomere** – a subunit of the capsid
- Viruses may contain double-stranded DNA, single-stranded DNA, double-stranded RNA, or single-stranded RNA.
- **Bacteriophages** – viruses that infect bacteria, and contain complex capsids

EXAMPLE:



- **Viral envelope** – accessory structure common in animal viruses, often derived from the membrane of host cells
- Host range – the collection of hosts that the virus can enter and infect
 - Viruses identify host cells with surface proteins that attach to specific receptors on the host

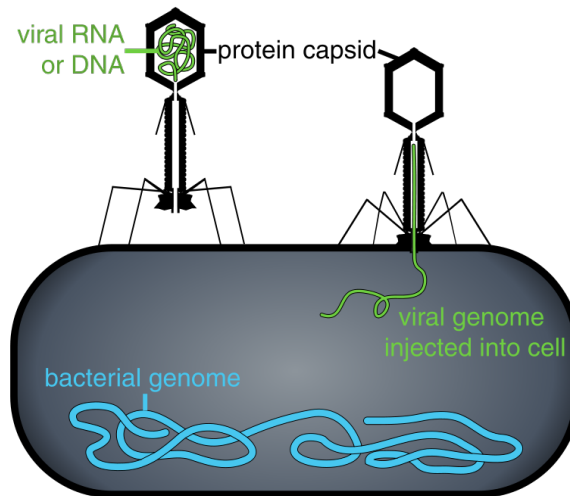
EXAMPLE:



CONCEPT: VIRUS REPLICATION

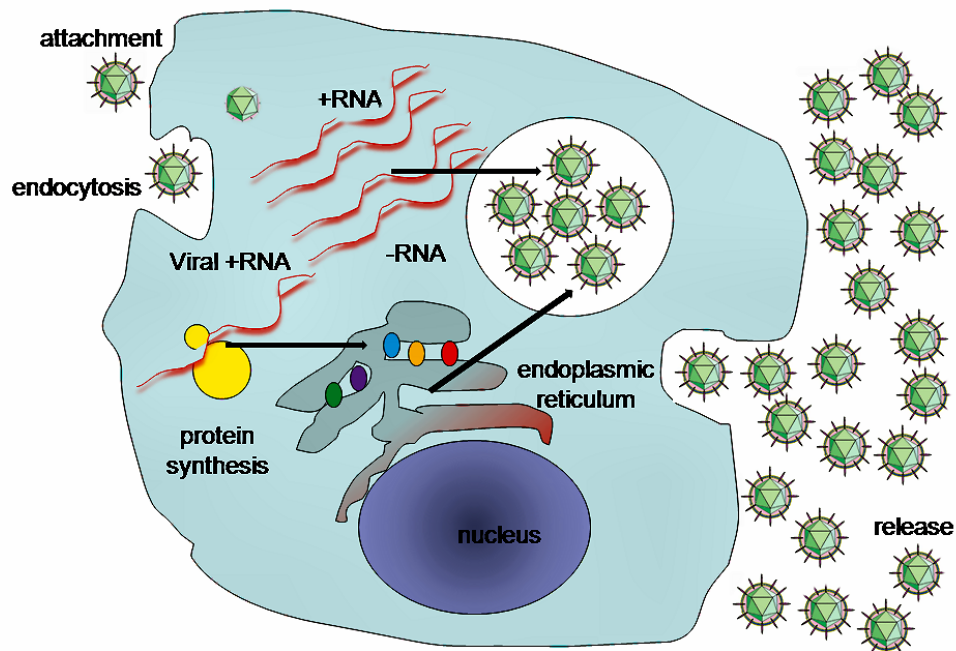
- Viral infection begins when the virus binds to the host cell, then the viral genome enters the cell
 - Some viruses, like bacteriophages, inject their genome into the host
 - Some viruses are absorbed into the host by endocytosis
 - Some viruses fuse their membranes with the host's membrane

EXAMPLE:



- Viral replication – the virus hijacks the replicative machinery of the host to produce products from its own genes
 - The host unwittingly provides nucleotides, enzymes, ribosomes, tRNA, amino acids, and ATP to the virus
 - Nucleic acids and capsomeres are produced, and spontaneously assemble into new viruses

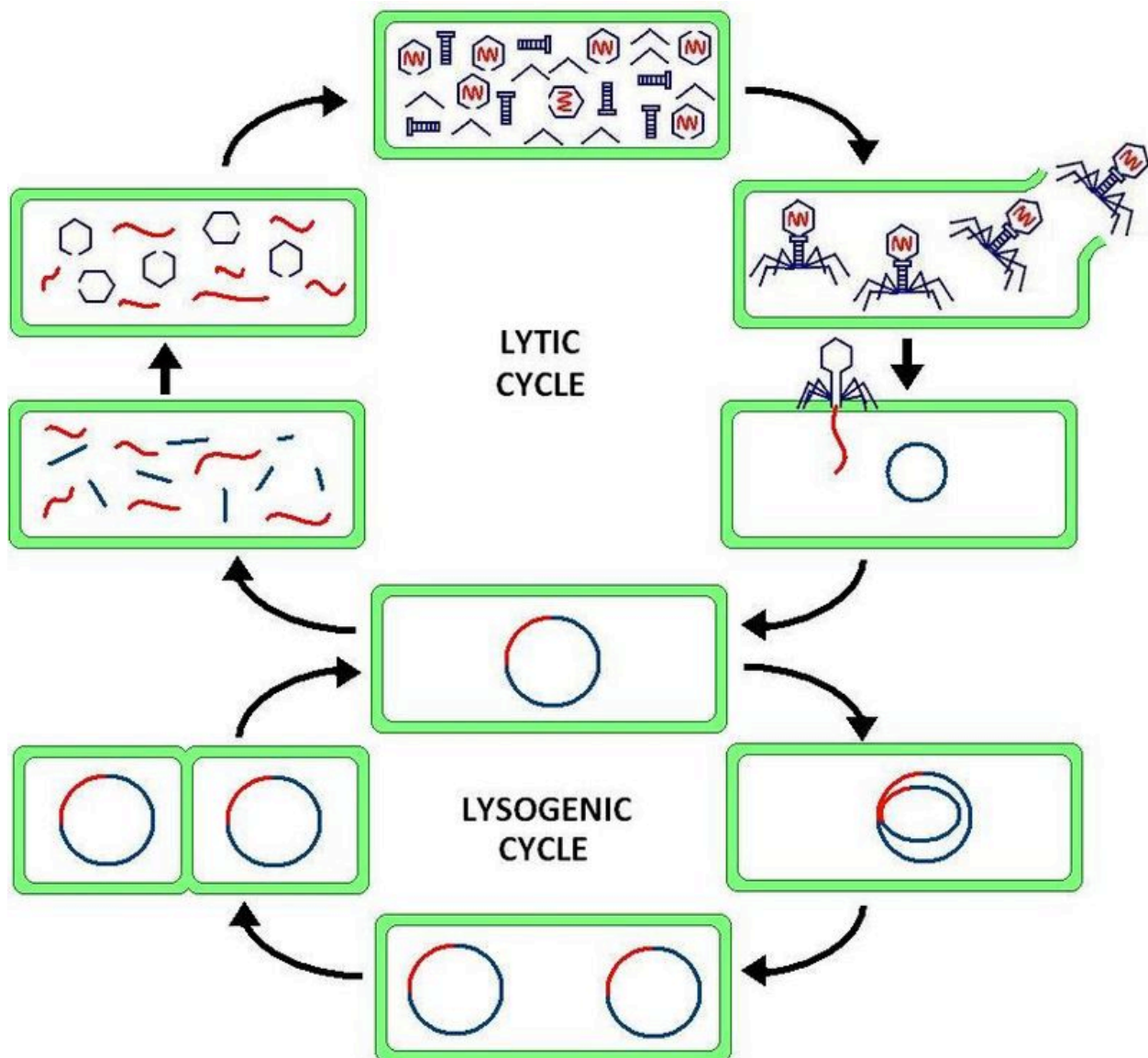
EXAMPLE:



CONCEPT: LYTIC AND LYSOGENIC CYCLES

- **Lytic cycle** – phage replication that culminates in the death of the host
 - The phage inserts its DNA, the host DNA is degraded, then viral components are synthesized
 - **Virulent phage** – a phage that replicates only by the lytic cycle
 - Many bacteria have defensive restriction enzymes that degrade viral DNA
- **Lysogenic cycle** – replicates the viral genome without killing the host
 - The phage inserts its DNA into the host, and it is integrated into the bacterial chromosome
 - **Temperate phage** – a phage capable of replicating through both the lytic and lysogenic cycles
 - **Prophage** – viral DNA integrated into the bacterial chromosome

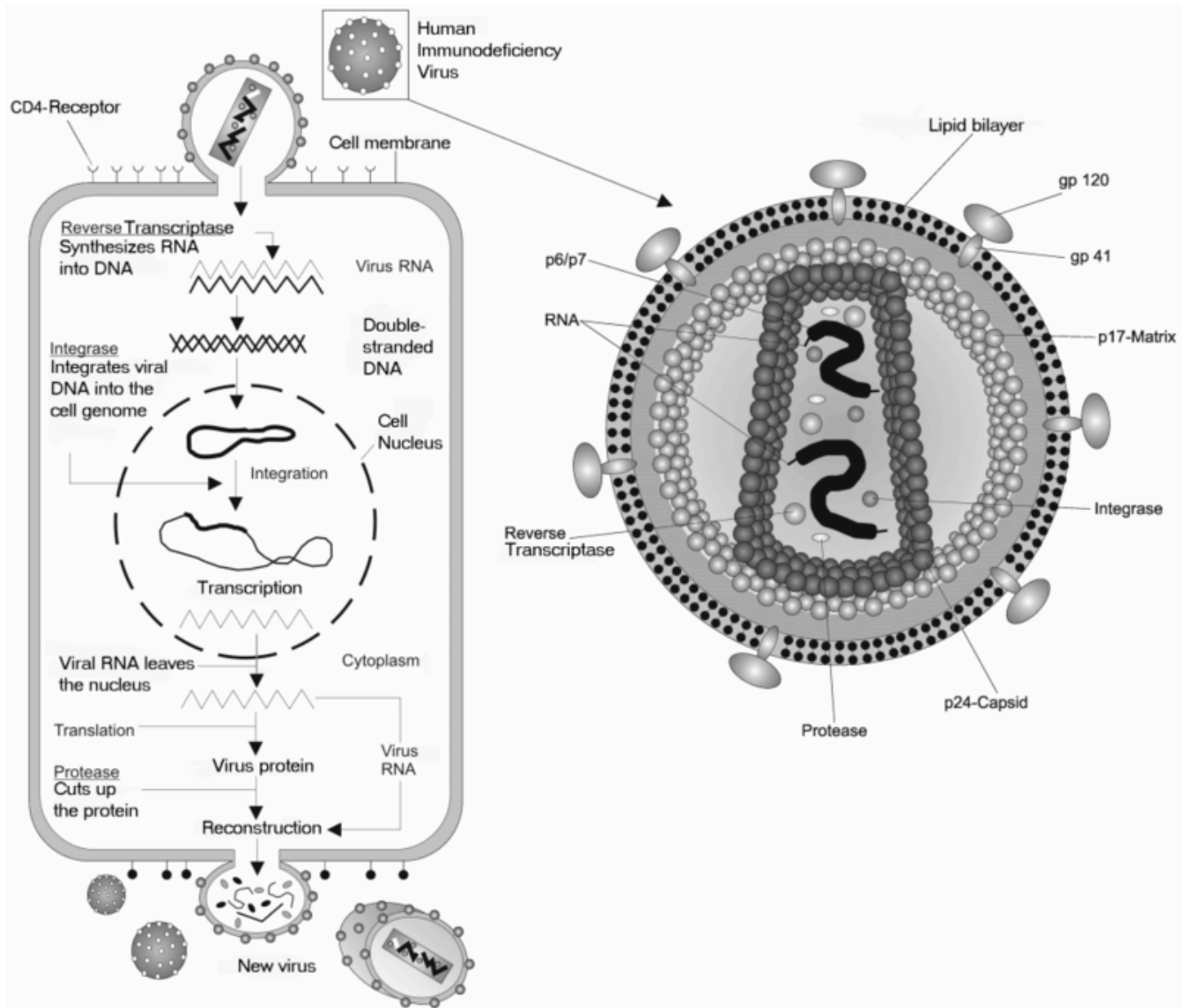
EXAMPLE:



CONCEPT: ANIMAL VIRUS REPLICATION

- Animal viruses tend to have viral envelopes and RNA genomes
- Animal virus replication involves the entry into the cell via cell surface protein-receptor recognition
 - Viral RNA serves as template for synthesis, and replication by viral RNA polymerase
- **Retrovirus** – virus with RNA genome that reverse transcribes its genes into the hosts DNA chromosome
 - **Reverse transcriptase** – the enzyme which catalyzes the RNA → DNA transcription
 - **Provirus** – the viral DNA integrated into the hosts genome

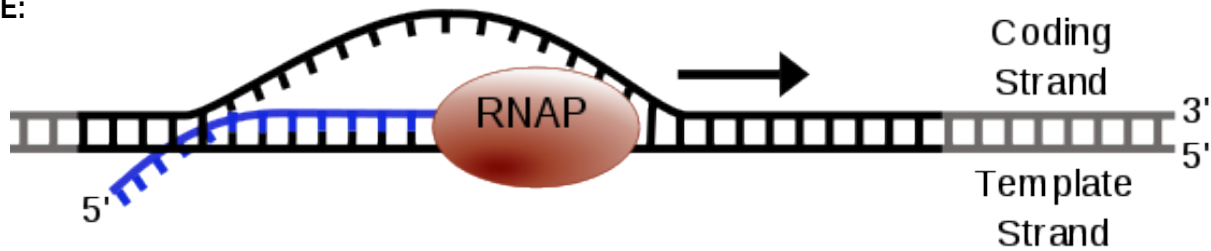
EXAMPLE:



CONCEPT: VIRUS

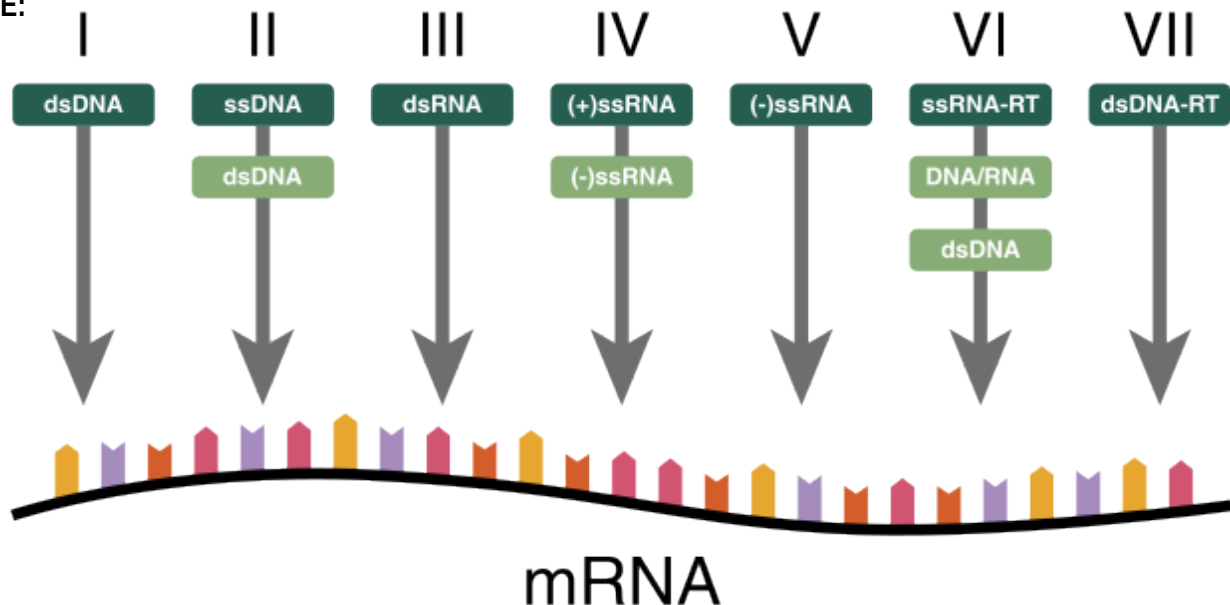
- Double stranded DNA virus – enter nucleus to be replicated, often replicate genomes during S phase of the cell cycle
 - Infect wide array of organisms, except land plants, include bacteriophage and human viruses like smallpox
- Double stranded RNA virus – enters cytosol and serves as template for synthesis, viral enzyme replicates genome
 - Infect a wide variety of organisms, including fungi, plants, vertebrates, bacteria, and insects

EXAMPLE:



- Positive sense RNA virus – genome contains the same sequences need to produce the viral proteins
 - Genome enters cell and is immediately transcribed into proteins
- Negative sense RNA virus – genome contains the complementary sequences to those coding for the viral proteins
 - Viral RNA polymerase must accompany genome to transcribe RNA
- Retrovirus (+ssRNA) – viral reverse transcriptase enters cell with the genome, transcribes the dsDNA version of genome

EXAMPLE:

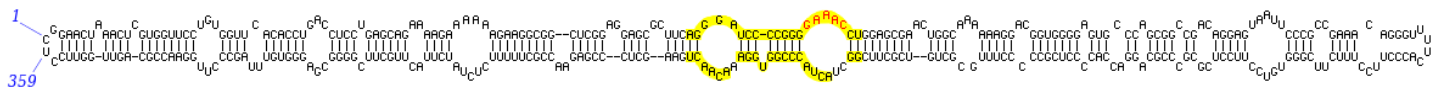


CONCEPT: OTHER INFECTIOUS AGENTS

- **Viroids** – the smallest known pathogens consisting of short, circular, single-stranded RNA

- Viroids are mostly plant pathogens and tend to disrupt growth
- Viroids do not encode proteins, but replicate in the host using host enzymes

EXAMPLE:



- **Prions** – infectious self-propagating proteins that cause brain diseases in animals

- Prions can fold in multiple ways, some of which are transmissible to other proteins

EXAMPLE:

