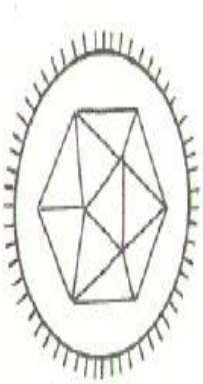
Asst.prof.Hanan Sami Nouri/lab 3



What is a virus?

- A virus is a submicroscopic infectious particle composed of a protein coat (capsid) and a nucleic acid core (either DNA or RNA).

- Viruses are similar in size to a large protein macromolecule, generally smaller than 200 nm in diameter.

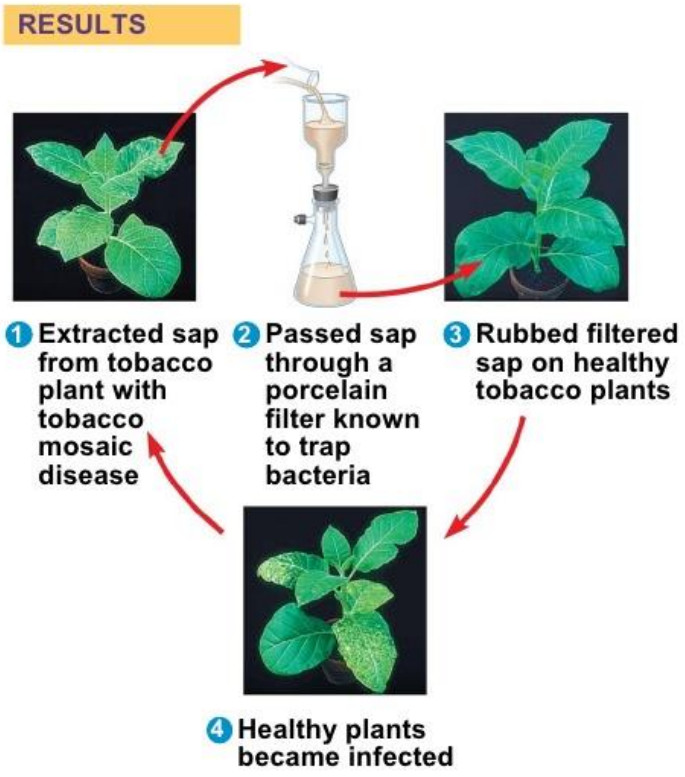
Viruses

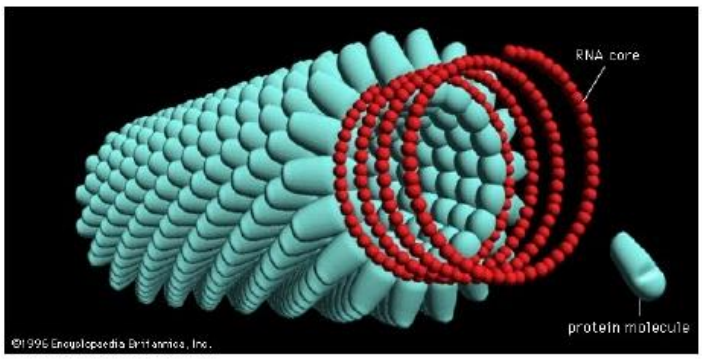
- Particles of nucleic acid, protein, and sometimes lipids
- Viruses can reproduce only by infecting living cells
- A typical virus is composed of a core of DNA or RNA surrounded by a protein coat
- Viruses are very small. They can only be seen with an electron microscope

Discovery of Viruses

- **Search for cause of tobacco mosaic disease led to viruses**
- **The elusive virus was crystallized in 1935 by Stanley**

Fig. 19-2





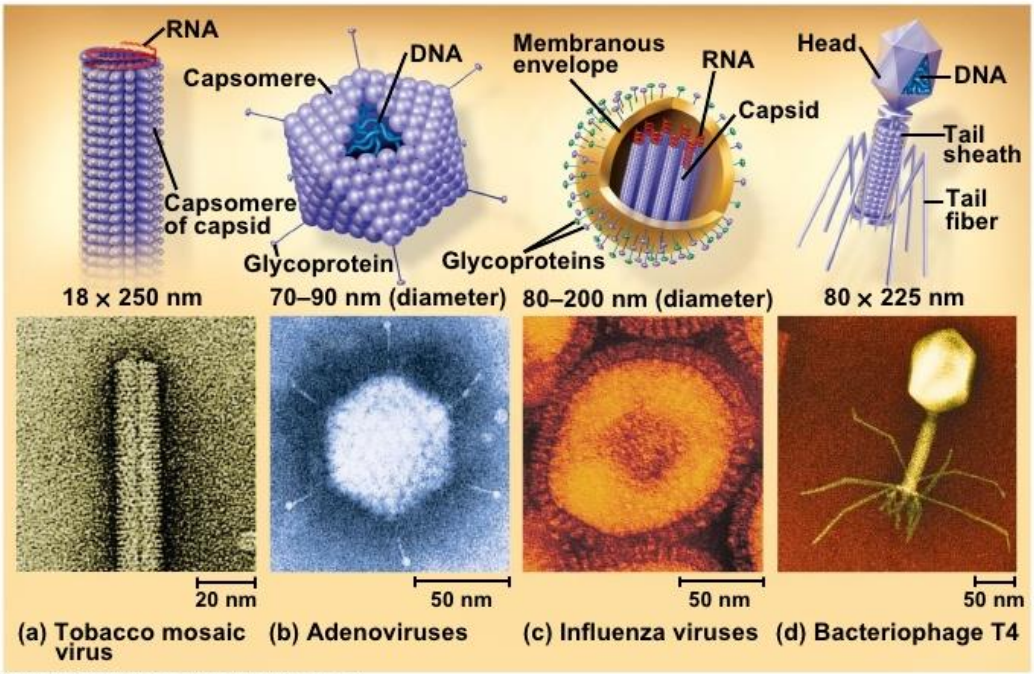
Capsid

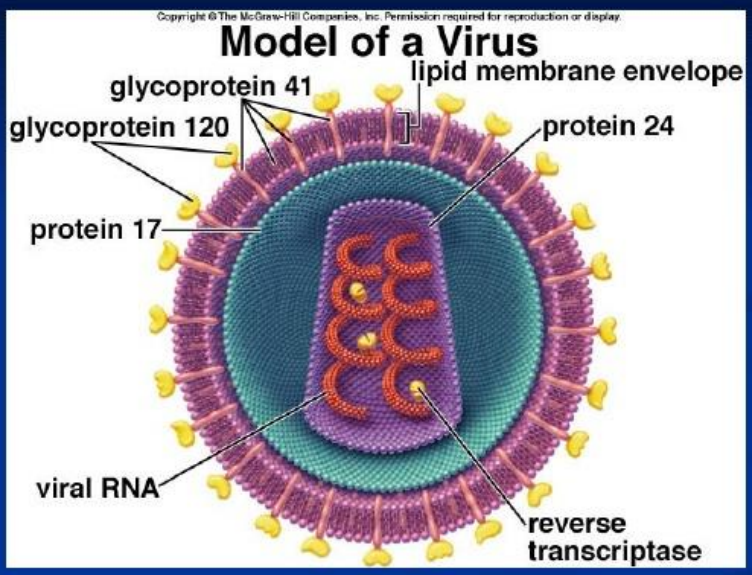
- A viruses protein coat
- The capsid proteins of a typical virus bind to receptors on the surface of a cell and “trick” the cell into allowing it inside
- Once inside, the viral genes are expressed and causes the host cell to make copies of the virus and in the process the host cell is destroyed
- Because viruses must bind precisely to proteins on the cell surface and then use a hosts genetic system, most viruses are highly specific to the cells they infect

Viral Capsids

- **Capsids are built from protein subunits called *capsomeres***
- **May be rod-shaped (helical viruses), polyhedral (icosahedral viruses) or more complex**
- **Some viruses have membranous envelopes that help them infect hosts (flu virus**
- **Bacteriophages, also called phages, are viruses that infect bacteria**

Fig. 19-3





Prions

- Proteins that cause disease in animals

Ex.) Mad cow disease

Viroids

- Single stranded RNA molecules that have no surrounding capsid
- Cause disease in plants

- Viruses are obligate intracellular parasites, which means they can reproduce only within a host cell
- Each virus has a **host range**, a limited number of host cells that it can infect

Viral Reproduction

- Once a viral genome has entered a cell, the cell begins to manufacture viral proteins using the host cell's materials (enzymes, ribosomes, tRNAs, amino acids, ATP, etc.)

- Phages are the best understood of all viruses
- Phages have two reproductive mechanisms: the lytic cycle and the lysogenic cycle

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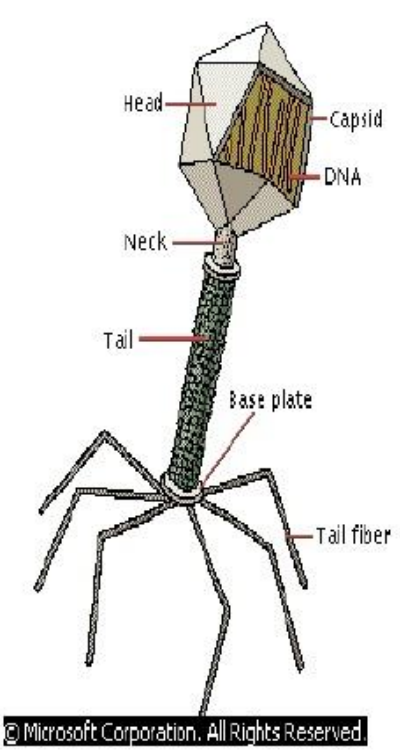
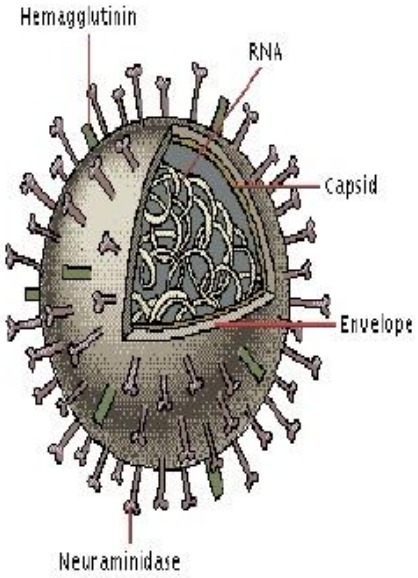
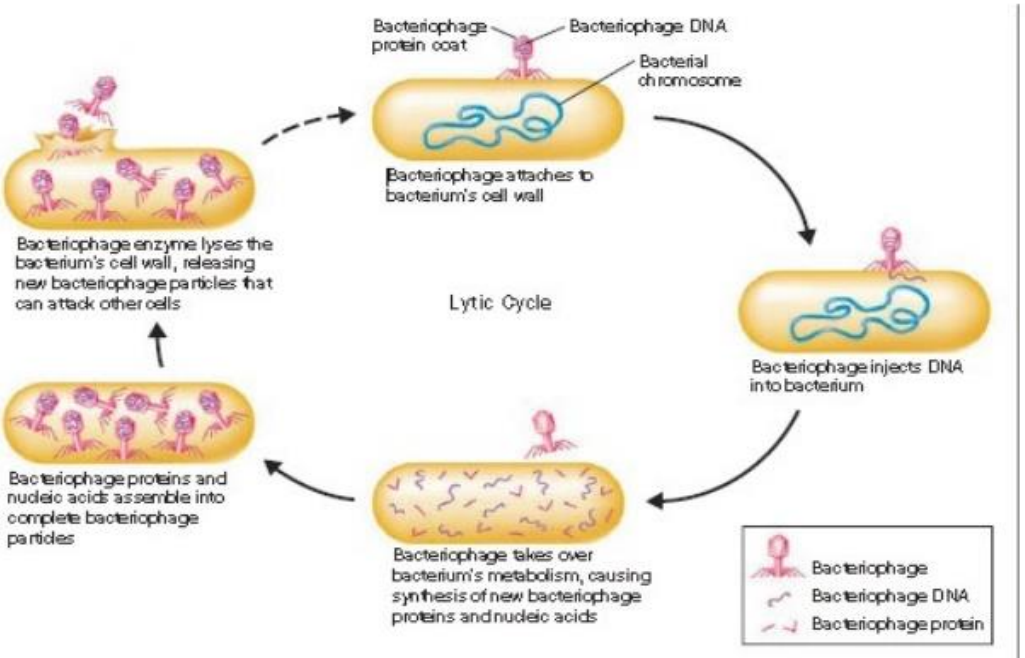
Virus structure:

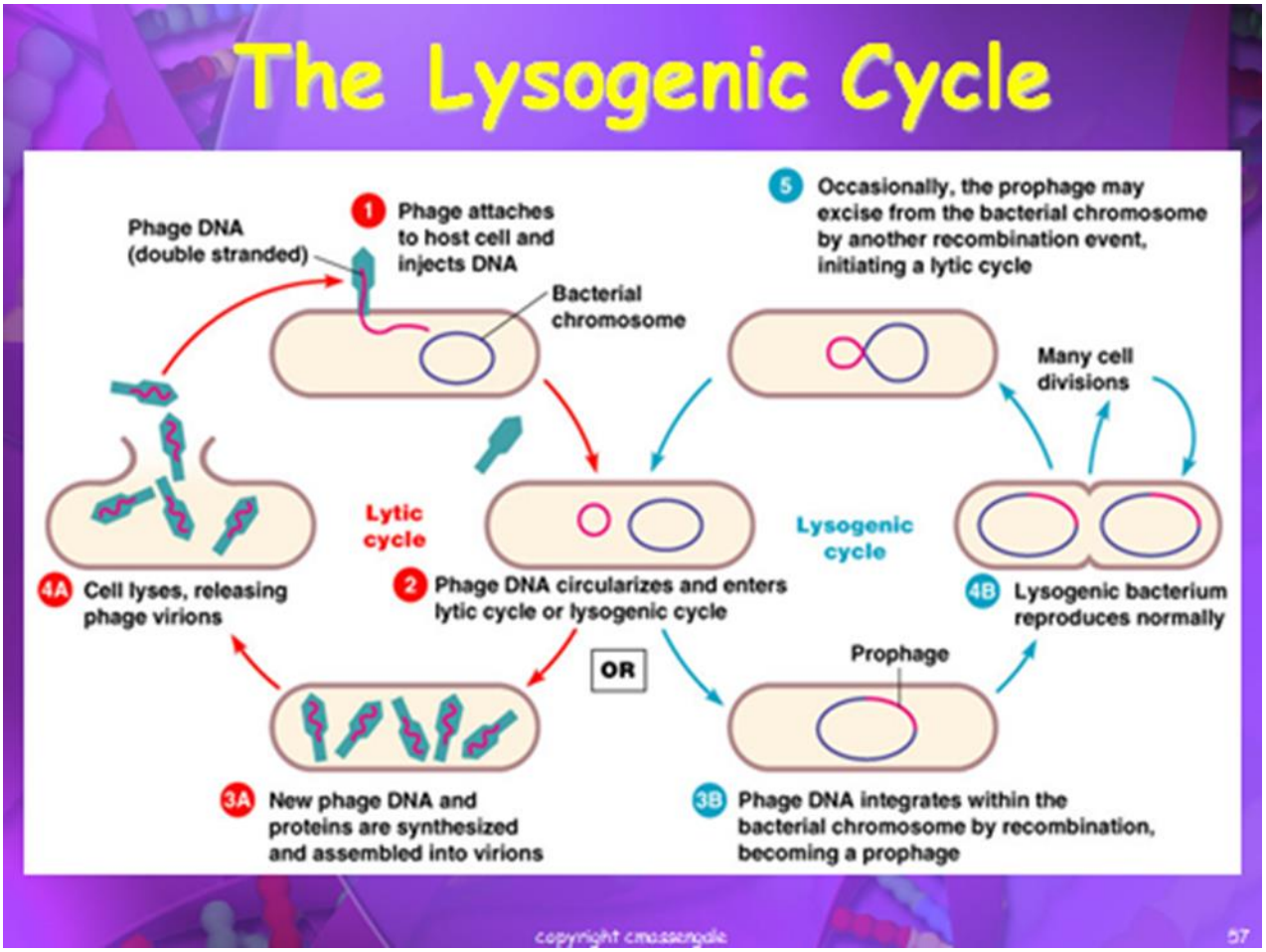




- Protein Coat
- DNA or RNA for replication
- Adsorb-tion site
- Host specific



Lytic Infection During the lytic cycle, a virus invades a host cell, makes copies of itself, and lyses its host. The new viruses can then go on to invade new host cells.



steps of lytic

1-Attachment: to the cell wall .

2-Penetration(injection) of the viral DNA or RNA .

3-Replication (Biosynthesis):of new viral proteins and nucleic acids .

4-Assembly(Maturation)of the new viruses .

5-Release:of the new viruses into the environment (cell lyses).