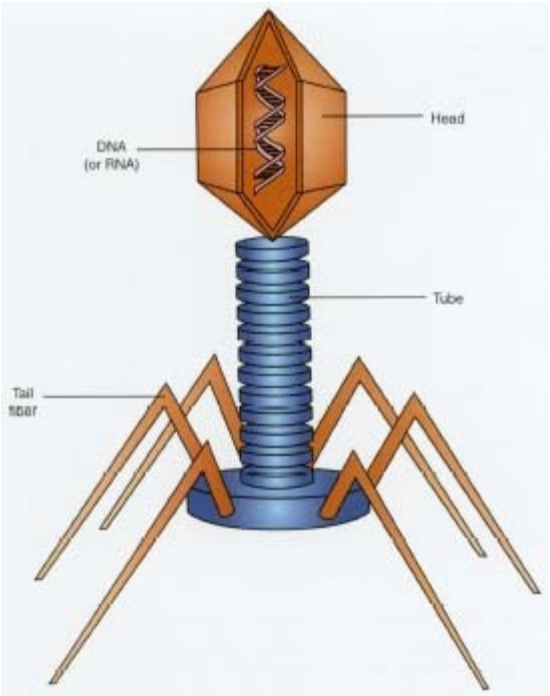
CH. 17.1 VIRUSES

The name "virus" means *poison* in the *Latin* language

I. WHAT IS A VIRUS?

- **A.Virus:** ***is a noncellular particle made up of genetic material and protein that can invade living cells***

- Stated Clearly: Evolution of a Virus

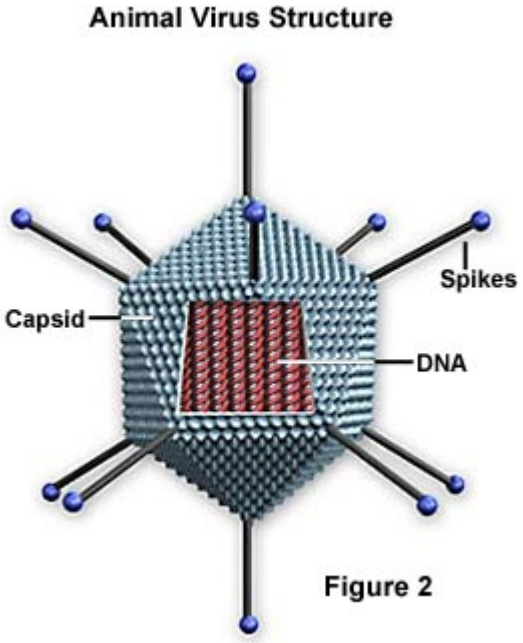


B. STRUCTURE OF A VIRUS

1. CORE of *nucleic acid*

a. Made of *DNA* or *RNA* but never both

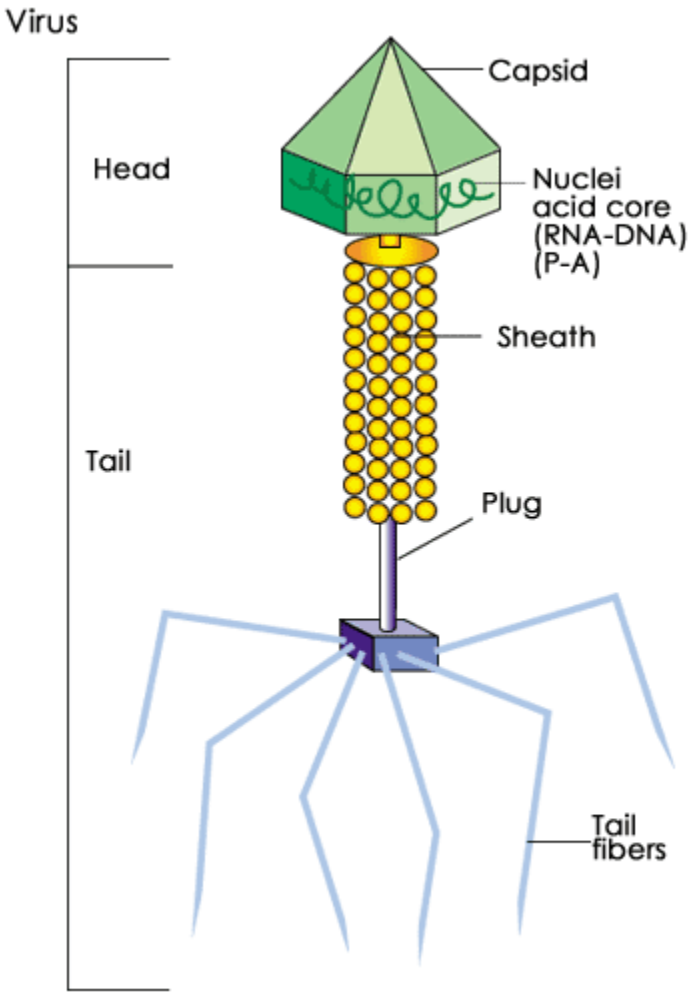
b. Contains up to *several hundred* genes



- Because most viruses are extremely well adapted to their host organism, virus structure varies greatly.

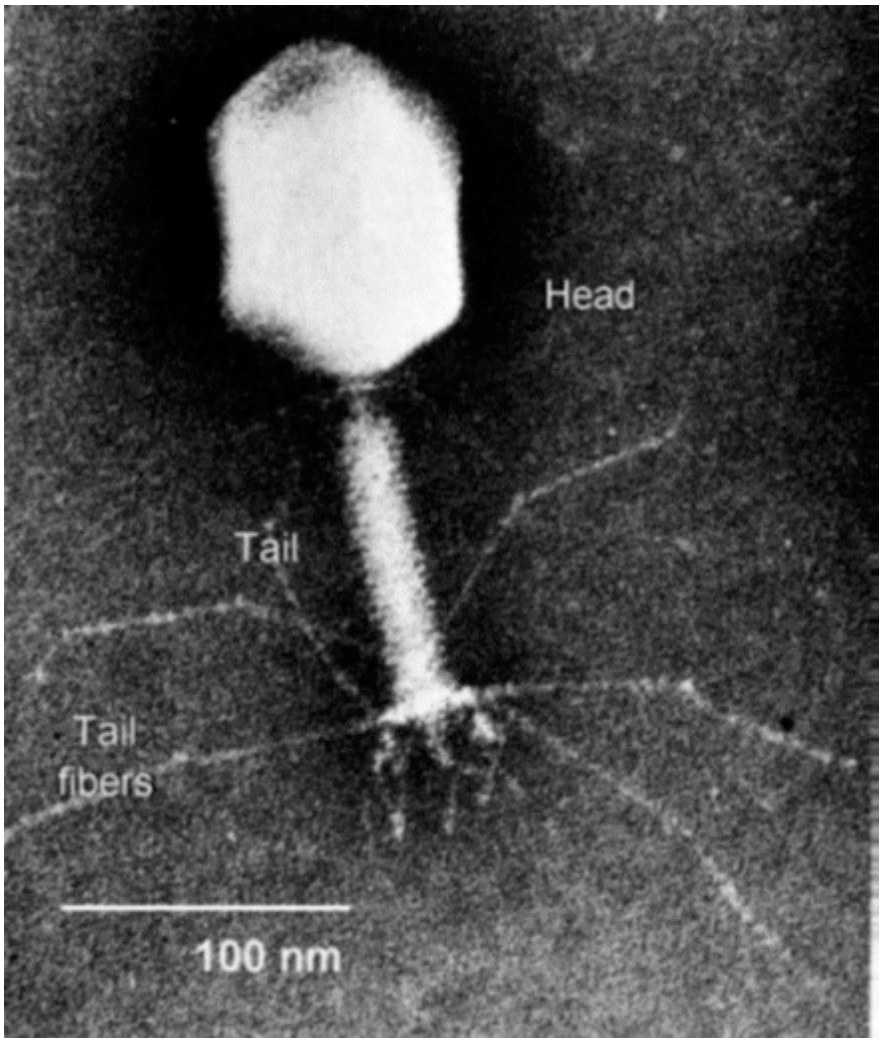
- All viruses have a capsid or head region that contains its genetic material

- Some viruses, mostly those that infect bacteria, have a tail region. The tail is an often elaborate protein structure. It aids in binding to the surface of the host cell and in the introduction of virus genetic material to the host cell.



- **C. Bacteriophage:**

  are viruses that invade bacteria



Some shapes of viruses:

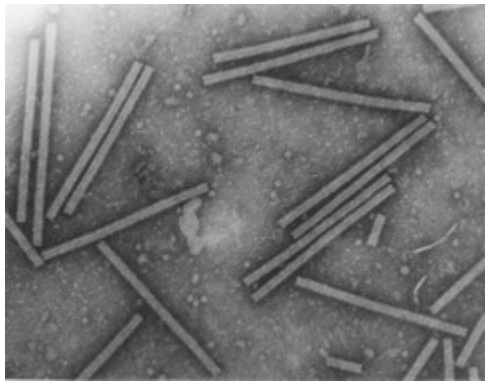
1. ***Rod-shaped***
2. ***Tadpole Shaped***
3. ***Helical***
4. ***Cube shaped***

Viruses vary in size from approximately *20* to *400* nanometers.

1 metre(m)=*1 000 000 000* nanometer(nm)

SPECIFICITY OF A VIRUS

1. What specificity means:
specific viruses will infect specific organisms



Tobacco Mosaic Virus

a. Example: ***a plant virus cannot infect an animal***

Ted-ed: Animal to Human

II. LIFE CYCLE OF A LYTIC VIRUS

- **A. In order to reproduce, *viruses must invade, or infect, a living host cell.***

Click on image

B. Infection:

1. Virus activated by *chance contact* with

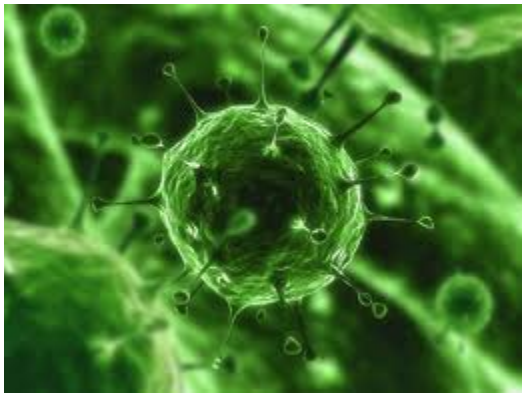
right host cell

2. T4: tail attaches *to the surface of a*

bacterium

3. DNA is *injected into the bacterium*

VIRAL INFECTION



C. GROWTH:

1. **Host cell cannot tell *the difference***

between its own DNA and the DNA of

the virus

2. **Viral messenger RNA (mRNA) acts**

like a *molecular wrecking crew*, taking over the infected *host cell*

3. **Produces enzymes that destroy**

***host's own* DNA but don't harm *the viral* DNA!**

D. REPLICATION

1. **Virus uses materials of the *host cell* to make *thousands of copies of its own protein coat and DNA***

2. **Host cell becomes filled with *hundreds of viral DNA molecules***

3. **This sequence (I,G,R) can take as little as *25* minutes!**

4. **During final stages:**

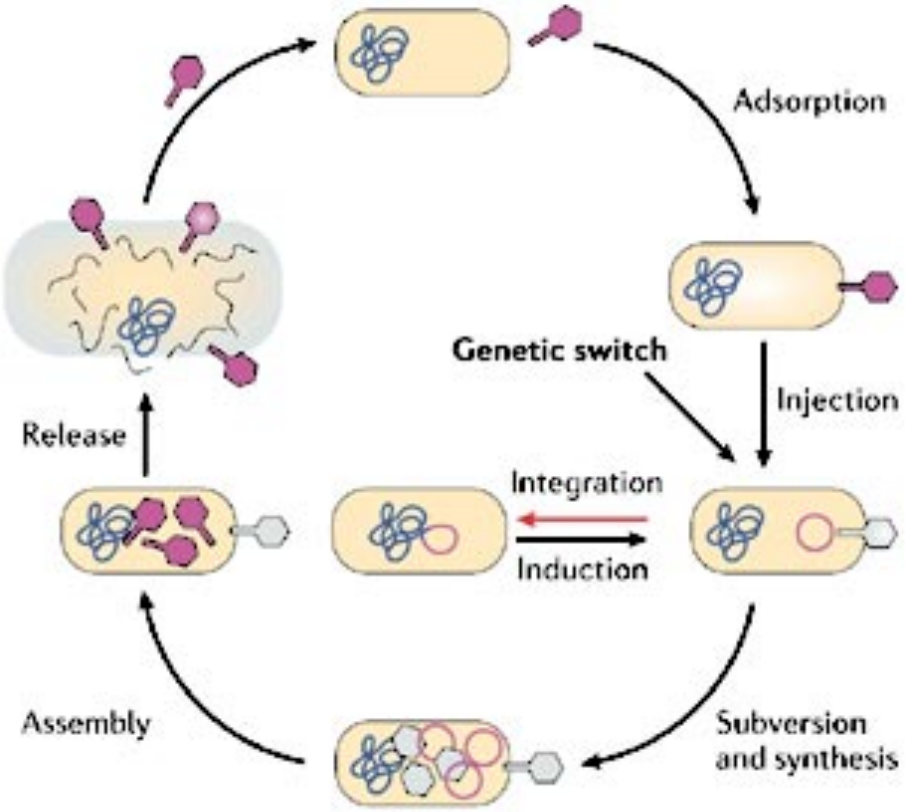
   a. **New *virus* particles are assembled**

   b. **Infected cell *lyses* (bursts)**

   c. ***Hundreds* of new virus particles are *released* and may now infect *other cells***

5. **Called a lytic infection because *the host cell is lysed and destroyed***

LYTIC CYCLE



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E. MAKE A LABELED SKETCH OF THE LYTIC CYCLE FIGURE 17-4

III. LYSOGENIC INFECTIONS

A. How it differs from a lytic infection:

1. Viral DNA enters cells and is *inserted* Into the *DNA* of the host cell

2. Once there, called a *prophage*

3. May remain in host DNA for *many generations*

Animation

PROPHAGE ACTIVITY:

May actually benefit the host cell by:

1. **Blocking the entrance of *other viruses***
2. **Adding useful *DNA* sequences**
3. **Doesn't stay in *prophage* form forever; eventually DNA becomes *active*, and removes itself from host DNA**
4. **Then it directs the *synthesis* of new *virus particles***
5. **Factors that can activate the virus:**
   - **a. *Sudden changes in temperature***
   - **b. *Availability of nutrients***

C. RETROVIRUSES:

1. Contain *RNA* as their genetic material
2. When infecting a host, make a *DNA* copy of their *RNA* genes
3. This *DNA* acts like that of a lysogenic virus and is *inserted* into the host DNA
4. Name means "*backward virus*" and comes from their genes being copied

backward from RNA to *DNA*

5. AIDS is caused by a *retrovirus called* HIV

IV. VIRUSES AND LIVING CELLS

A.Viruses are parasites:

an organism that depends entirely upon another living organism for its existence in such a way that it harms that organism

ARE VIRUSES LIVING OR NON-LIVING?

1. **Evidence for "non-living":**

   - *viruses cannot grow and develop independently*

   - *viruses cannot reproduce independently*

   - *viruses cannot obtain and use energy independently*

2. **Evidence for "living":**
   - *contains DNA*

ORIGIN OF VIRUSES

A. More likely that viruses developed after living cells because they are completely

dependent **upon living cells for** ***growth*** **and** ***reproduction***