

# Viruses

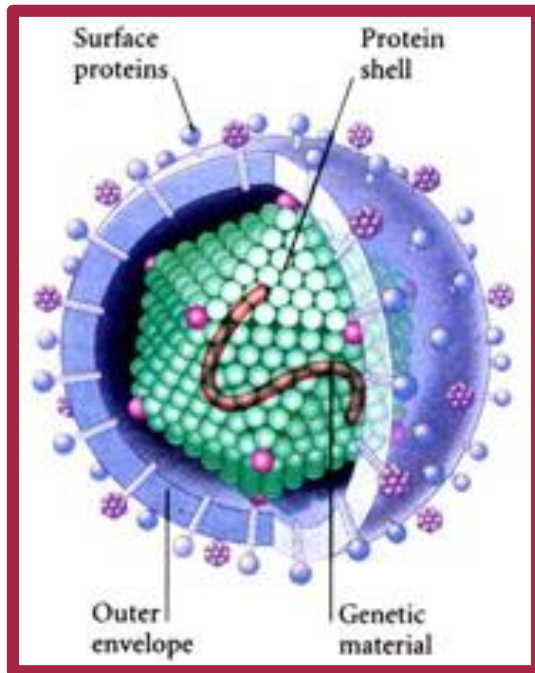
Doesn't belong to any kingdom  
-It's not a plant or an animal.  
-It's not a fungi, protist, or  
bacteria.

**WHAT IS A VIRUS?**

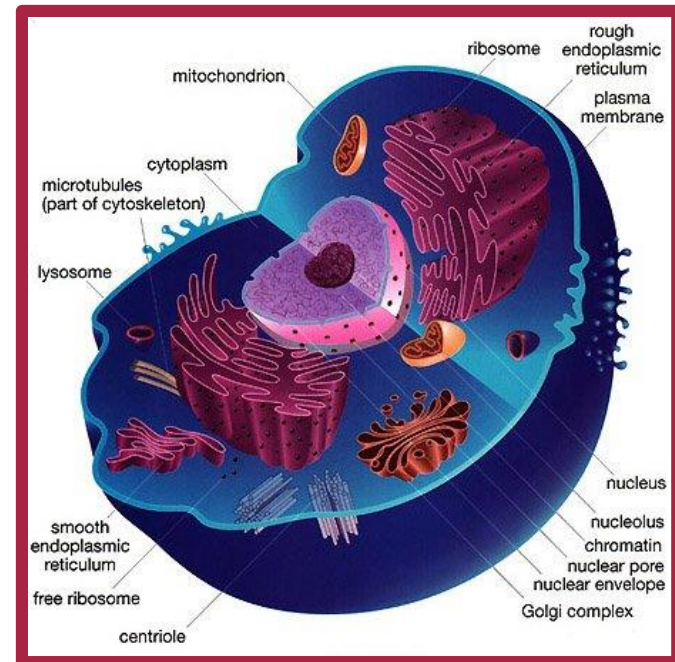
A virus is an infectious agent made up of nucleic acid (DNA or RNA) wrapped in a protein coat called a capsid.

Viruses have no nucleus, no organelles, no cytoplasm or cell membrane—Non-cellular

This is why it does NOT belong to any kingdom.



VS





Viruses have either DNA or RNA but NOT both.

Viruses with \_\_\_\_\_ that transcribe into \_\_\_\_\_ are

Viruses are parasites—an organism that depends entirely upon another living organism (a host) for its existence in such a way that it harms that organism.

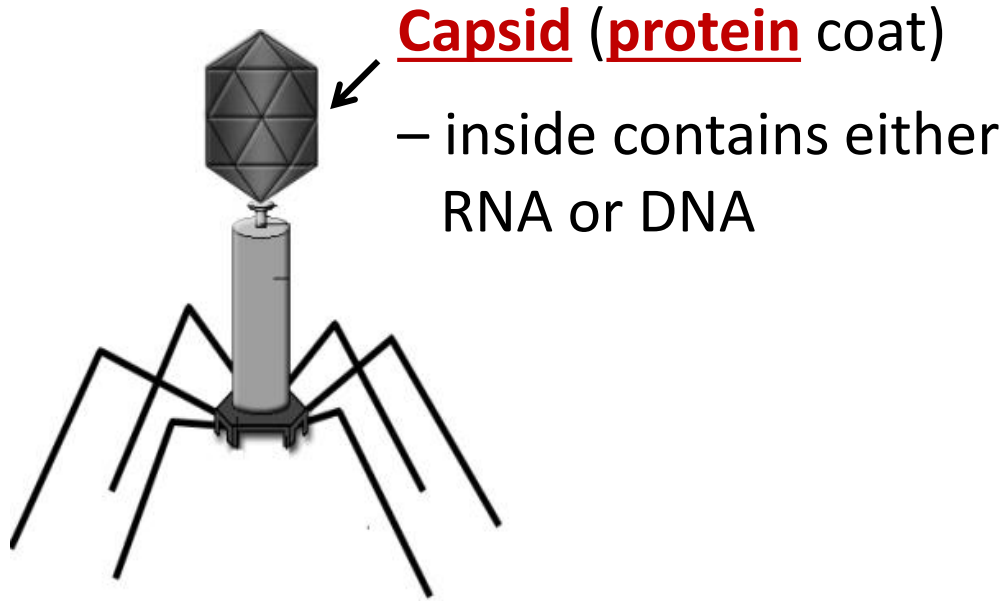


(This is the reason why HIV is so incurable.)

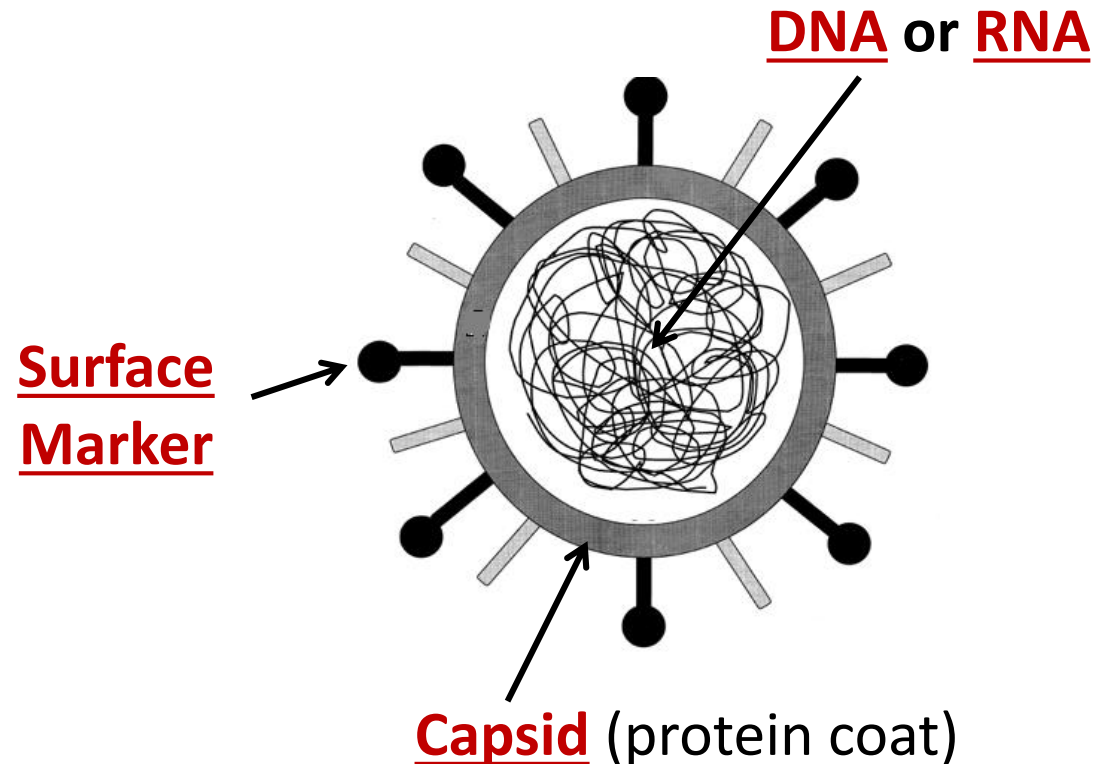
A flea is a parasite to a dog and is harmful to the dog.



# 1. Bacteriophage—viruses that infect bacteria



## 2. Flu (influenza), HIV



# ***VIRUS MODEL***

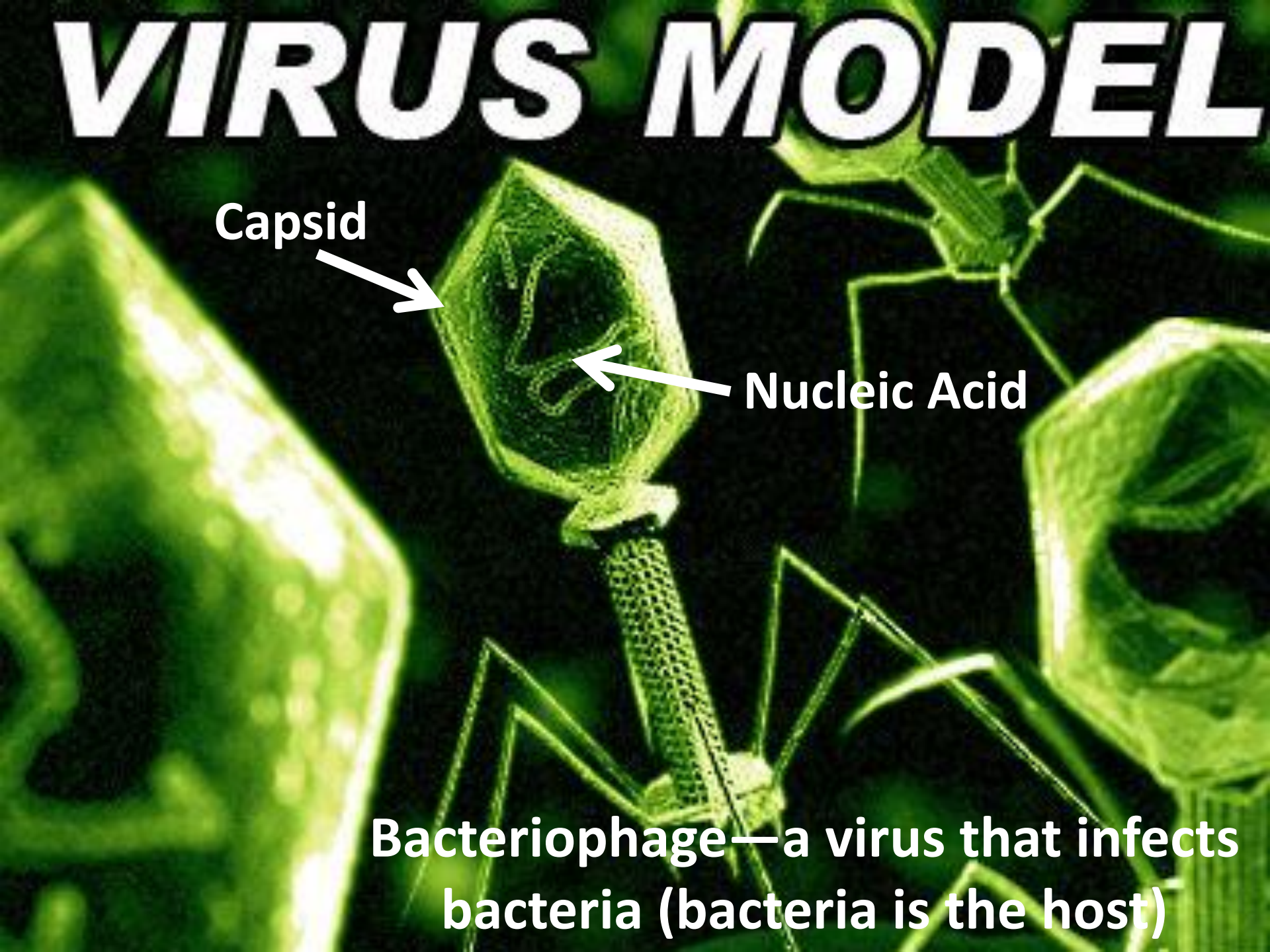
**Capsid**



**Nucleic Acid**



**Bacteriophage—a virus that infects  
bacteria (bacteria is the host)**

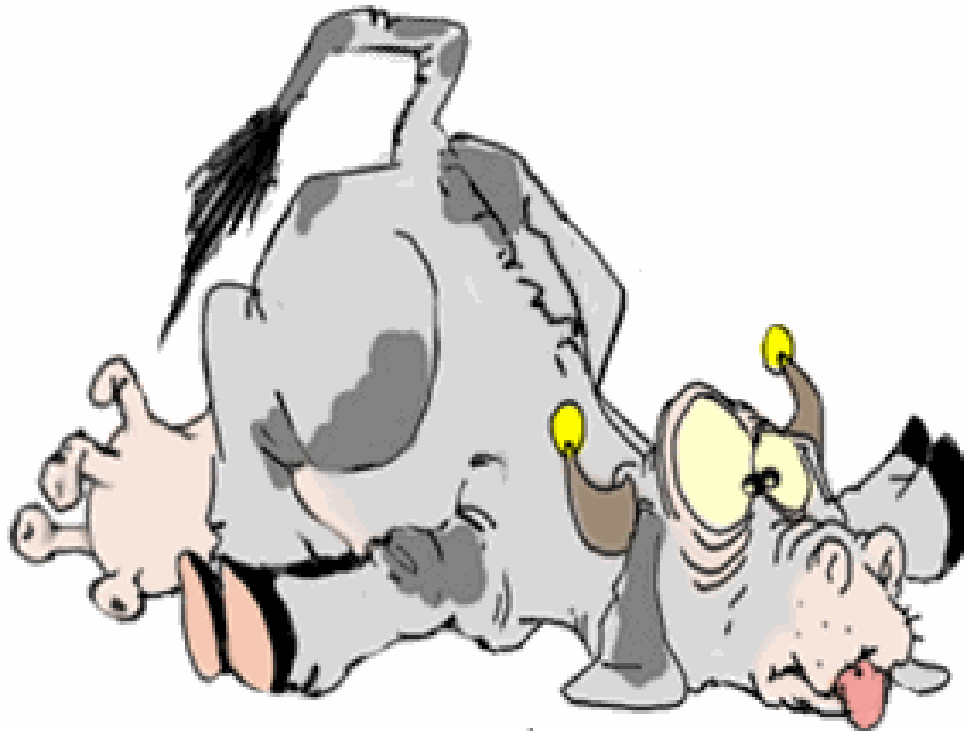




### C. Nonviral particle

Has protein only, no DNA or RNA (cause of mad cow disease and Creutzfeldt-Jacob disease in humans)—  
Prions (affects the brain and is always fatal)

No DNA or RNA!



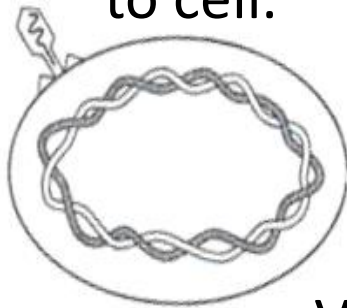
...it wasn't Mad Cow Disease...  
Elsie was "Lactos Intolerant"!

D. Replication is how a virus spreads.

A virus **CANNOT** reproduce by itself—it must invade a host cell and take over the cell activities, eventually causing destruction of the cell and killing it. (The virus enters a cell, makes copies of itself and causes the cell to burst releasing more viruses.)

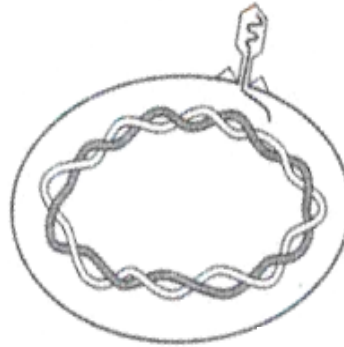
Virus attaches to cell.

Step 1



DNA/RNA injected into cell.

Step 2



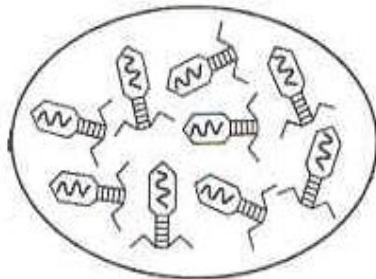
DNA/RNA is copied.

Step 3



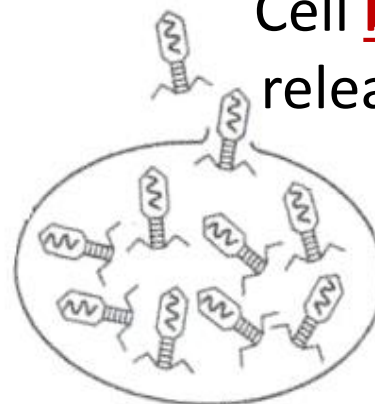
Virus copies itself.

Step 4



Cell bursts (lyses) and releases new viruses.

Step 5



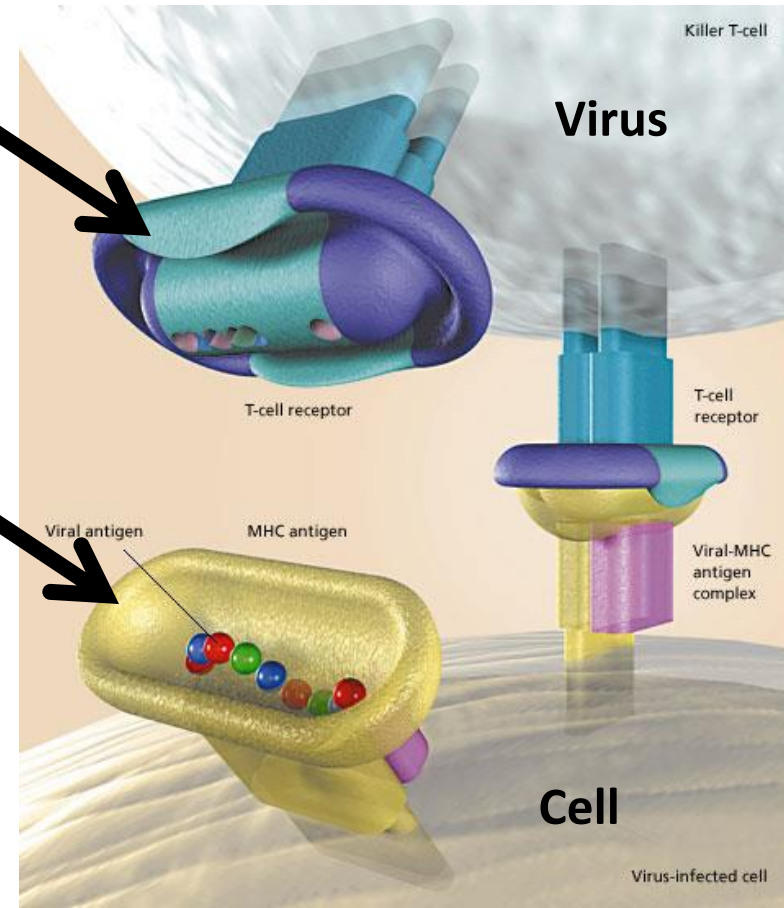
# Certain viruses can only attack certain cell types. They are said to be specific.

Example: The rabies virus only attacks brain or nervous cells.

Surface Markers

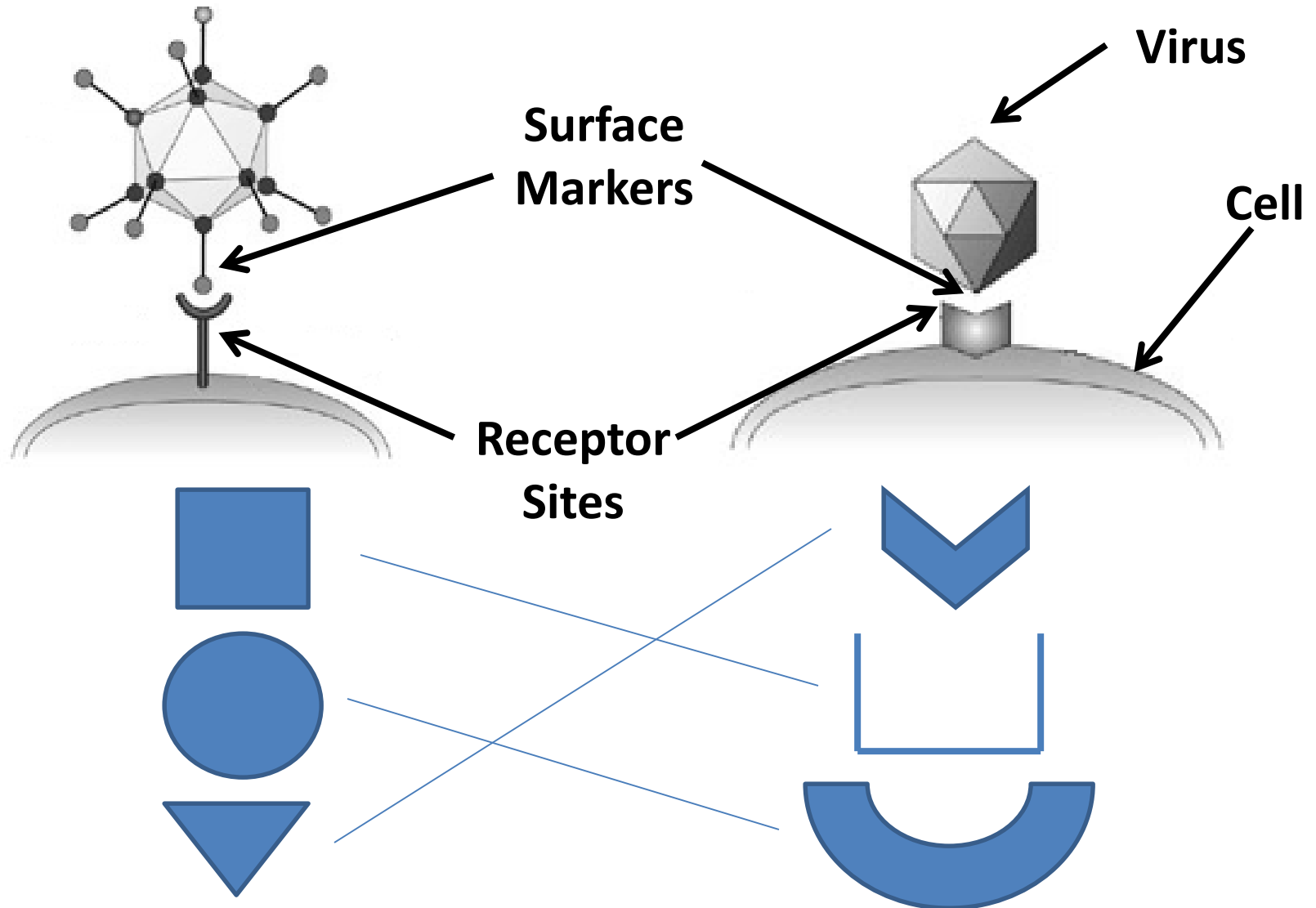
Receptor Sites

It's like the pieces of a puzzle. The ends have to match up so only certain pieces fit.





A virus recognizes cells it can infect by matching its surface marker with a receptor site on a cell.



# Importance:

\*Harmful

Causes disease—pathogenic

Disease producing agent—pathogen

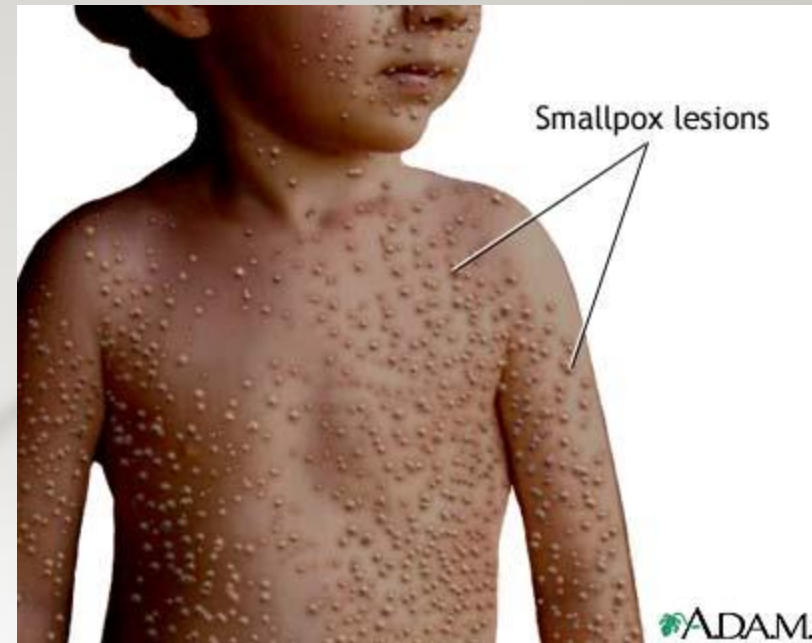
Human Diseases: Warts, common cold, Influenza (flu), Smallpox, Ebola, Herpes, AIDS, Chicken pox, Rabies

Viruses disrupt the body's normal equilibrium/balance

Viruses can be prevented with vaccines, but NOT treated with antibiotics. (antibiotics treat bacteria)

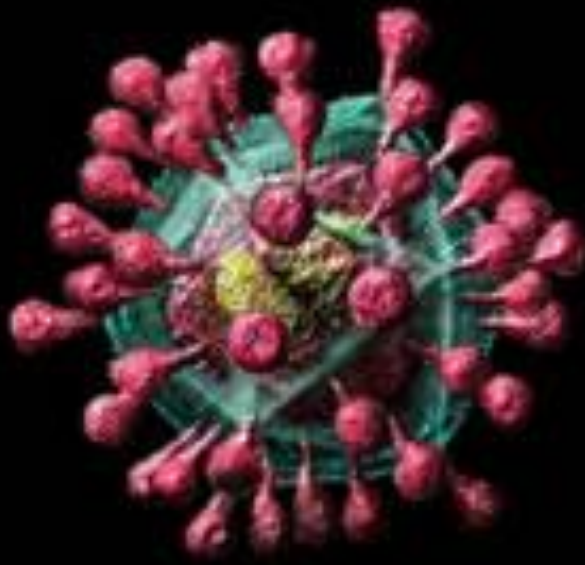
# Beneficial:

Genetic Engineering—harmless virus carries good genes into cells.

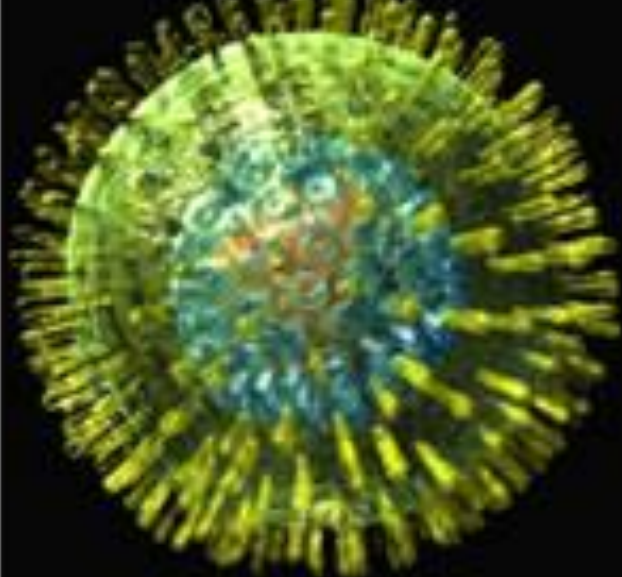




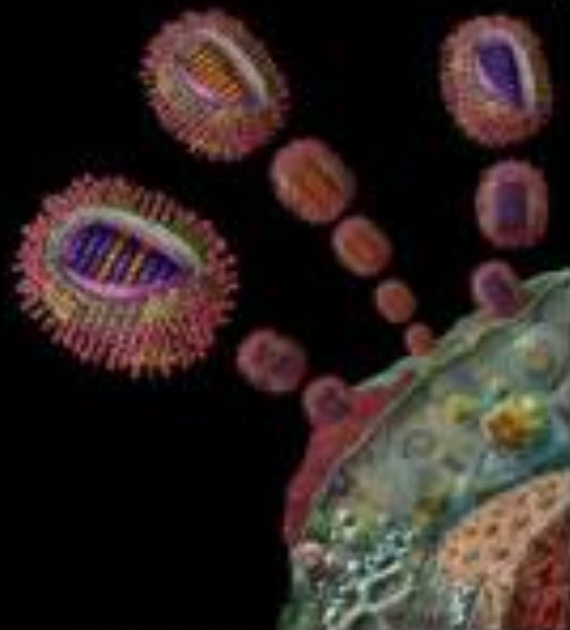
**Hepatitis C virus**



**Coronavirus**



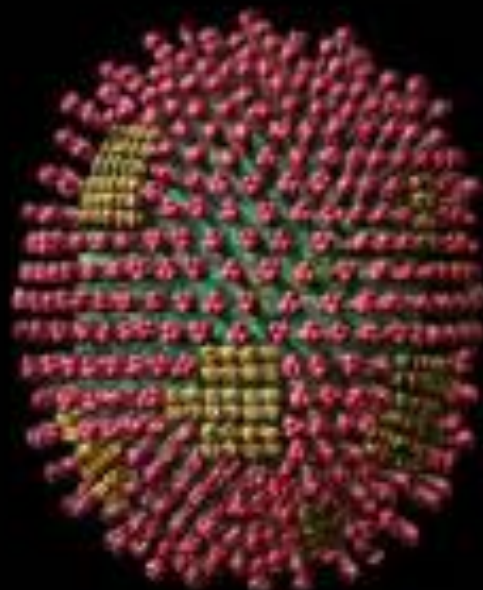
**Herpes virus**



**Bird flu virus**



**Smallpox virus**



**Influenza virus**



# Virus

# Living Cell

	<b>Virus</b>	<b>Living Cell</b>
<b><i>Structure</i></b>	RNA or DNA core (center), protein coat (capsid)	Cell membrane, cytoplasm, genetic material, organelles
<b><i>Reproduction</i></b>	Copies itself only inside host cell--REPLICATION	Asexual or Sexual
<b><i>Genetic Material</i></b>	DNA <u>or</u> RNA	DNA <u>and</u> RNA
<b><i>Growth and Development</i></b>	NO	YES—Multicellular Organisms
<b><i>Obtain and Use Energy</i></b>	NO	YES
<b><i>Response to Environment</i></b>	NO	YES
<b><i>Change over time</i></b>	NO	YES

A microscopic image showing plant cells in shades of blue and green. A large, spherical, brownish virus particle with many small spikes is prominent in the center-left. Several smaller, similar virus particles are scattered throughout the field of view.

How many characteristics  
of life do viruses possess?

**ONE**

\*Genetic Material

**Are viruses living?**

**NO**