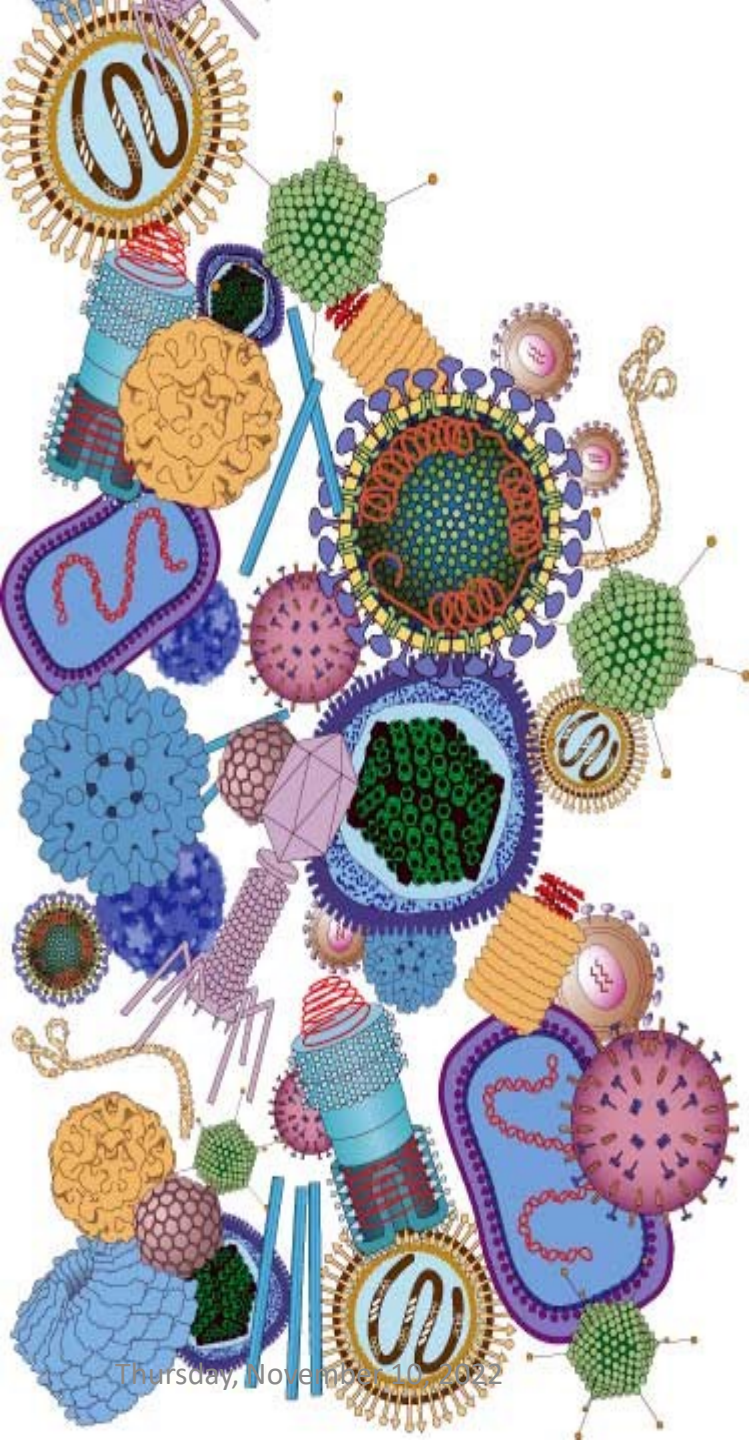




Viruses

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Department of Botany

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Viruses

Virus doesn't belong to any kingdom.

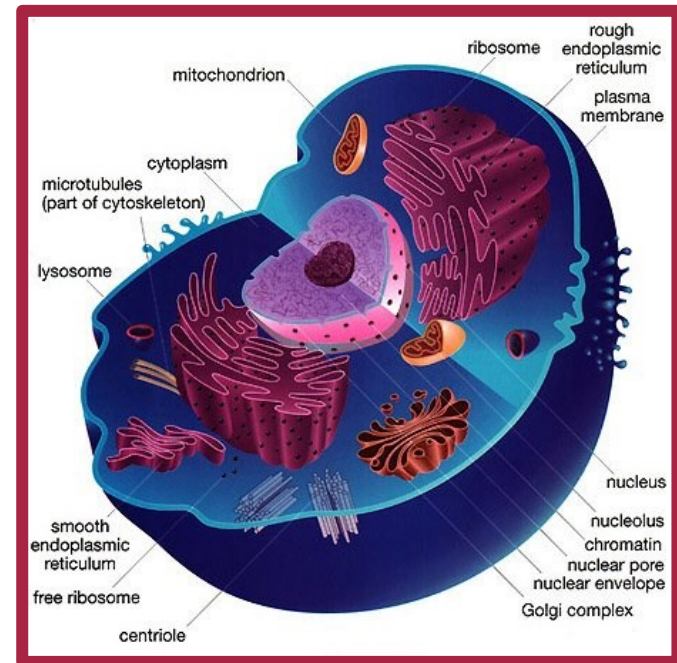
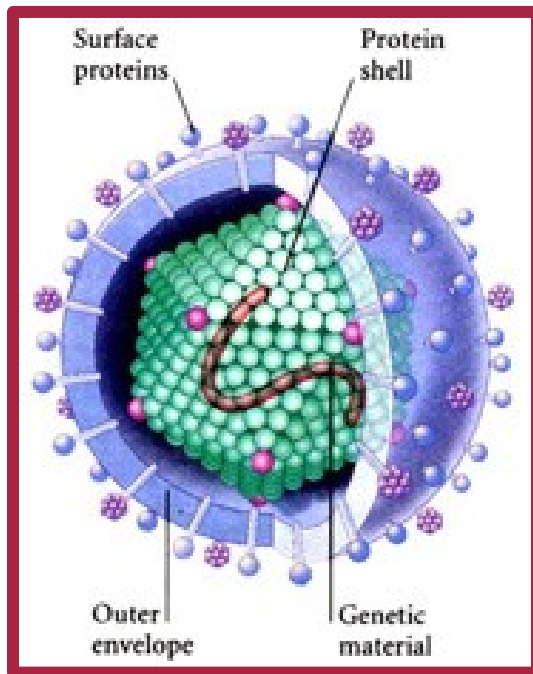
1. It's not a plant or an animal.
2. It's not a fungi, protist, mycoplasma or bacteria.

WHAT IS A VIRUS?

A virus is an infectious agent made up of nucleic acid (DNA or RNA) covered/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.



Viruses have either DNA or RNA.

Viruses with **RNA** that transcribe into DNA are called **retroviruses**.

Viruses are parasites—

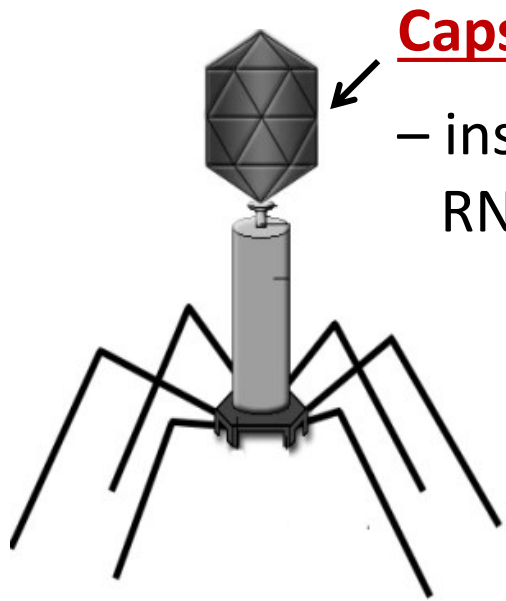
An organism that depends entirely upon another living organism for its existence in such a way that it harms that organism.



HIV Infected Cell

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

1. Bacteriophage—viruses that infect bacteria

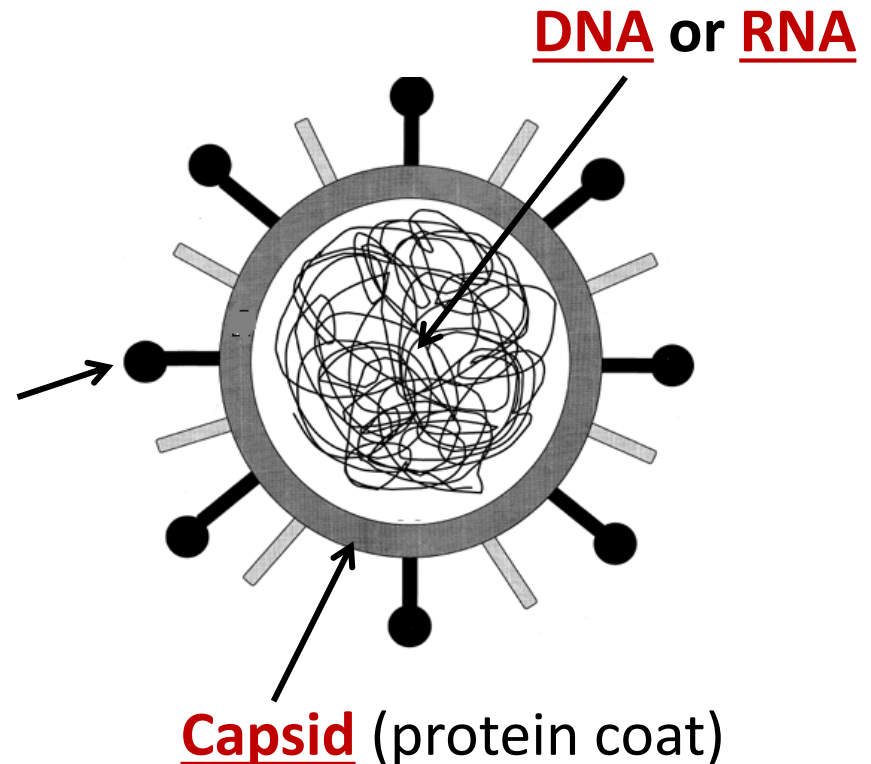


Capsid (protein coat)

– inside contains either
RNA or DNA

2. Flu (influenza), HIV

Surface
Marker



Order	Morphology	Nucleic acid	Examples
<i>Belfryvirales</i>	Enveloped, isometric	Linear dsDNA	
<i>Caudovirales</i>	Nonenveloped, contractile tail	Linear dsDNA	
<i>Caudovirales</i>	Nonenveloped, contractile tail	Linear dsDNA	T4 , Mu , P1 , P2
<i>Caudovirales</i>	Nonenveloped, noncontractile tail (long)	Linear dsDNA	λ , T5 , HK97 , N15
<i>Caudovirales</i>	Nonenveloped, noncontractile tail (short)	Linear dsDNA	T7 , T3 , Φ29 , P22
<i>Durnavirales</i>	Nonenveloped, isometric	Linear dsRNA	
<i>Haloruvirales</i>	Enveloped, pleomorphic	Circular ssDNA, circular dsDNA, or linear dsDNA	

Order	Morphology	Nucleic acid	Examples
<i>Mindivirales</i>	Enveloped, spherical	Linear dsRNA	Φ6
<i>Norzivirales</i>	Nonenveloped, isometric	Linear ssRNA	
<i>Petitvirales</i>	Nonenveloped, isometric	Circular ssDNA	ΦX174
<i>Tubulavirales</i>	Nonenveloped, filamentous	Circular ssDNA	M13
<i>Tubulavirales</i>	Nonenveloped, filamentous	Circular ssDNA	

Non-viral 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)

Replication is how a virus spreads

A virus **CANNOT** reproduce by itself—it must enter in 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.)

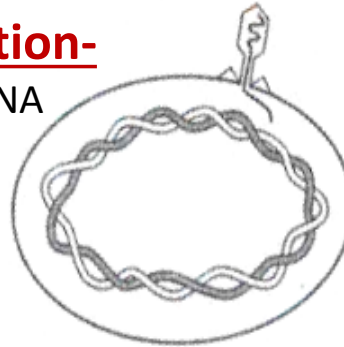
Step 1

Attachment



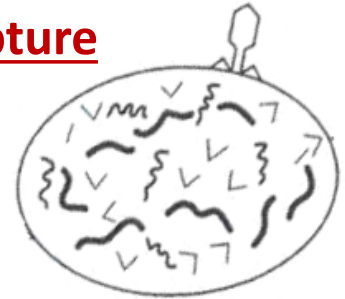
Step 2

Penetration-
DNA/RNA



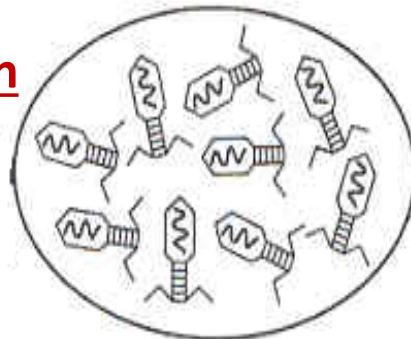
Step 3

Capture

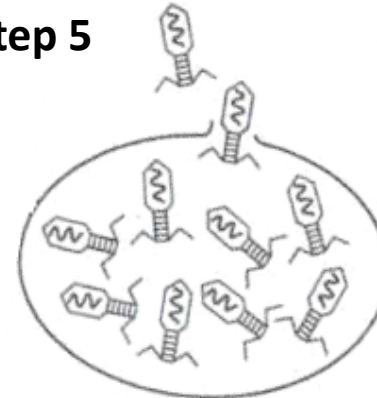


Step 4

Multiplication



Step 5



Cell **bursts** (lyses) and releases new viruses.

Species Specific: Certain viruses can only attack certain cell types. They are said to be specific.

Example: (1) *Tobacco mosaic virus*, (2) *Tomato spotted wilt virus*, (3) *Tomato yellow leaf curl virus*, (4) *Cucumber mosaic virus*, (5) *Potato virus Y*, (6) *Cauliflower mosaic virus* infect only Tobacco, Tomato, Cucumber, Potato and Cauliflower respectively.

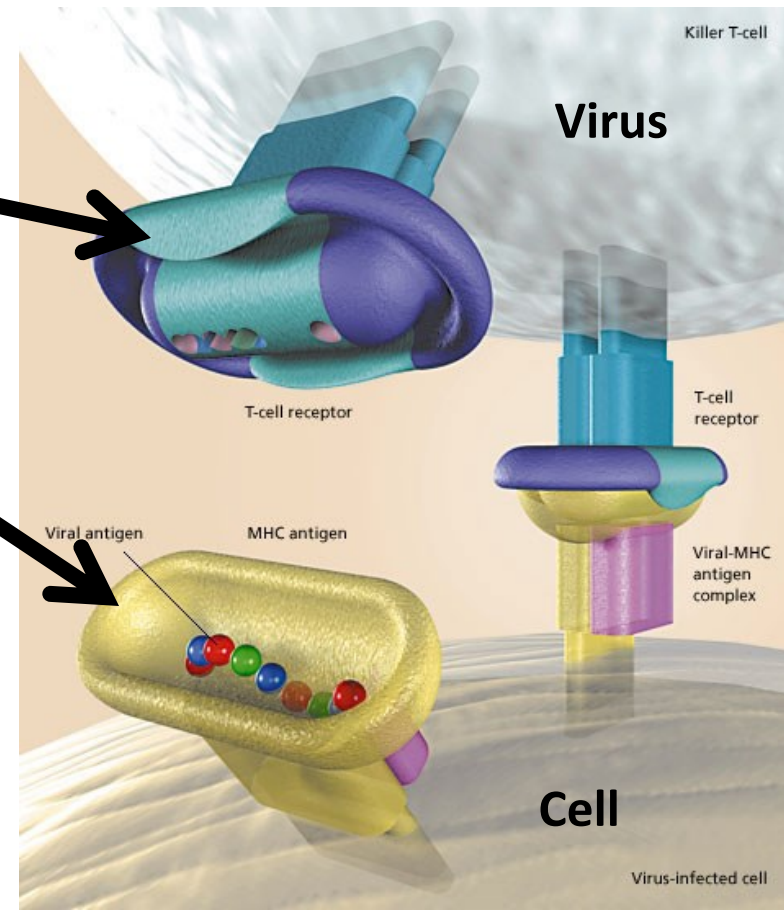
The rabies virus only attacks brain or nervous cells.

Surface Markers

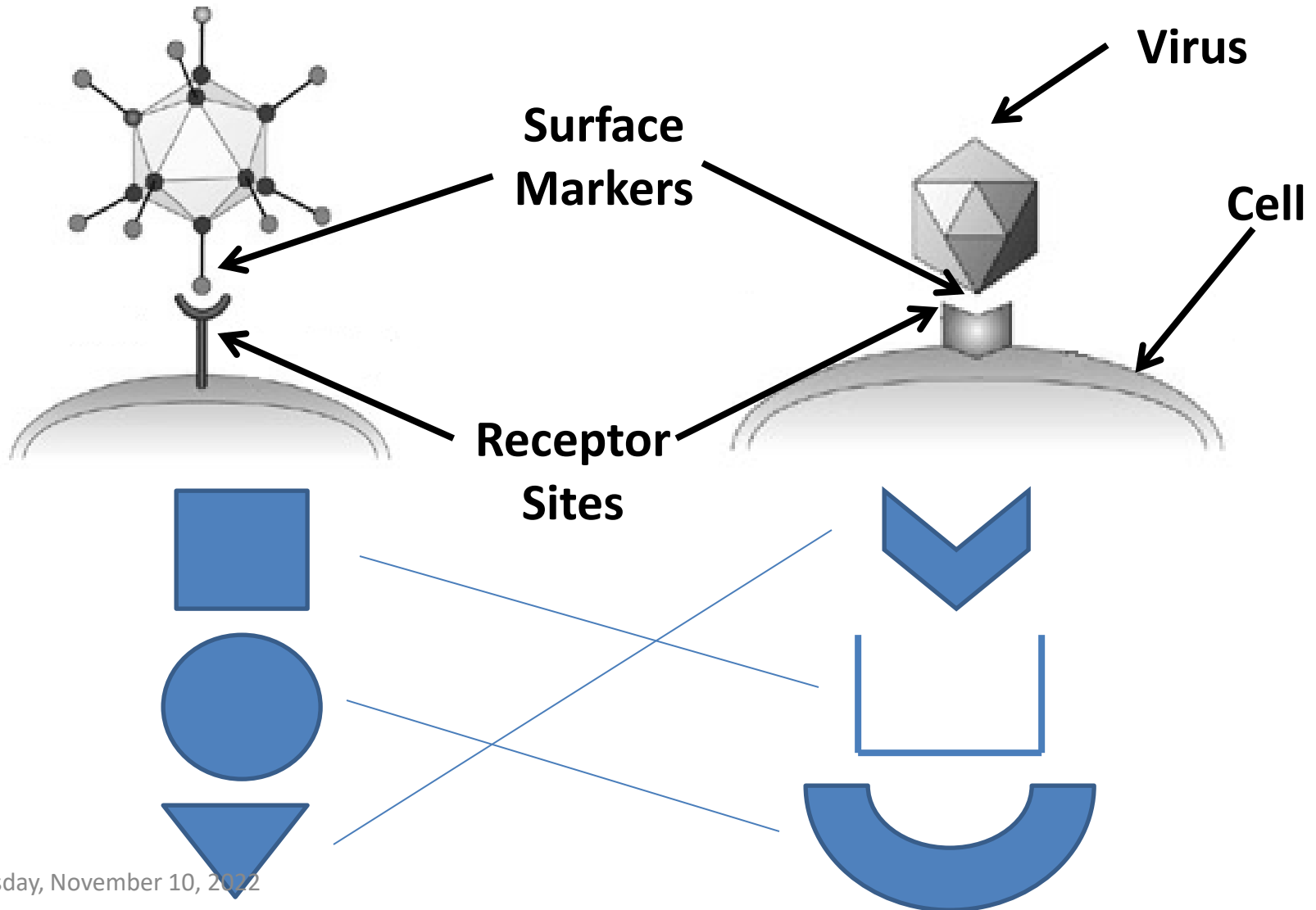
Receptor Sites

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

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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

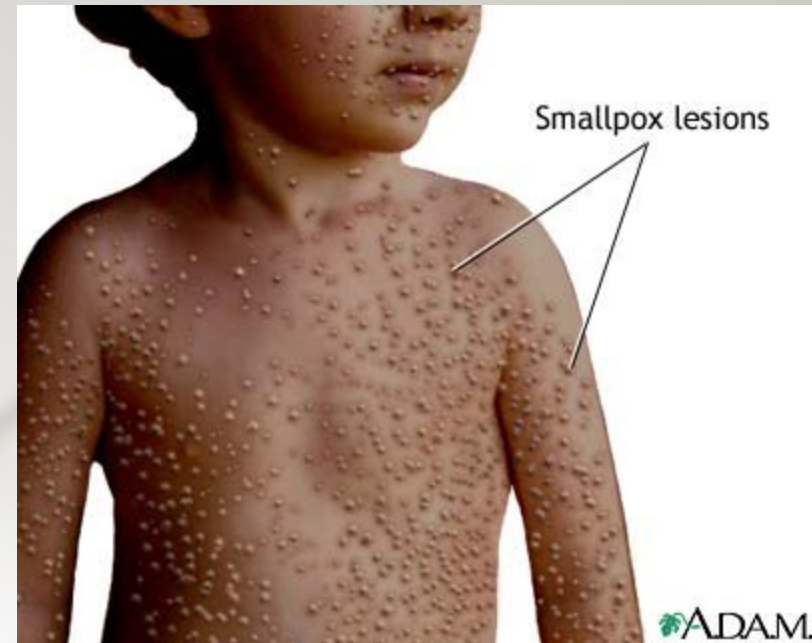
Human Diseases: Warts, common cold, Influenza (flu), Smallpox, Ebola, Herpes, AIDS, Chicken pox, Rabies

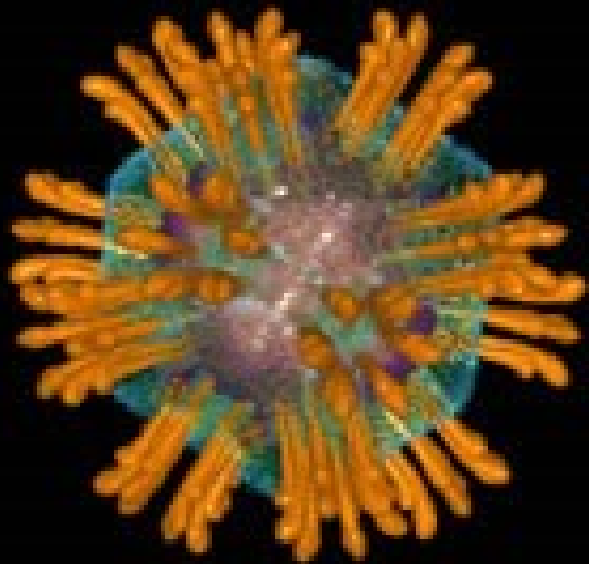
Viruses disrupt the body's normal equilibrium/balance

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

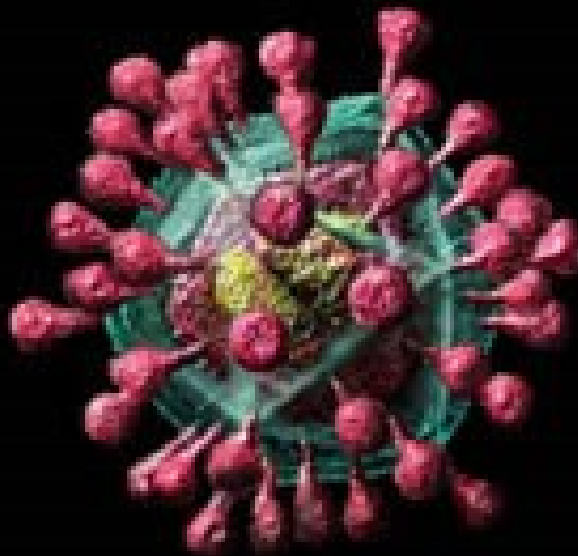
Beneficial:

Genetic Engineering—harmless virus carries good genes into cells.

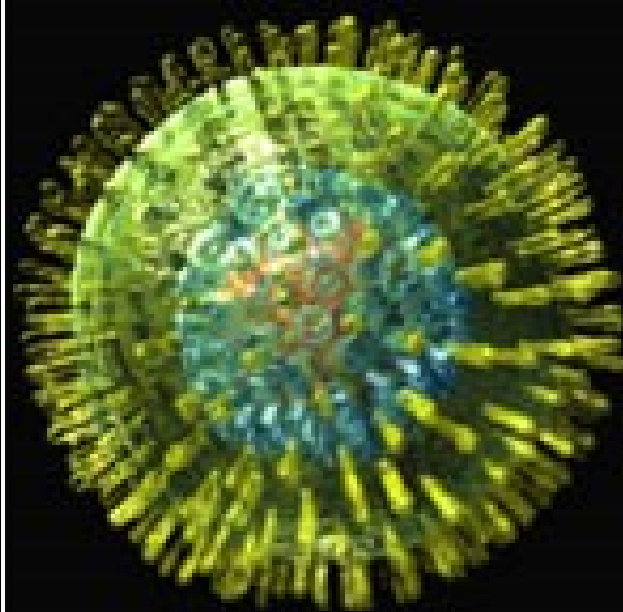




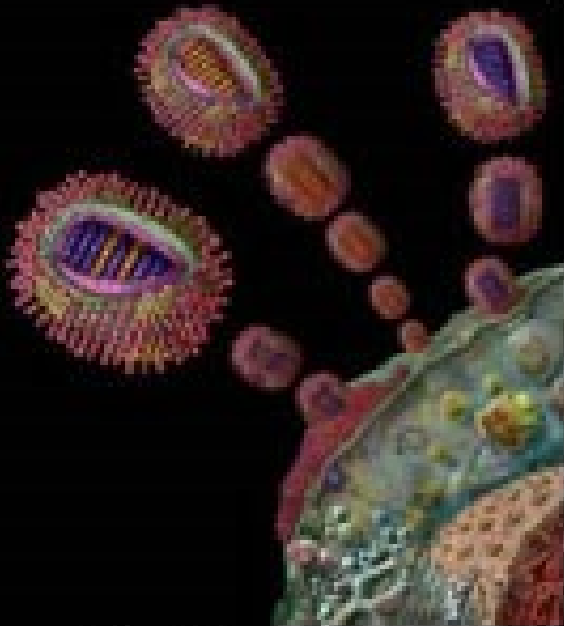
Hepatitis C virus



Coronavirus



Herpes virus

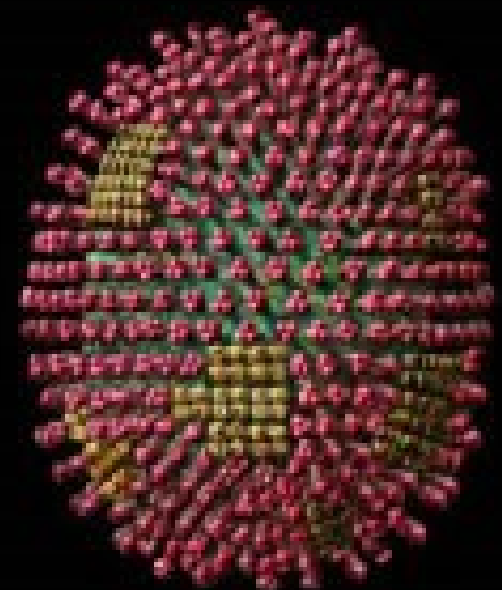


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Bird flu virus



Smallpox virus



Influenza virus

Virus

Living Cell

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

The background of the slide is a microscopic image. It features a large, spherical virus particle with a brown, spiky surface, resembling a coronavirus, positioned in the upper left quadrant. Several blue, double-helix DNA strands are visible, extending diagonally across the frame. The overall color palette is dominated by shades of blue and cyan, with some brown from the virus particle. The lighting is dramatic, highlighting the textures of the virus and the DNA.

How many characteristics
of life do viruses possess?

ONE

*Genetic Material

Are viruses living?

NO



Thank you

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