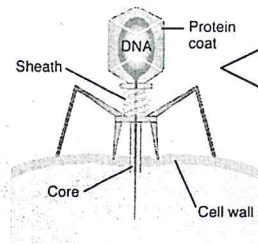


A.P. Biology

Name _____

The Genetics of Viruses – Chapter 19 – Campbell

A sheet that forces you, against your very will, to learn about the viral genome and its role in regulation and reproduction.



← Virus or Bacteria?

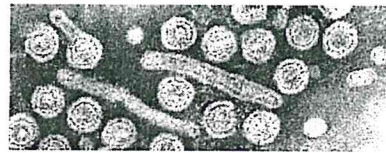
Shown to the left is the virus known as bacteriophage _____.
Do viruses *have* or *lack* metabolic machinery?
What is being injected into the bacterium? _____

← What organism is this? _____

The Genetics of Viruses

Was the agent that caused Tobacco Mosaic Disease:

- _____ Larger or smaller than bacteria?
- _____ Filterable or non-filterable?
- _____ Able to reproduce?
- _____ Able to be cultured on nutrient medium (like bacteria)?
- _____ Killed by exposure to alcohol?
- _____ Convertible to a crystal?
- _____ Viewable with a conventional light microscope (a typical virus)?
- _____ Too small to be seen with an electron microscope?



The Viral Genome

If viruses are NOT cells, then what are they? They are i_____ particles consisting of n_____
a _____ enclosed in a p_____ coat and, in some cases, a m_____ envelope.

Name the four forms that the viral genome can assume:

- (1)
- (2)
- (3)
- (4)

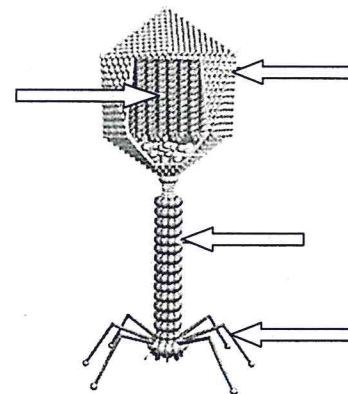
Is viral DNA/RNA "naked" or is it organized into chromosomes? _____

How many genes in the genome of a virus? (Small viruses)_____ to (Large viruses)_____.

Bacteriophage Structure

- _____ What is the *protein shell* that encloses the viral genome called?
- _____ Are capsids usually *geometric* or *non-geometric* in shape?
- _____ The protein subunits making up capsids are named _____.
- _____ A membrane encasing a capsid is called a _____.
- _____ These envelopes are derived from the _____ of the host cell.
- _____ Are there any viruses that harbor enzymes within their capsids?
- _____ A bacterial virus is called a(n) _____.

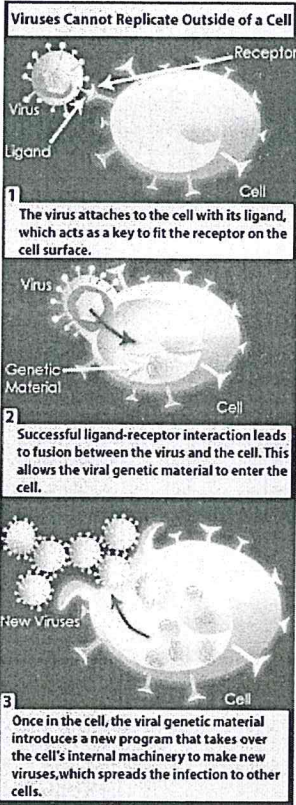
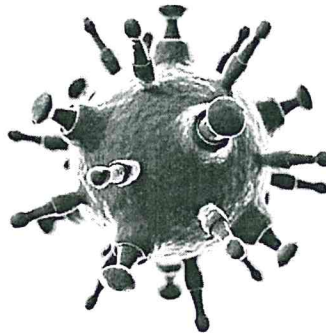
Bacteriophage Structure



Viral Reproduction

Why are viruses called "obligate intracellular parasites"?
Do viruses have:

- Ribosomes?
- Metabolic enzymes?
- A nucleus?
- Organelles?
- Flagella?
- A genome.
- The ability to undergo mitosis?
- The ability to move on their own?
- The ability to reproduce on their own?



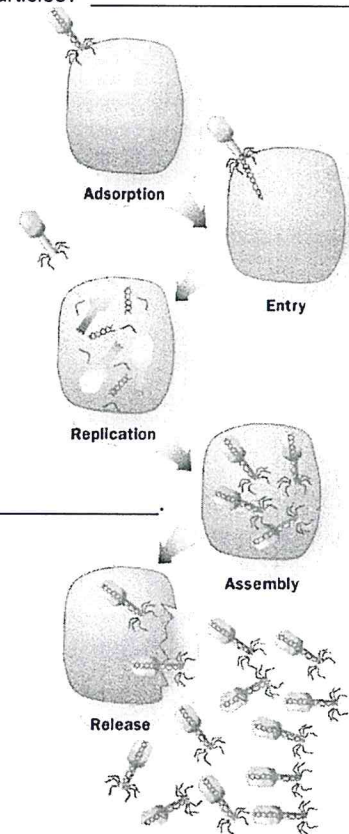
The range of different hosts that a single viral strain can infect is called the _____.
Viral recognition of a host cell occurs because of the complimentary fit of _____ on the surface of the virus (commonly called ligands) and _____ molecules on the host cell.

Humans share the swine flu with _____.
The rabies virus can infect _____, _____, _____ and humans.
Beyond being species specific, the viruses that attack multicellular eukaryotes are usually _____ specific.

The cold viruses infect the _____ tissues.
The AIDS virus infects only _____ blood cells (more, and more detail later!)
DNA viruses use the host cell's DNA _____ to make copies of the viral DNA.
RNA viruses must package and utilize their own RNA _____ because cells usually lack the enzymes necessary for RNA -> RNA synthesis.

Who provides the nucleotides for new DNA or RNA synthesis? The _____, of course.
Who provides the ATP to drive the synthesis reactions? The _____, of course.
Who provides the amino acids for new viral protein synthesis? The _____, of course.
The assembly of viral components into new viruses is usually _____ (*spontaneous / regulated*).

How many newly-assembled viruses emerge from the host cell? _____
Does the host cell *survive* the infection or *die*? (usually) _____
What happens to the newly-assembled and released virus particles? _____


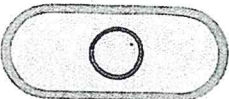
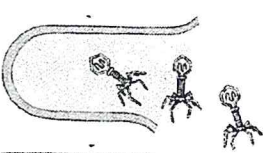


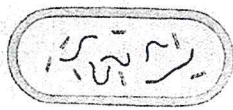
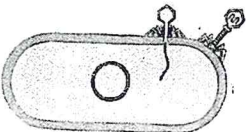
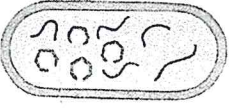
The Lytic Cycle


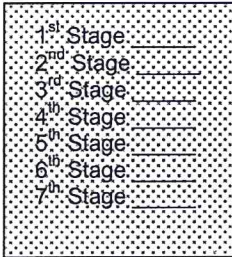
This cycle (pictured to the right) occurs in viruses that infect _____ and possess _____ (singly / doubly) stranded DNA.
Does lysis occur at the *beginning* or *end* of this sequence of events? _____
A phage that reproduces only by the lytic cycle is called a v _____ p _____.
The virus pictured to the right is the _____ phage. (Hint: it's a tobacco parasite)
The evolutionary response of bacteria to viral invasion is a change in the shape of its _____.
Bacterial enzymes that cause the destruction of viral DNA are called r _____ e _____.
Remember this, for it is a point of importance in the A.P. Biology curriculum.
If the virus gains entry into T4's interior, the host cell's _____ is hydrolyzed.
Phage DNA directs the assembly of viral p _____, and the viral genome replicates itself many times.
The phage "parts" then assemble themselves into new viral particles.
The enzyme l _____ is used to lyse the bacterial cell wall, resulting in the release of the newly-assembled viral particle

Which came first, the host cell (E. coli) or the parasite (T4)? _____

Place the pictures (A) – (G) so they are in the correct order:

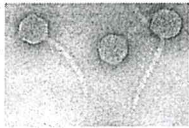
(A)  (B)  (C) 

(D)  (E)  (F) 

(G)  

The Lysogenic Cycle

While the host cell _____ as a result of the lytic cycle, the lysogenic cycle replicates the phage genome _____ (with / without) killing the host cell.

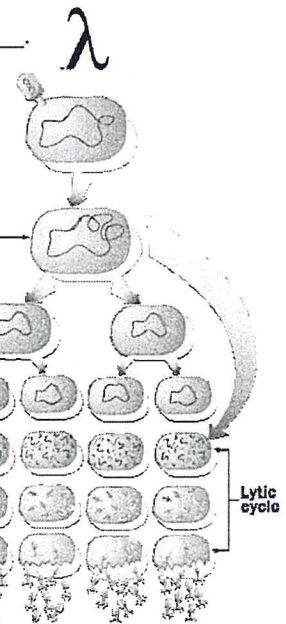


Phages that use both modes of reproduction are called _____ phages.

The example temperate phage used in Campbell – Chapter 18 is named _____.

Injection of the viral DNA is accompanied by its incorporation into the host cell's genome at a specific site. The host cell is now named a _____.

The injected host cell now divides many times, replicating the viral DNA every time it divides. Thus, the bacterial population does not _____ (unless the viral DNA separates itself from the host DNA, thus initiating the _____ cycle.

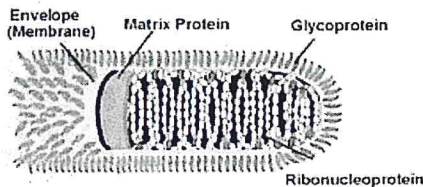


Lytic Cycle or Lysogenic Cycle?

- _____ Immediate destruction of host cell DNA.
- _____ Phage DNA is incorporated into the host's DNA
- _____ Prophage
- _____ Lysis is triggered by an environmental event.
- _____ No bacterial reproduction between penetration and lysis.

Animal Viruses

How do most animal viruses enter their host cell? They use their _____.



This envelope is usually a l_____ b_____ with g_____ protruding from the surface.

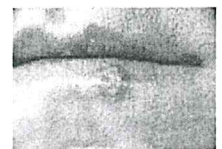
Once the glycoprotein fuses with its receptor, the viral envelope fuses with the host cell's p_____ m_____.

The capsid and genome end up inside the host cell.

The newly assembled viruses bud from the host cell, each one of them wrapping themselves in a small bit of the host cell's _____.

Does this reproductive cycle always kill the host cell? _____ (Yes / No)

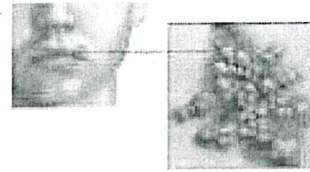
Herpes viruses get THEIR viral envelope from the _____ of the host cell.



Once a person contacts Herpes, the infection tends to appear and reappear through the course of one's life in correspondence to stressful events and ill health. Many of the people that you know have Herpes. Take a look around the room and you are certain to see a victim of this lifelong pest.

Herpes

- _____ Where does the viral envelope come from?
 _____ What form does the genome take?
 _____ Lytic or lysogenic?
 _____ What triggers the Herpes virus?
 _____ What is the virus that causes cold sores called?
 _____ What is the virus that causes genital conditions called?



RNA As The Genetic Material

Do animal cells have the ability to synthesize RNA using RNA as a template? _____ (Yes / No)
 Do RNA viruses have the ability to synthesize RNA using RNA as a template? _____ (Yes / No)
 A retrovirus uses its own RNA to reverse transcribe DNA. What is the name of the enzyme utilized in this "backwards trick"?

The retrovirus of greatest interest in the 21st century is abbreviated _____, which stands for _____
 _____, the virus that causes the condition known as _____, which stands for _____.

Why are RNA viruses so much more infectious and more difficult to develop vaccines for than DNA viruses?

The textbook (Campbell – 6th Ed.) attributes the spread of "new" viruses to three processes / events. Please name them (no description required).

- (1)
- (2)
- (3)

What distinguishes a "cancer" cell from a "non-cancer" cell?

Plant Viruses

Describe what a horizontal transmission is, and give several examples:

What It Is _____
 Several Examples _____

Describe what vertical transmission is, and give two examples:

What It Is _____
 Two Examples _____

Other Infectious Agents

Molecules of "naked" RNA that infect plants are called _____.
 Does the genome of a viroid encode proteins? _____ Can it replicate? _____

The two symptoms normally associated with viroid infection are:

- (1) _____
- (2) _____

Infectious "naked" proteins are called _____.

What do prions do to the shapes of the normal proteins that they engage? They _____ them!

What famous bovine disease results from prions? _____

The Final Questions

Are viruses nature's most complex molecules or its simplest form of life? _____

Do viruses affect the course of evolutionary history? _____

Did viruses appear before or after the first cells? _____

Many scientists speculate that viruses evolved from renegades strands of DNA that could move from cell to cell, eventually turning to lawlessness and crime in an attempt to fill the void in their life that resulted from having nobody to call family, nobody to love.

