Virus Structures and Life Cycles

A virus is a nonliving particle that depends on a host to reproduce. Viruses are considered nonliving because they do not exhibit all of the characteristics of life. Viruses have no organelles to take in nutrients or use energy, they cannot make proteins, they cannot move, and they cannot replicate on their own. Although some viruses are not harmful, many viruses are known to infect and harm all types of living organisms. Despite the variety of viruses that exist on Earth, all consist of the same basic structure: inner genetic material and an outer protein coat (known as a capsid).

1. Put the following in order, from smallest to largest: prokaryotic cell, eukaryotic cell, virus.

2. What do scientists theorize about the origin of viruses?

3. Draw the following viruses. Label the capsid and genetic material found in each.

Adenovirus

Influenza

Bacteriophage

Tobacco Mosaic
In order to replicate, a virus must enter a host cell. Once the virus successfully attached to a host cell, the genetic material of the virus enters the cytoplasm of the host. In some cases, the entire virus enters the cell and the capsid is quickly broken down, exposing the genetic material. The virus then uses the host cell to replicate by either the lytic cycle or the lysogenic cycle.

4. Why are most viruses NOT able to be transmitted between different species?

5. Fill in the following information on the viral life cycles.

<table>
<thead>
<tr>
<th>Lytic Cycle</th>
<th>Lysogenic Cycle</th>
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<tbody>
<tr>
<td>Summary:</td>
<td>Summary:</td>
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<tr>
<td>How long until symptoms?</td>
<td>How long until symptoms?</td>
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<tr>
<td>Examples of active infection viruses:</td>
<td>Examples of latent (passive) infection viruses:</td>
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</tbody>
</table>

6. What is a **retrovirus**?

7. Draw the Human Immunodeficiency Virus (HIV), an example of a retrovirus. *Label the capsid, RNA and reverse transcriptase.*
In the lytic cycle, the entire replication process occurs in the cytoplasm. The viruses’ genetic material enters the cell; the cell replicates the viral RNA or DNA. The viral genes instruct the host cell to manufacture capsids and assemble new viral particles. The new viruses then leave the cells.

In the lysogenic cycle, the viral DNA inserts into a chromosome of the host cell. Many times the genes are not activated until later. Then the viral DNA instructs the host cell to make more viruses.