**A 2.3 Viruses**

1. Viruses share some structural features. All viruses have a \_\_\_\_\_\_, \_\_\_\_\_\_\_ size, are enclosed in a protein \_\_\_\_\_\_\_\_\_\_\_\_\_, and lack both \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ and \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ or have very few.
2. There is a great \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ of structure among viruses. Their genetic material can be \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ or \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_-stranded, and it may be either \_\_\_\_\_ or\_\_\_\_\_\_. Some viruses are \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_—surrounded by a piece of the host's \_\_\_\_\_\_\_\_\_\_\_\_ membrane —while others are non-\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

Their basic components reflect their reliance on host cells for survival and reproduction.

1. Notable examples of viruses include \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_, \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, and \_\_\_\_\_\_\_\_\_. They differ significantly in structure and behavior:

****a. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ lambda infects \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ and has a \_\_\_\_\_\_\_\_\_\_\_\_\_ structure with a head and \_\_\_\_\_ , and its genetic material is \_\_\_\_\_\_\_\_\_\_\_-stranded \_\_\_\_\_\_. It can replicate using either the \_\_\_\_\_\_\_\_\_ or \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ cycle.

****b. In contrast, coronaviruses infect \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, including humans, and are \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ viruses with \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_-stranded \_\_\_\_\_\_\_\_. They are known for their \_\_\_\_\_\_\_\_\_\_\_\_\_ proteins that help them enter host cells.

c. HIV is also an \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ virus with \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_-stranded \_\_\_\_\_\_\_\_\_\_, but it is a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, meaning it uses \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ (an enzyme) to integrate its genetic material into the host's \_\_\_\_\_\_\_.

While \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ lambda is used mainly in \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, both \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ and \_\_\_\_\_\_ cause serious human diseases.

1. The \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ is one of the main viral replication methods, illustrated by \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ lambda. In this cycle, the virus hijacks the host's \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, and \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ machinery to reproduce, ultimately causing the host cell to burst.
2. In contrast, the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, also seen in bacteriophage lambda, involves \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ of the viral \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ into the host \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, allowing the virus to remain \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ for a period before becoming active.
3. The origins of viruses remain debated, but their \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ suggests they may have arisen several times from different organisms. Their shared \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ and minimal structure point to \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_. The fact that they use the same \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_ as living organisms supports the idea of a shared evolutionary history.
4. Finally, many viruses exhibit rapid \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, which poses significant challenges for disease treatment. This is especially true for \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ viruses and \_\_\_\_\_\_\_\_, both of which \_\_\_\_\_\_\_\_ quickly. Their high mutation rates make it difficult to develop long-lasting \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ or \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, as the virus can quickly \_\_\_\_\_\_\_ and \_\_\_\_\_\_\_\_\_ therapeutic efforts.