

Chapter 19: Viruses

1. What was some early evidence of the existence of viruses? Why were they difficult to study?

In 1883, Adolf Mayer discovered that he could transmit tobacco mosaic disease from plant to plant by rubbing sap extracted from diseased leaves into healthy plants. After an unsuccessful search for an infectious microbe in the sap, Mayer suggested that the disease was caused by unusually small bacteria that were invisible under a microscope. A decade later, Ivanowsky reasoned that such bacteria were small enough to pass through a porcelain filter or made a toxin that could do so. The latter idea was ruled out when Martinus Beijerinck showed that the infectious agent in the filtered sap could replicate, but, unlike bacteria used in the lab at that time, could not be cultivated on nutrient media in test tubes or petri dishes. Beijerinck imagined a replicating particle much smaller and simpler than a bacterium. Because viruses are so small, they are difficult to detect and study.

2. What was Wendell Stanley's contribution to our knowledge of viruses?

In 1935, Stanley crystallized the tobacco mosaic virus (TMV), confirming Beijerinck's concept. Subsequently, many viruses could be seen with an electron microscope.

3. What are the four forms of viral genomes?

Viral genomes may consist of double-stranded DNA, single-stranded DNA, double-stranded RNA, or single-stranded RNA.

4. What is a capsid? What are capsomeres? What different shapes may capsids have?

The protein shell enclosing the viral genome is called a capsid. Depending on the type of virus, the capsid may be rod-shaped, polyhedral, or more complex in shape, like T4. Capsids are built from a large number of protein subunits called capsomeres, but the number of different kinds of proteins in a capsid is usually small.

5. What are the components of a viral envelope?

Viral Component	Derived From
phospholipids and membrane proteins	host cell
proteins and glycoproteins	viral origin

6. What is the role of an envelope in animal viruses?

Viral envelopes contain host cell phospholipids and membrane proteins, as well as proteins and glycoproteins of viral origin. These accessory structures help viruses infect their hosts.

7. What is a bacteriophage T4? ✓

"Bacteriophage" means "bacteria eater." T4's host is *E. coli* and its genome consists of DNA.

8. What property of a virus determines its attachment to a host cell membrane?

Viruses usually identify host cells by a "lock-and-key" fit between viral surface proteins and specific receptor molecules on the outside of cells.

9. Viruses are obligate intracellular proteins. What does this mean?

Viruses can only replicate within a host cell, subsisting on "borrowed life."

10. What is meant by host range?

Each particular virus can infect cells of only a limited number of host species, called the host range of the virus. This host specificity results from the evolution of recognition systems by the virus. Some viruses have broad host ranges. For example, West Nile virus can infect mosquitoes, birds, horses, and humans. Other viruses have host ranges so narrow

Ap Biology Chapter 19 Viruses Study Guide Answers

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Mammalogy George A. Feldhamer, Lee C. Drickamer, Stephen H. Vessey, Joseph F. Merritt, Carey Krajewski, 2015-01-15
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