Name _____ Class _____ Date _____



# *The Development of Virology*

**A.** Virology, the study of viruses, developed from the work of several scientists who performed experiments during the course of many years. In this activity you will analyze events in the development of the science of virology.

During the nineteenth century, scientists discovered that bacteria cause some diseases. Scientists, however, could not find the causes of several other diseases. In 1892, Dimitri Iwanowski, a Russian biologist, was studying a disease in tobacco plants. He discovered that the disease, called tobacco mosaic, could be passed from one tobacco plant to another by rubbing the juice from an infected plant on the leaves of a healthy plant. Iwanowski thought that tobacco mosaic was caused by bacteria. He set out to test his hypothesis. He knew that bacteria were killed by heat. He boiled the juice of an infected tobacco plant and rubbed the boiled juice on a healthy plant. The healthy plant did not develop the disease. Iwanowski then obtained a new batch of juice from an infected plant and passed it through a very fine filter. The filter had such small holes that no known bacteria could pass through them. He rubbed the filtered juice on a healthy plant and the plant still developed the disease.

1. At the beginning of his experiments, what did Dimitri Iwanowski think caused tobacco mosaic?

_____

_____

2. Explain the reason that Iwanowski boiled the tobacco juice.

_____

_____

3. Why did Iwanowski's filtering experiment cause him to doubt his hypothesis about bacteria?

_____

_____

4. What conclusions would you have reached had you performed Iwanowski's experiment?

_____

_____

_____

**B.** A few years after Iwanowski's experiment, the Dutch scientist Martinus Beijernick named the disease-causing particles viruses. Despite the discovery of viruses, however, biologists still did not know whether they were living organisms or chemical substances. To find out the nature of viruses, scientists studied their structures and activities. They also thought about how viruses might have originated.

Viruses are much simpler than cells. They do not produce energy. They do not make proteins or other substances by themselves. Yet they contain nucleic acids and proteins—substances found only in living organisms. Viruses contain hereditary information that allows them to reproduce. But they only reproduce inside living cells. A virus uses the machinery of the cell to reproduce itself.

Read each of the following passages that summarize hypotheses about the origin of viruses. Then answer the questions.

### Hypothesis 1: Parasites Have Evolved To Become Viruses.

There are many types of parasites in the world. Internal parasites, for example, are those that live inside the bodies of other organisms. The tapeworm is an internal parasite. Its ancestors, however, were free living. They had organ systems, including a fully developed digestive system. The tapeworm no longer needs a digestive system because it absorbs digested food directly from its hosts. It is thought that during the process of evolution, the tapeworm and other internal parasites lost many of the structures that their ancestors needed for survival as free-living organisms.

Viruses fit the definition of parasites because they live off living organisms. Some biologists hypothesize that viruses were once free-living cells that became internal parasites.

1. Discuss how viruses reached their current form, according to this hypothesis.

2. Describe the problems associated with testing such a hypothesis.

### Hypothesis 2: Viruses Are Descendants of the First Living Organisms

Some biologists have hypothesized that viruses are descendants of the first living organisms. Many scientists think that bodies of water that existed on Earth four billion years ago were like seas of organic "soup" and that life arose from this rich chemical environment. According to this hypothesis, during the early stages of life, all of the materials necessary for the activities of life were floating in the organic soup. Processes took place there that take place today only inside living organisms. It has been hypothesized that viruses that lived in the organic soup could replicate themselves by using materials found in the soup. As life evolved, the organic soup environment disappeared.

**3.** What would be the conclusion of this hypothesis?

**4.** Explain why this hypothesis might be criticized.