

Discovering Life

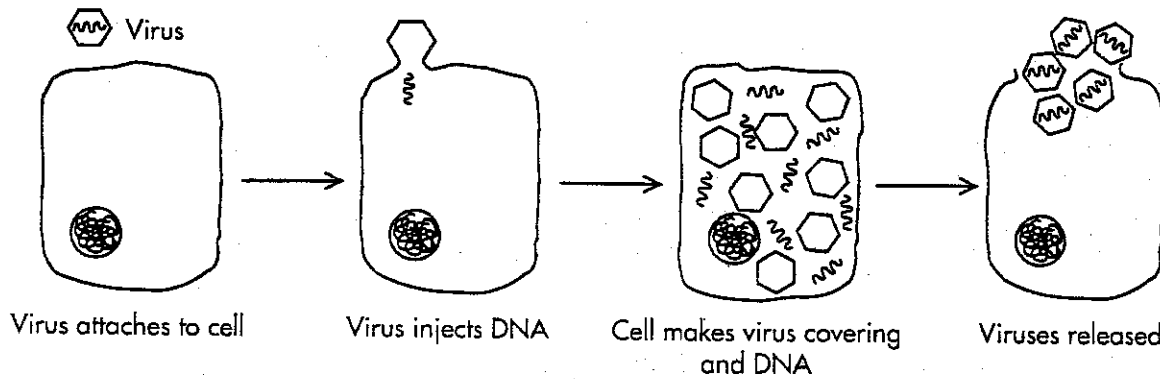
EXTENSION

Are Viruses Alive?

In 1892 the particles we now call viruses were discovered. Biologists have long debated whether to classify them as living or nonliving. What do you think?

Read the following paragraph, study the illustrations, and then answer the questions below. Explain your answers.

Viruses cannot reproduce unless they invade a living cell. A virus consists of a protein coat surrounding a core of reproductive material, usually the hereditary chemical DNA. The virus injects its DNA into the living cell. The viral DNA then directs the cell to make material for the virus's covering. The viral DNA also directs the cell to make more viral DNA. These components are then assembled inside the cell, forming many new viruses. Eventually the cell bursts open, and the viruses are released. Then the viruses disperse. They remain unchanged until they come in contact with other cells, where the reproductive cycle begins anew. Viruses do not make or consume food in any way.



1. One requirement of living things is that they reproduce. Do viruses meet this requirement?

2. Do viruses have metabolisms?

3. Are viruses made of cells?

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CHAPTER 2 EXTENSION CONT.

- 4. Does heredity occur in viruses? _____

- 5. Does homeostasis occur in viruses? _____

- 6. Are viruses living things? _____

The Scientific Method

A. Read the passage and answer the questions that follow.

On July 20, 1976, the *Viking I* lander touched down on the dusty red surface of Mars. A few months later, the *Viking II* lander arrived on another Martian plain. The primary mission of these two robot spacecraft was to determine if there was life on Mars.

Conditions on Mars were thought to be far too harsh for large life forms. There is no liquid water on Mars and the atmosphere is very thin. During the course of a day, the temperature on Mars may range from 10°C to -80°C. The large changes in temperature produce strong winds and planetwide dust storms. Because of these conditions, scientists decided to look for microorganisms rather than large life forms.

The Viking spacecraft performed several experiments. In one experiment, samples of soil were taken from different locations. The soil samples were put into a nutrient broth that supported the growth of microorganisms on Earth. The amount of carbon dioxide in the broths was tested over a period of time.

Scientists were excited to discover that Martian soil produced carbon dioxide in the nutrient broth. However, the amount of carbon dioxide produced in the Martian soil was much smaller than the amount that would be produced by living things on Earth. Thus, the results of the Viking spacecraft experiments are not conclusive. Scientists are still not sure if life exists on Mars.

- 1. What assumptions did scientists make in this experiment? _____

- 2. Why did scientists obtain soil samples from different places and from different parts of the Martian soil? _____

- 3. Which characteristic of life was being tested for in the experiment? _____
- 4. Why can't scientists be sure if life exists on Mars? _____

The Science of Biology

VOCABULARY REVIEW

Read the passage and then answer the questions that follow.

Many years ago, scientists believed that some organisms arise from nonliving materials, a process referred to as *spontaneous generation*. In 1668 Francesco Redi challenged the idea that decaying meat turns into flies. Redi began with a different explanation for the appearance of flies on the meat: "The flies come from eggs laid by other flies on decaying flesh." To test this explanation, Redi filled two sets of four jars with chunks of meat. He sealed one set of jars and left the other set open to the air.

There were a number of possible results that Redi might reasonably expect from his experiment. For example, he might expect that flies would not appear in the sealed jars. During the experiment, Redi observed flies entering and leaving the open jars. Several days later maggots (fly larvae) appeared on the meat in the open jars, but none appeared on the meat in the sealed jars. Redi concluded that the maggots came from eggs laid by flies on the meat—not through spontaneous generation.

Redi's work, along with the later work of Pasteur and others, eventually convinced scientists that organisms arise only from other living things. Thus their work contributed to the *theory of biogenesis*, which states that all living things arise from other living things.

Identify the following elements in the scientific investigation described above. Write a description of each of these elements in the case discussed.

1. hypothesis _____
2. prediction _____
3. control experiment _____
4. theory _____

In the space at the left, write the letter of the definition that matches the term.

- | | |
|-------------------|---|
| 5. _____ biology | a. A group of similar organisms that interbreed and produce fertile offspring |
| _____ genes | b. An organism's maintenance of a constant internal environment |
| _____ homeostasis | c. Segments of DNA that contain hereditary information |
| _____ science | d. The study of living things |
| _____ species | e. Knowledge about the world; observing nature to form rules about the causes of events |
| _____ development | f. The changes an organism undergoes as it matures. |

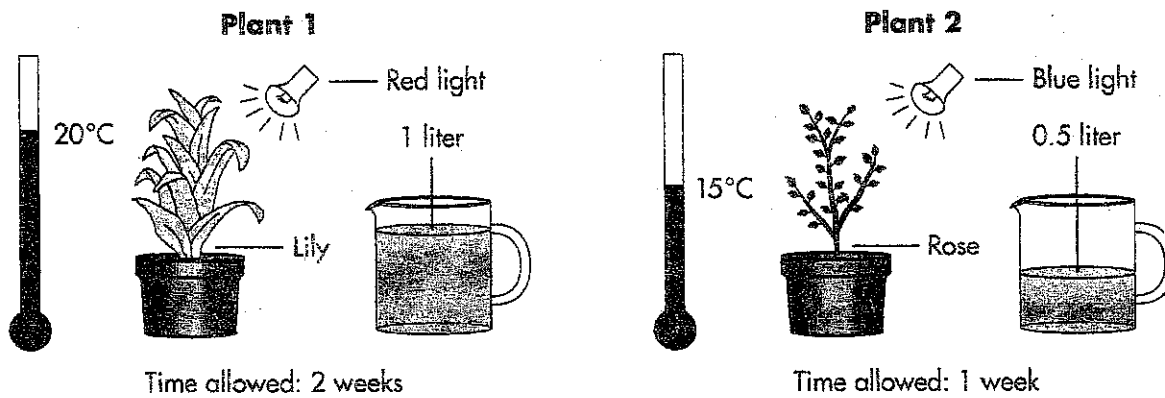
The Science of Biology

SCIENCE SKILLS

Analyzing Scientific Experiments

In the experiment illustrated below, a botanist wanted to determine the effects of different colored lights on plant growth. To do this, she set up two experiments. She grew one plant under blue light and one under red light and gave each plant the amount of water shown.

Study the illustrations and answer the questions that follow.



1. At the end of the experiment, Plant 1 had grown 10 cm and Plant 2 had grown 5 cm. The botanist concluded that plants grow better under red light. Comment on this conclusion.

2. How would you revise the experiment to make it scientifically valid? Use the spaces below to show the values of the variables in your redesigned experiment.

	Plant 1	Plant 2
light	_____	_____
temperature	_____	_____
water	_____	_____
time	_____	_____
plant	_____	_____