

SECTION

3

Viruses

BEFORE YOU READ

After you read this section, you should be able to answer these questions:

- What is a virus?
- How does a virus survive?
- How do viruses make more of themselves?

National Science Education Standards**LS 1f, 2a****What Is a Virus?**

Most people have either had chickenpox or seen someone with the disease. Chickenpox is caused by a virus. A **virus** is a tiny particle that gets inside a cell and usually kills it. Many viruses cause diseases, such as the common cold, the flu, and acquired immune deficiency syndrome (AIDS). Viruses are smaller than bacteria and can only be seen with a microscope. Viruses can also change quickly. These traits make it hard for scientists to fight viruses. ✓

STUDY TIP

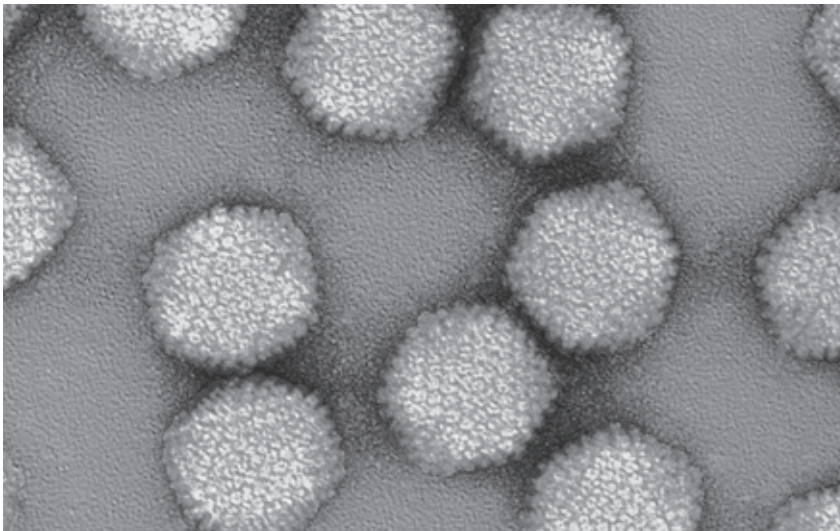
Compare As you read, make a Venn Diagram to compare viruses and bacteria.

READING CHECK

1. Explain Why is it difficult for scientists to fight viruses?

Are Viruses Living?

Like living things, viruses have protein and genetic material. However, viruses are not alive. A virus cannot eat, grow, or reproduce like a living thing. For a virus to function, it needs to get inside a living cell. Viruses use cells as hosts. A **host** is a living thing that a virus lives on or in. A virus uses a host cell to make more viruses.



Viruses are not cells. They have genetic material, but they do not have cytoplasm or organelles.

STANDARDS CHECK

LS 2a Reproduction is a characteristic of all living systems; because no living organism lives forever, reproduction is essential to the continuation of every species. Some organisms reproduce asexually. Others reproduce sexually.

2. List Give three reasons that viruses are not considered living things.

SECTION 3 Viruses *continued***What Is the Structure of a Virus?**

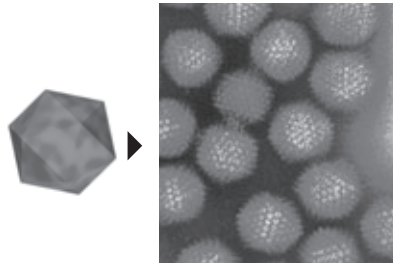
Every virus is made up of genetic material inside a protein coat. The protein coat protects the genetic material and helps the virus enter a cell.

How Are Viruses Grouped?

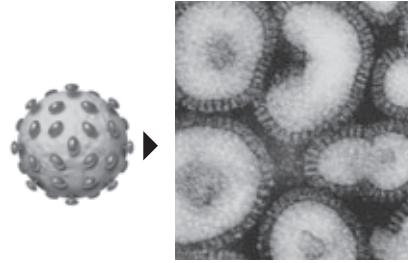
Viruses can be grouped in several ways. These include shape and type of genetic material. The genetic material in viruses is either RNA or DNA. RNA is made of only one strand of nucleotides. DNA is made of two strands of nucleotides. The viruses that cause chickenpox and warts have DNA. The viruses that cause colds, flu, and AIDS have RNA. ✓

READING CHECK

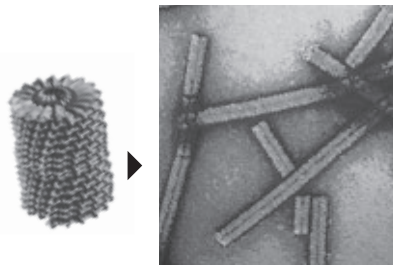
3. Identify What two kinds of genetic material can viruses have?

The Basic Shapes of Viruses**Crystals**

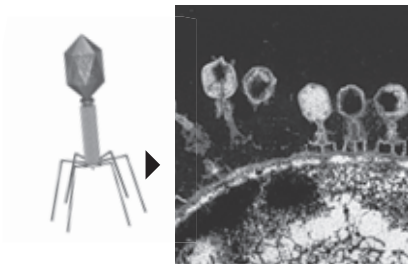
The polio virus is shaped like the crystals shown here.

**Spheres**

Influenza viruses look like spheres. HIV, the virus that causes AIDS, also has this structure.

**Cylinders**

The tobacco mosaic virus is shaped like a cylinder and attacks tobacco plants.

**Spacecraft**

One group of viruses attacks only bacteria. Many of these look almost like spacecraft.

TAKE A LOOK

4. Identify What shape are viruses that attack bacteria?

READING CHECK

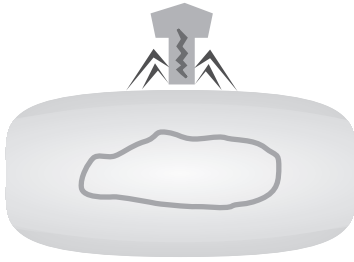
5. Identify Name one way viruses are like living things.

How Do Viruses Make More Viruses?**THE LYTIC CYCLE**

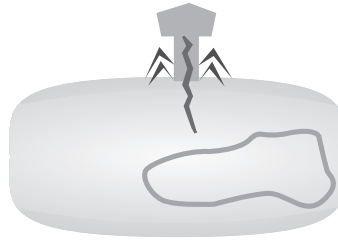
Like living things, viruses make more of themselves. However, viruses cannot reproduce on their own. They attack living cells and turn them into virus factories. This process is called the *lytic cycle*. ✓

SECTION 3 Viruses *continued***The Lytic Cycle**

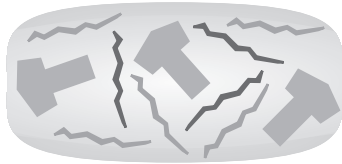
- 1** The virus finds and joins itself to a host cell.



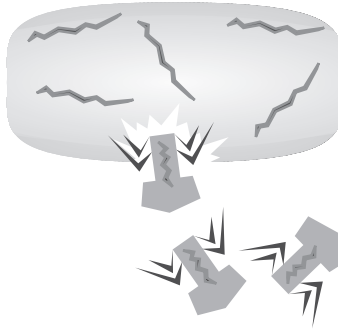
- 2** The virus enters the cell, or the virus's genetic material is injected into the cell.



- 3** Once the virus's genes are inside, they take control of the host cell and turn it into a virus factory.



- 4** The host cell dies when the new viruses break out of it. The new viruses look for host cells, and the cycle continues.

**Math Focus**

6. Calculate If you enlarged an average virus 600,000 times, it would be about the size of a small pea. How tall would you be if you were enlarged 600,000 times?

TAKE A LOOK

7. Explain What happens to a host cell when the new viruses are released?

THE LYSOGENIC CYCLE

Some viruses don't go right into the lytic cycle. These viruses put their genetic material inside a host cell, but new viruses are not made. As the host cells divide, the genetic material of the virus is passed to the new cells. This is called the *lysogenic cycle*. The host cells can carry the genes of the virus for a long time. When the genes do become active, the lytic cycle begins.

How Can You Stop Viruses?

Antibiotics cannot destroy viruses. However, scientists have made some medicines called *antiviral medications*. These medicines stop viruses from reproducing in their host. Most diseases caused by viruses do not have cures. It is best to try to stop a virus from entering your body. Washing your hands helps you avoid some viruses. The vaccinations some children get also help to prevent viral infections.

Critical Thinking

8. Infer Why shouldn't you take antibiotics to treat a cold?

Section 3 Review

NSES LS 1f, 2a

SECTION VOCABULARY

host an organism from which a parasite takes food or shelter**virus** a microscopic particle that gets inside a cell and often destroys the cell

1. Compare How are viruses similar to living things?

2. Describe What is the structure of a virus?

3. List List four shapes that viruses may have.

4. Summarize Complete the process chart to show the steps of the lytic cycle.

The virus attaches to a host cell.







The new viruses break out of the host cell, and the host cell dies. The new viruses look for hosts.

5. Explain Why do viruses need hosts?

5. Compare How is the lysogenic cycle different from the lytic cycle?

6. List Name two ways to prevent a viral infection.
