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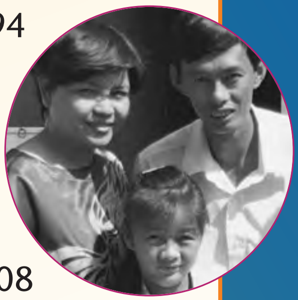
Unit 5: They Came Across the Water



Unit 6: The Future

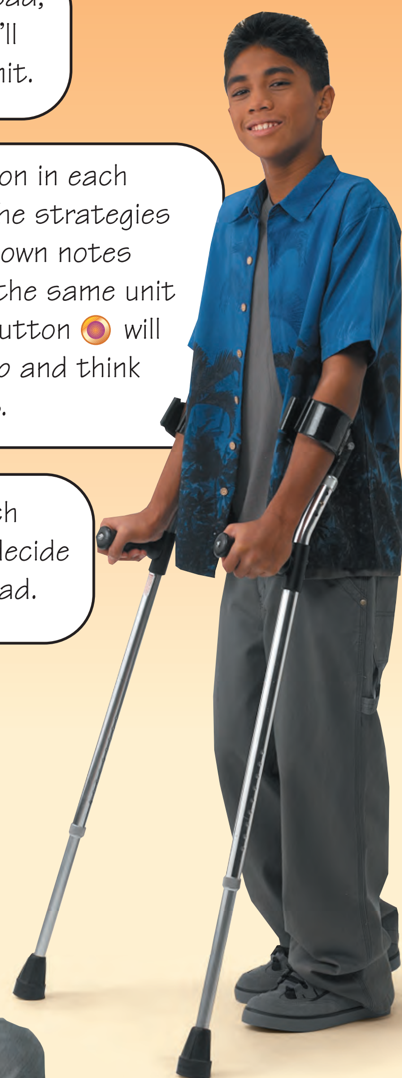
Hi! We're your READ FOR REAL Reading Team Partners!

Have you noticed that the reading you do in science and social studies is different from reading stories and novels? Reading nonfiction is different. When you read nonfiction, you learn new information. We'll introduce you to some strategies that will help you read and understand nonfiction.

In each unit, you'll learn three strategies—one to use **Before** you read, one to use **During** your reading, and one to use **After** you read. You'll work with these strategies in all three reading selections in each unit.

In the first selection, you'll **Learn** the unit strategies. When you see a red button like this, read "My Thinking" notes to see how one of us modeled the strategy.

In the second selection in each unit, you'll **Practice** the strategies by jotting down your own notes about how you used the same unit strategies. The red button will tell you where to stop and think about the strategies.



When you read the last selection in each unit, you'll **Apply** the strategies. You'll decide when to stop and take notes as you read.

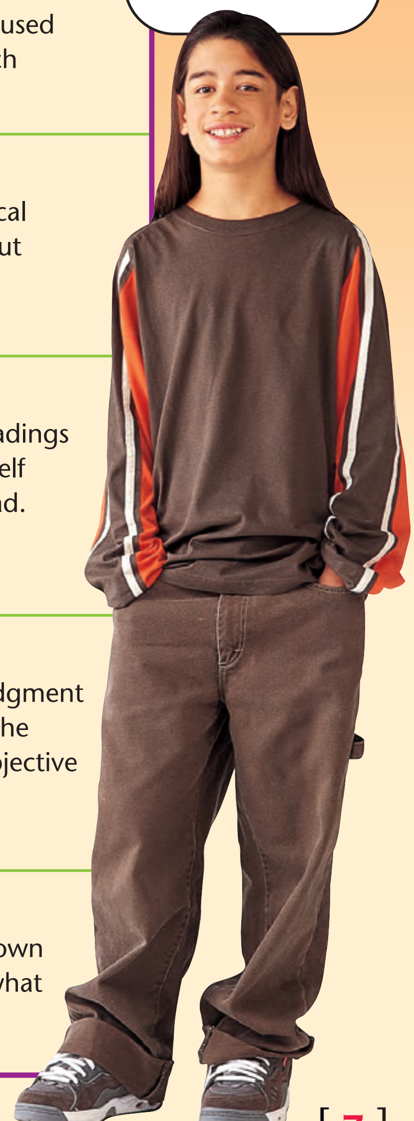
Strategies

Here they are—the **Before, During,** and **After** Reading Strategies.

Use these strategies with all your nonfiction reading—social studies and science textbooks, magazine and newspaper articles, Web sites, and more.

	BEFORE READING	DURING READING	AFTER READING
UNIT 1	**Preview the Selection** by looking at the title and headings to predict what the selection will be about.	**Make Connections** by relating information that I already know about the subject to what I'm reading.	**Recall** by summarizing the selection in writing or out loud.
UNIT 2	**Activate Prior Knowledge** by looking at the title, headings, pictures, and graphics to decide what I know about this topic.	**Interact With Text** by identifying the main idea and supporting details.	**Evaluate** by searching the selection to determine how the author used evidence to reach conclusions.
UNIT 3	**Set a Purpose** by using the title and headings to write questions that I can answer while I am reading.	**Clarify Understanding** by using photographs, charts, and other graphics to help me understand what I'm reading.	**Respond** by drawing logical conclusions about the topic.
UNIT 4	**Preview the Selection** by looking at the photo-graphs, illustrations, captions, and graphics to predict what the selection will be about.	**Make Connections** by comparing my experiences with what I'm reading.	**Recall** by using the headings to question myself about what I read.
UNIT 5	**Activate Prior Knowledge** by reading the introduction and/or summary to decide what I know about this topic.	**Interact With Text** by identifying how the text is organized.	**Evaluate** by forming a judgment about whether the selection was objective or biased.
UNIT 6	**Set a Purpose** by skimming the selection to decide what I want to know about this subject.	**Clarify Understanding** by deciding whether the information I'm reading is fact or opinion.	**Respond** by forming my own opinion about what I've read.

Now that you've met the team, it's time to get started.



Unit 1 Strategies

BEFORE READING

Preview the Selection

by looking at the title and headings to predict what the selection will be about.

DURING READING

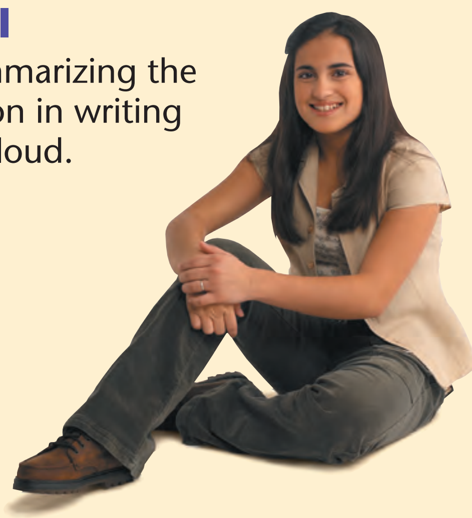
Make Connections

by relating information that I already know about the subject to what I'm reading.

AFTER READING

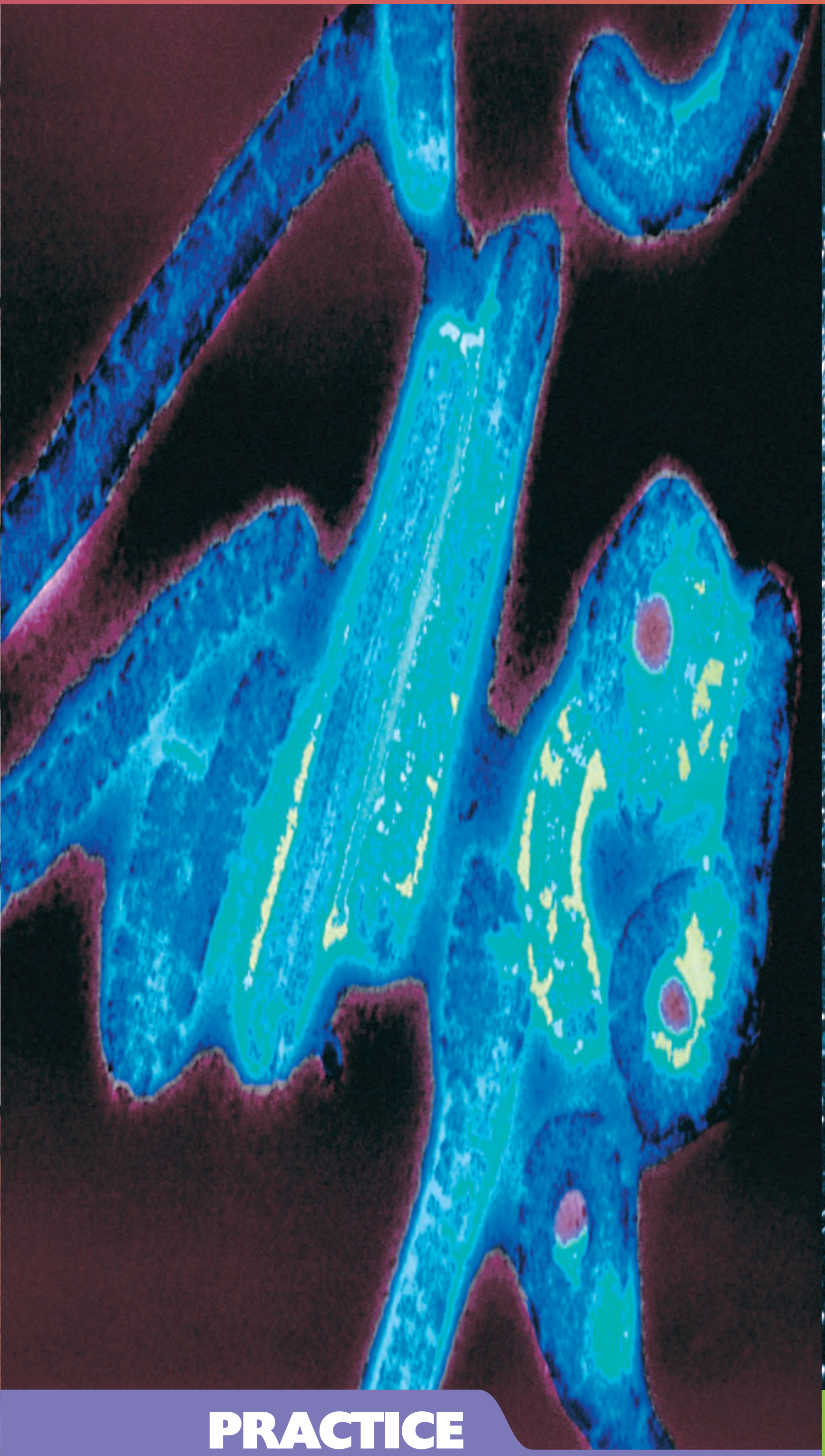
Recall

by summarizing the selection in writing or out loud.



LEARN
the **strategies**
in the selection
Viruses: The Tiniest Killers
page 11

UNSOLVED MYSTERIES IN MEDICINE



PRACTICE
the **strategies**
in the selection
Medical Detectives: In Search of Microscopic Suspects
page 25

APPLY
the **strategies**
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Curing the Common Cold
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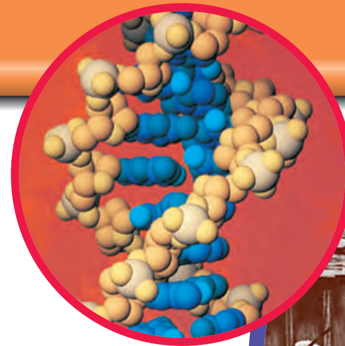


Think About the Strategies

BEFORE READING

Preview the Selection

by looking at the title and headings to predict what the selection will be about.

My Thinking

The strategy says to preview the selection to predict what the selection will be about. The title says that viruses kill. The headings mention cells, viruses, the past, and a battleground. I predict the selection will explain viruses, our history, and our future challenges in relation to viruses. Now I'm ready to read and find out if my prediction is right.

DURING READING

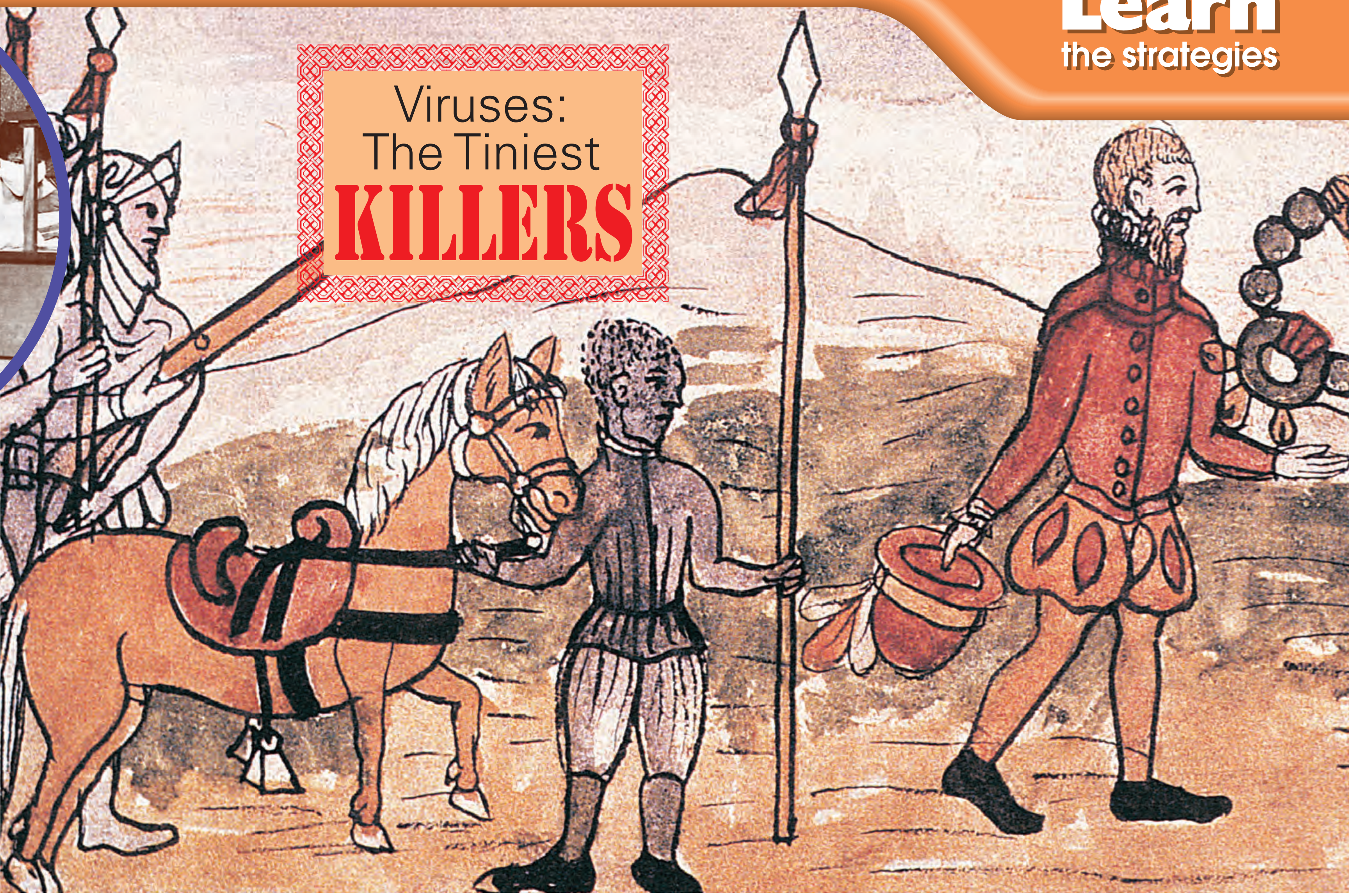
Make Connections

by relating information that I already know about the subject to what I'm reading.

My Thinking

The strategy says to make connections by relating information I already know about the subject to what I'm reading. I will stop and think about this strategy every time I come to a red button like this .

Viruses: The Tiniest KILLERS



The Aztecs greet Hernando Cortez. This drawing is from a manuscript by Friar Diego Duran.

In 1519, a Spanish explorer named Hernando Cortez landed in an area that is now part of Mexico. A year later, in 1520, thousands of Aztec Indians began fighting against Cortez and his 400 men. What happened next changed the course of history. The Aztecs had built a strong civilization. They were experienced warriors. The Aztecs should have been able to kill all the Spaniards. But they didn't. In fact, the Aztecs hardly fought the Spaniards at all. Cortez's troops were able to defeat the mighty Aztec nation. Cortez destroyed the Aztecs' capital city. He built Mexico City on its ruins.

How could this have happened? How could a few hundred soldiers defeat an entire empire?

A Virus Destroys an Army

The Aztecs were not really defeated by the Spanish army, but by a disease—**smallpox**. On the night of their defeat, smallpox had broken out in the city. It quickly killed the nephew of Montezuma, the Aztec emperor, and many other Aztecs.

The Spanish had grown up with smallpox. Most of the soldiers probably had it as children. If you survive smallpox, you won't get it again. This is called building up an **immunity**.

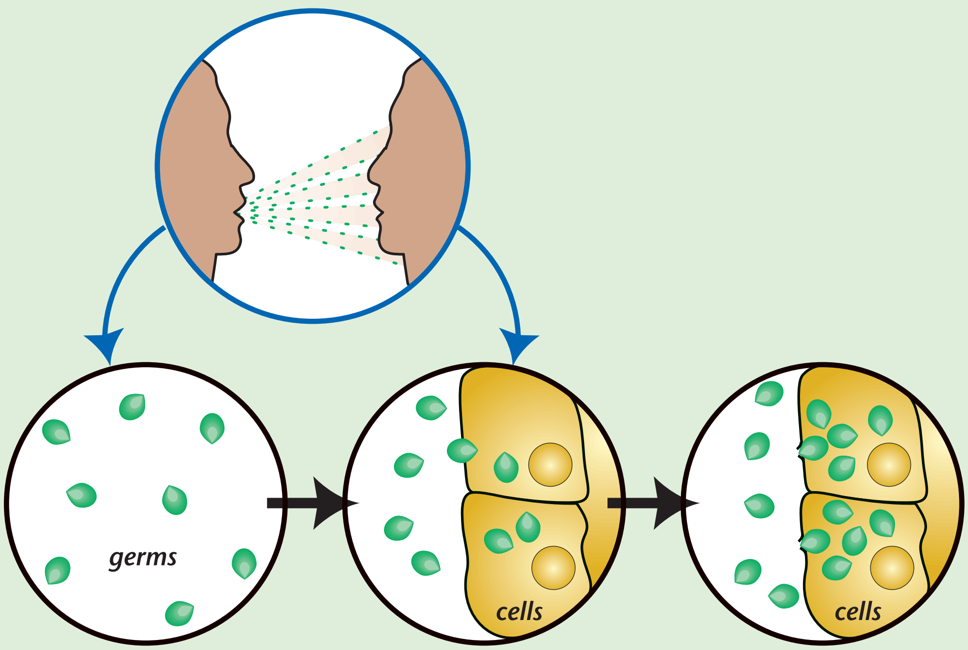
In the New World, however, smallpox was unknown. The Spanish first brought it across the Atlantic Ocean. The local population had no immunity against it. The disease had a disastrous effect on the Aztecs. Their warriors fell victim to the virus, and the nation was defeated. Over the course of many years, smallpox killed millions of the native population.

Using Text Features

Diagram Why are there two arrows leading from the blue circle? How is the scale of the pictures in the blue circle different from the pictures in the black circles?

Answer: One blue arrow indicates what happens when a person sneezes. The other blue arrow indicates what happens to the person who is exposed to the sneeze. The scale in the black circles is magnified to show the germs close up.

How Some Germs Are Spread



When someone coughs and sneezes, germs are forced out into the air.

The germs enter your body when you breathe.

The germs attack your cells, making you sick.

Vo•cab•u•lar•y

smallpox—a serious, highly contagious disease marked by chills, fever, and pimples on the skin

immunity (i•**myoo**•ni•tee)—the ability to resist a disease

What Is a Virus?

Until about 100 years ago, almost any disease-causing **organism** in humans was called a virus. But as scientists learned what caused illnesses, they discovered that different types of **pathogens,** or disease carriers, cause different illnesses. Some, such as poisons, were easily identified. These included carbon monoxide, lead, mercury, arsenic, and potassium cyanide. Such chemicals destroy the body's tissues if they are breathed in or eaten.

Bacteria—microscopic living organisms—also were found to cause many diseases. These include strep throat, staph infections, and **diphtheria**. Much of our early knowledge about bacteria was gained through the work of brilliant and courageous scientists. People such as Louis Pasteur, country doctor Robert Koch, and others learned how to combat bacteria with **antibiotics**. At first, it seemed that antibiotics could conquer all forms of disease.

Unfortunately, there was another, more resistant pathogen—the virus. So far, scientists have named more than 3,000 viruses. Of those, several hundred affect humans.

Fortunately, most viruses cause only a mild illness, or no illness at all. The most common type of virus produces the most common disease—the cold.

Strategy

Make Connections by relating information that I already know about the subject to what I'm reading.

My Thinking

I knew that people commonly catch colds. But I did not know colds were viruses.

Some viruses are very dangerous, however. Viruses cause HIV, rabies, influenza, measles, smallpox, and many other illnesses. In fact, diseases caused by viruses are responsible for many deaths worldwide.

The Edge of Life

While bacteria are small—about four one-hundred thousandths of an inch (that's 4/100,000)—viruses are even smaller. In fact, the largest known virus is only one-third as large as an average bacterium. Viruses are so small that thousands of them can live inside a single cell!

Perhaps the oddest thing about viruses is that they exist on the edge of life. They are not quite alive. Yet they are not quite dead, either. Bacteria are definitely living things. They reproduce by dividing their cells. They need food, water, and oxygen to survive. Some can move around on their own.

Vo•cab•u•lar•y

organism (**or**•guh•niz•uhm)—any living thing

pathogens (**path**•uh•juhnz)—disease carriers

diphtheria (dif•**theer**•ee•uh)—a disease that causes difficulty in breathing, high fever, and weakness

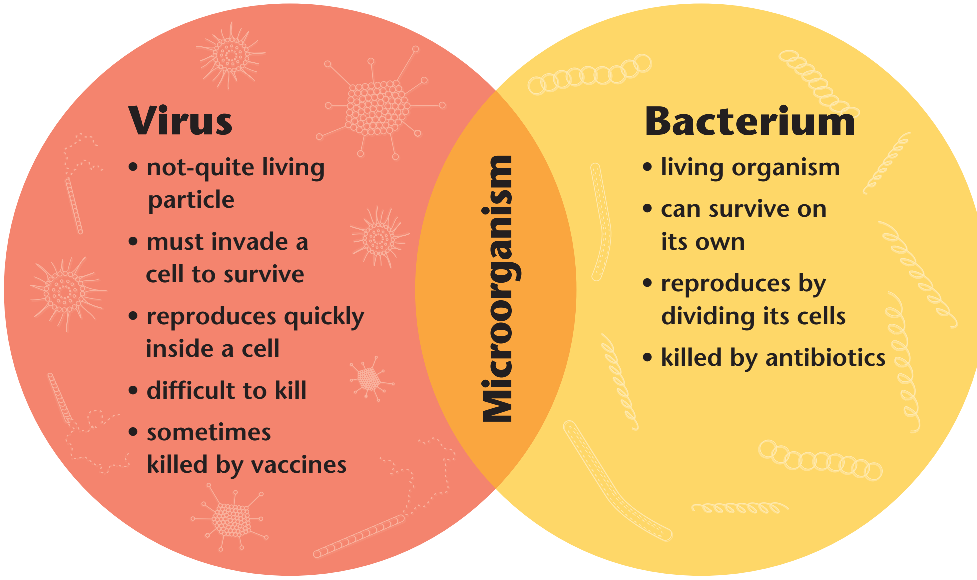
antibiotics (an•ti•by•**ot**•iks)—a group of medicines that destroy bacteria

Strategy

Make Connections by relating information that I already know about the subject to what I'm reading.

My Thinking

I already knew that cells contained DNA. Now I understand how DNA works.

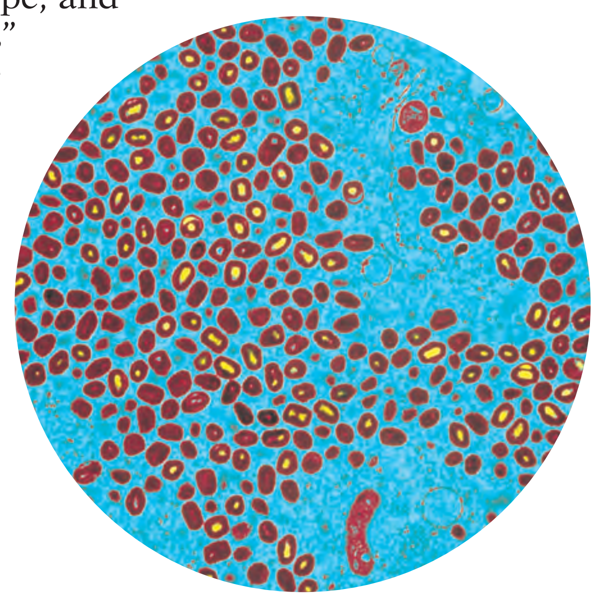


Viruses can't do anything until they invade a living cell. Then they take over the cell. Viruses are completely **parasitic**. They are "living" in only one sense: They control their own reproduction. Outside a **host** cell, however, a virus is **inert**. It just sits and waits for a host to come along.

How Cells Function

In order to understand why viruses are dangerous, you have to understand how they interact with cells. All cells—plant, animal, or bacteria—contain strands of chemicals called RNA and DNA. Roughly speaking, DNA is the cell's master recipe, and RNA is its chef. RNA "cooks" the DNA, eventually making the organism called for in the DNA recipe. Whenever RNA and DNA reproduce, their goal is to turn out perfect, unchanging copies of themselves.

Viruses are strands of RNA or DNA without a cell to do all the cooking that the complete recipe requires. That's why they need to invade cells. Once inside, the trouble begins.



Viruses inside a cell

Vo•cab•u•lar•y

parasitic (par•uh•**sit**•ik)—growing, feeding, and living on or in another organism

host—a living thing on which another living thing lives

inert (in•**urt**)—having no power to move or act

Invading a Cell

It might sound odd, but a virus uses its shape as a weapon to invade a cell. If a virus wants to invade a particular cell, it grows into a particular shape. For example, some viruses are thin rods. Some look like six-sided bullets. Others bristle with spikes. One even looks like a spider with a doll's head!

Cells defend themselves by trying to stay cut off from the outside world. But cells still need entryways through their **membranes** so that **nutrients,** salts, and other needed materials can enter. Cells also need openings to throw out waste products. These areas are called receptor sites, and they are shaped differently on different cells. Viruses try to find receptor sites through which they can fit.

If a virus finds an opening in a cell that is a good fit, it can trick the cell into letting it in. Once inside, the virus's DNA interferes with the cell's DNA "cooking" process, although no one knows exactly how.

Doll's head virus

A Master Multiplier

The DNA in a virus uses a cell's DNA to produce copies of itself. This can happen very quickly. One doll's head virus can create about 100 new viruses per cell in about 30 minutes.

Model of DNA

Those 100 viruses then leave that cell and invade 100 new cells. Once they reproduce, there can be 10,000 viruses. Then those 10,000 invade 10,000 more cells. Within a couple of hours, one virus can become 100 million viruses.

One thing that helps viruses stay ahead of the body's defenses and ahead of modern medicine is their rapid **evolution**. They can change their shape frequently in a process called **mutation**. Whenever a virus copies its

Vo • cab • u • lar • y

membranes—thin layers of tissue that cover or line certain organs

nutrients (**noo**•tree•uhnts)—foods

evolution (ev•uh•**loo**•shuhn)—a process in which change takes place

mutation (myoo•**tay**•shuhn)—a change in a living thing that can be inherited by its offspring

Strategy

Make Connections by relating information that I already know about the subject to what I'm reading.

My Thinking

I knew that the flu is short for influenza. But I did not know how deadly the virus can be.

DNA inside a cell, pieces of the DNA often get copied in the wrong order—just as you may sometimes mix up the position of the letters on your computer keyboard and type a word incorrectly. Because viruses change almost constantly, it is easy for them to find new ways to invade host cells and spread themselves around.

Deadly Outbreaks of the Past

The changing nature of viruses is best shown by one of the most common viral diseases, influenza, or simply "the flu." The flu has probably been attacking humans for at least 2,000 years. A deadly epidemic in Athens, Greece, in the year 430 B.C. may have been influenza.

Some writers in the Middle Ages clearly describe influenza epidemics. More recently, an outbreak of Spanish flu, which occurred between 1918 and 1919, killed about 22 million people worldwide. That's more than twice as many as the death toll from World War I. There were major flu epidemics in 1957 (Asian flu), in 1968 (Hong Kong flu), and in 1977 (Russian flu). In fact, a flu **pandemic**—a worldwide spreading of the disease—seems to occur about every ten years.

An influenza virus often breeds first in ducks or pigs somewhere in Asia. Then it sweeps across Africa and Europe, finally ending up in America. Why this pattern occurs is unclear. It might be because contact among humans, ducks, and pigs is more frequent in Asia.

How to Fight a Virus

It is difficult to kill a virus once it takes hold. Antibiotics can stop diseases caused by bacteria. Because viruses work from inside cells, medicines can't attack viruses without attacking and killing the cells, too. A different plan is needed.

When viruses first move from one kind of animal to another, some of the more dangerous strains are weakened. Scientists use these weakened viruses to make **vaccines**. Vaccination allows the body to build up an immunity to the virus. If the virus tries to infect a body that has been vaccinated, the body's own defenses can kill it.

Vo•cab•u•lar•y

pandemic (pan•**dem**•ik)—a worldwide spread of a disease

vaccines (vak•**seenz**)—substances used for the prevention of diseases

Smallpox has been completely eliminated in humans, thanks to vaccination. The last known cases of smallpox were seen in 1977.

Viruses and Vectors

Vaccination doesn't work as well with influenza, however. The first year a person gets a flu shot, he or she probably won't get sick. But the next year, the same vaccine might not work as well. By the third year, there's a chance the vaccine won't work at all. The reason: The flu virus changes its form all the time.

Strategy

Make Connections by relating information that I already know about the subject to what I'm reading.

My Thinking

My grandmother gets the influenza vaccine each year. But I did not know that she still might be able to get the flu.

In 1918, people wore masks. They mistakenly thought they would be protected from the flu.

Viruses use another tool, called a **vector,** to keep infecting new host animals. Vectors are organisms that carry a virus from one host to another. In the case of the most deadly viruses, vectors allow the virus to spread before the host animal dies. This is important for the virus's survival. If the host dies before the virus is spread, the virus dies with it.

Vo•cab•u•lar•y

vector (**vek**•tuhr)—an organism that carries a disease from one host to another

Strategy

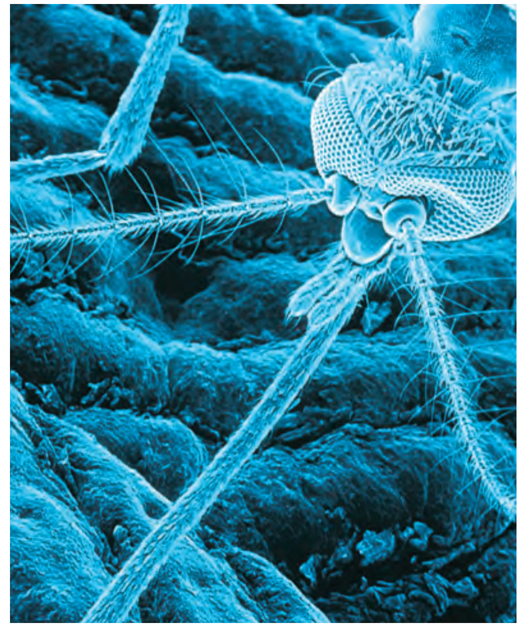
Make Connections by relating information that I already know about the subject to what I'm reading.

I knew that mosquitoes could spread diseases, but I did not realize that they carry the virus without getting sick themselves.

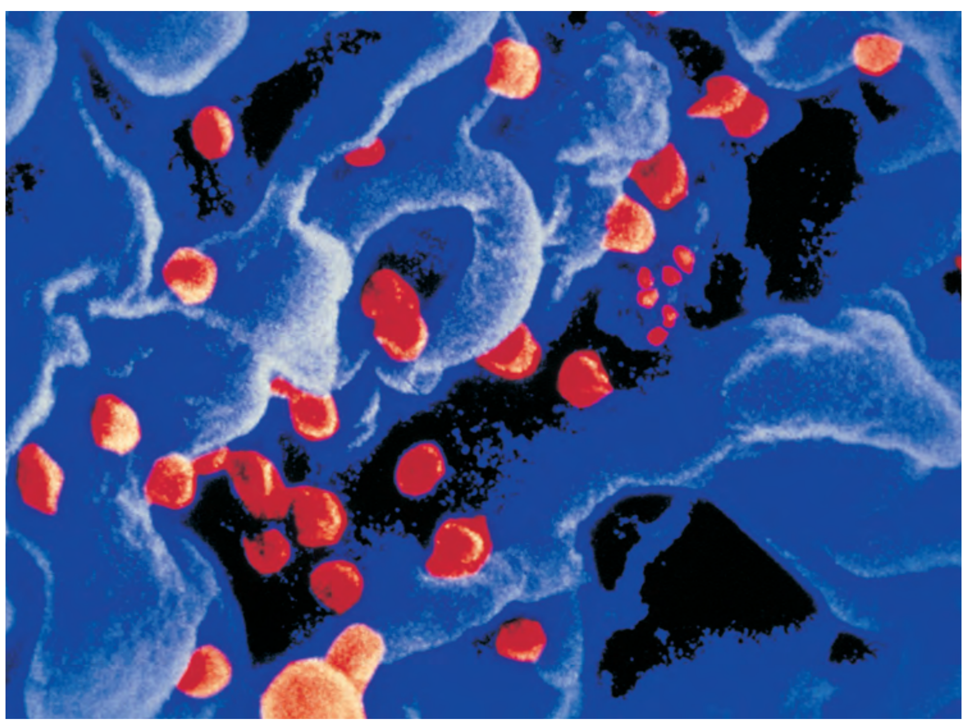
Vectors spread disease in two ways. The first is a set of **symptoms** caused by the virus. Symptoms in the host help it spread easily to other hosts before the original one dies.

In the case of rabies, symptoms include frothing at the mouth and biting. The virus is spread by the infected animal's saliva. The same process is used by the cold virus in humans, which is spread by coughing and sneezing.

The second type of vector is an animal that carries the virus without getting sick from it. This is how mosquitoes spread viral diseases such as yellow fever.



Mosquitoes like this one (shown in a magnified view) spread yellow fever and other diseases.



HIV virus

Vo•cab•u•lar•y

symptoms (**sim**•tuhmz) —signs of a disease

A Changing Battleground

Because there are so many viruses, and because they change rapidly, our fight against them takes place on a constantly changing battleground. New vaccines are needed all the time because new viruses appear frequently. HIV, West Nile virus, and SARS are a few of the newest. So far, no cures have been found for them.

Research has shown that viruses can even cause certain forms of cancer, such as adult T-cell **leukemia**. But little is known about this so far.

You might be familiar with the phrase "survival of the fittest." This means that the strongest creatures and plants survive. Most people see this fight for survival as a struggle among enemies: **predators** and **prey,** or one human battling another. Many biologists now believe, however, that one of the most important factors in how life has developed on Earth has been how organisms respond to viral infections. Fitness in the microscopic world may be more important than fitness in the visible world. Viruses have never given up the struggle. They continue to be one of our most dangerous enemies. And in many ways they remain an unsolved medical mystery.

Vo•cab•u•lar•y

leukemia (loo•**kee**•mee•uh)—a cancer of the blood

predators (**pred**•uh•tuhrz)—living things that hunt other living things for food

prey (pray)—any animal hunted by other animals for food

Think About the Strategy

AFTER READING

Recall by summarizing the selection in writing or out loud.

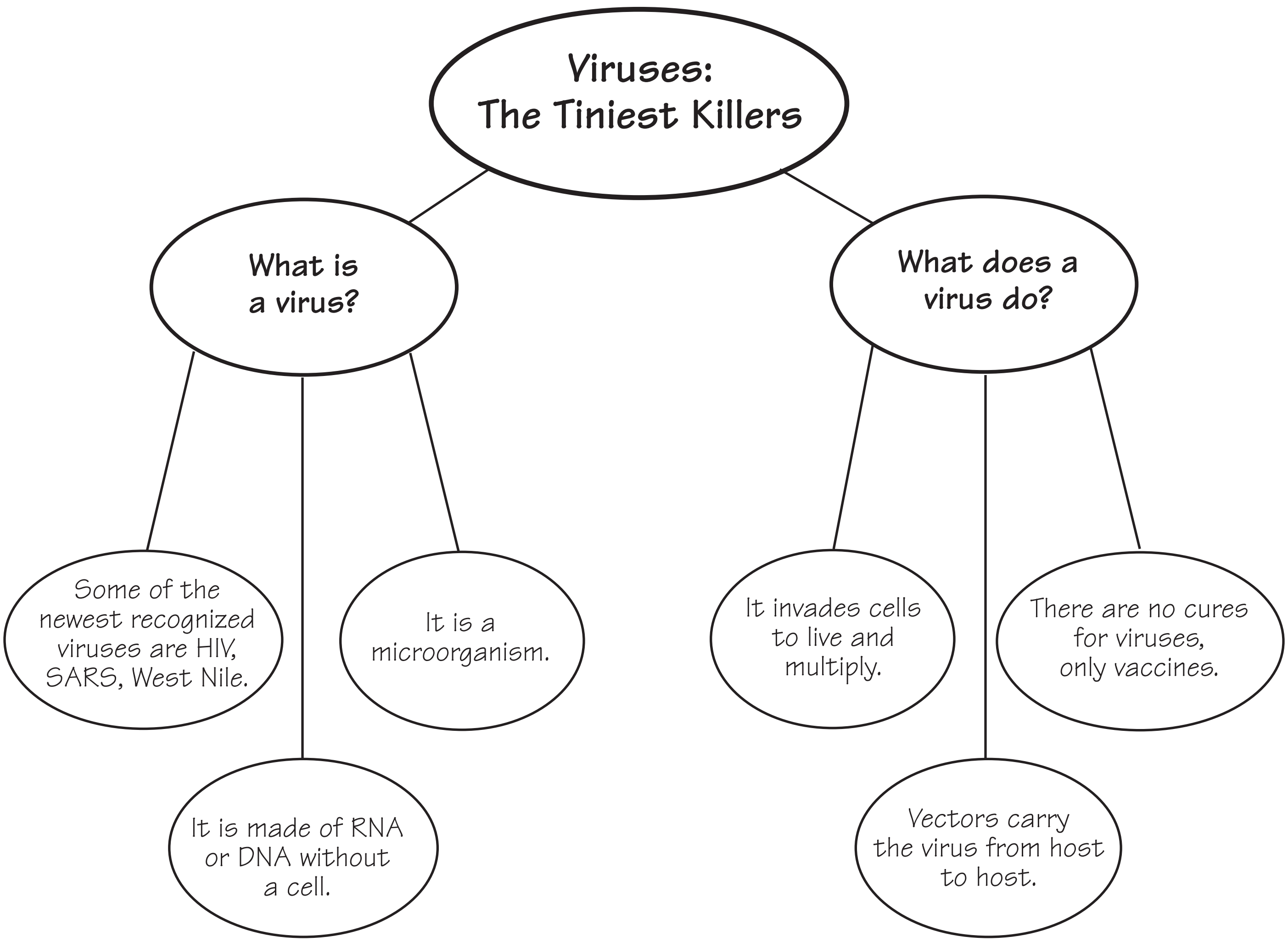
My Thinking

The strategy says to summarize the selection. Viruses live in host cells by invading them. There have been major outbreaks of viruses in the past. People get vaccines to help prevent them from catching a virus. Research is being done to find treatments for viruses.

Organizing Information

Graphic organizers help us organize information. I think this article can be organized by using a network tree. Here is how I organized the information. I put my central idea at the top. I used supporting ideas on the next level, and details relating to the supporting ideas on the bottom levels.

Network Tree



I used my graphic organizer to write a summary of the article. Can you find the information in my summary that came from my network tree?

A Summary of

Viruses: The Tiniest Killers

Viruses are microorganisms. They are so small that thousands of them can live inside one tiny cell in our bodies. A virus is only about one-third the size of an average bacterium. Viruses are made of strands of RNA or DNA. However, they cannot function outside a cell. The cell's outer membrane tries to keep viruses out, but the viruses seek out receptor sites on the membrane. These receptor sites are openings that are the correct shape to allow certain viruses to slip into the cell. After invading a cell, a virus quickly multiplies, making millions of copies of itself.

Medicine cannot cure a disease caused by a virus. Still, vaccines can help people build up immunity to certain viruses. Unfortunately, viruses often change shape, or mutate. Then the old vaccine cannot keep them out of the body's cells. A new vaccine must be developed.

Some viruses can be spread by saliva or blood. Other viruses are spread by vectors. A vector is an organism, such as a mosquito, that carries the virus to other animals without getting sick itself.

Smallpox is an old virus, but vaccines keep this virus under control. Newer viruses include AIDS, West Nile virus, and SARS. So far, scientists have not found a cure for these.

Introduction
Here is how I developed my introductory paragraph. It gives readers an idea of what they are about to read.

Body
I used information from the network tree to construct the paragraphs in the body of my paper.

Conclusion
I summarized my paper by explaining the most recent findings regarding viruses.

Multiple Meanings

Many words have more than one meaning. When words are used in different subjects, they can mean different things. Knowing the different meanings of words prevents confusion when you read.

The word *host* is a good example. You are probably familiar with the following meanings of the word *host:*

- a person who entertains guests
- a television or radio personality who leads a talk show

Read the passage that contains the word *host* from "Viruses: The Tiniest Killers."

> *They are "living" in only one sense: They control their own reproduction. Outside a host cell, however, a virus is inert. It just sits and waits for a host to come along.*

From the serious subject of the sentence you can tell that *host* must have another meaning. The word *host* in the passage means "a living thing on which another living thing lives." When you see the word *host* in a passage, you can look for clues in the sentence to help you choose the correct meaning.

The words below appear in "Viruses: The Tiniest Killers," and they deal with the subject of biology. You may know other meanings for the words. On a separate sheet of paper, write two sentences that show two different meanings for each word. If you need help, use a dictionary.

1. immunity
2. inert
3. evolution
4. predator

Readers' Theater

Read the play out loud and practice the parts as if you were part of an ancient people.

Fluency TIP

When you perform this script for your class, be sure to speak slowly, loudly, and expressively so all will understand and appreciate the story.

Narrator: Aztecs had never seen anything like smallpox before. When so many became infected, they thought it was a punishment from the gods. The medicine man performed healing rituals and advised the people on how to use herbs. Apothecaries sold herbal medicines in the marketplace.

Aztec soldier: Healer, help us!

Medicine man: Why have you come to me?

Aztec soldier: We are sick and dying. Hundreds of us lie suffering. We are on fire with fever. We ache in our heads and backs. These sores come first to our faces and hands. Then they spread to our arms and our bodies. What is this torment? Can you help us?

Medicine man: The Sun god is not pleased with us. He has sent this mysterious sickness to destroy us.

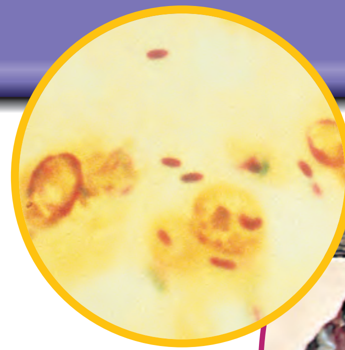
Aztec soldier: What can we do?

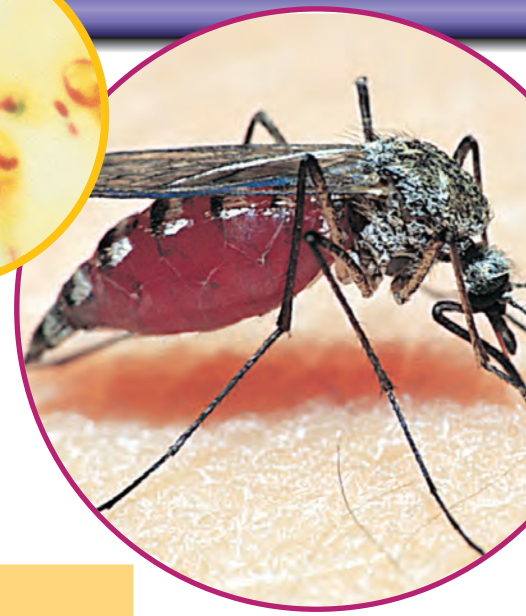
Medicine man: Go to the apothecary and bring back copal, agave, and black beetles.

Aztec soldier: What will we do with these?

Medicine man: We will burn the copal and let its smoke purify the rooms of the sick. I will make an ointment of agave and black beetles to spread on the burning sores. In steam baths, you will sweat out the evil spirits.

Aztec soldier: I will run to the apothecary now.





Think About the Strategies

BEFORE READING

Preview the Selection

by looking at the title and headings to predict what the selection will be about.

Write notes on your own paper to tell how you used this strategy.

DURING READING

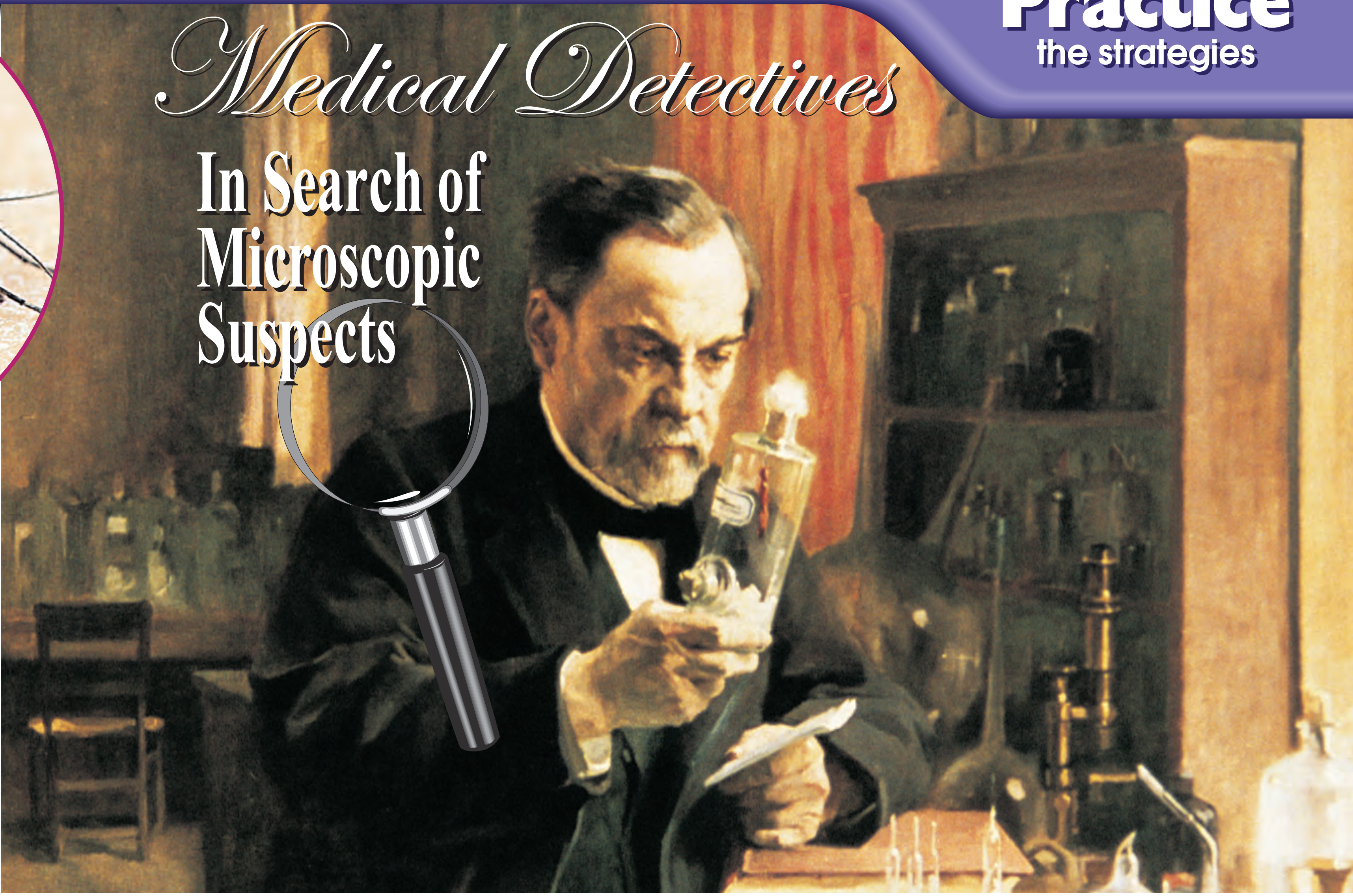
Make Connections

by relating information that I already know about the subject to what I'm reading.

When you come to a red button like this, write notes on your own paper to tell how you used this strategy.

Medical Detectives

In Search of Microscopic Suspects



Pasteur in his laboratory

One of the First Medical Detectives

During the early 1880s in France, Louis Pasteur [pas•**toor**], a chemist, was trying to find a cure for rabies. At the time, rabies was a dangerous disease and always **fatal** in humans. Because people were so afraid of getting rabies, mobs sometimes hunted down and killed people infected with the disease.

The symptoms of rabies are scary. First, you feel as though your skin is crawling. Then you become so excited that you can't calm down. You begin to feel very afraid, and for some reason you become afraid of water. Next, your body begins to shake wildly and you can't control it. In the next stage, you can't move at all. Then, death happens quickly.

Vo • cab • u • lar • y

fatal (**fayt**•l)—deadly

Rabies most often infects dogs and their relatives, such as wolves and foxes. It is also found in bats and raccoons. No matter which animal catches rabies, this terrible disease always produces the same results. Rabid animals die a painful death—so painful that it usually drives them mad. They attack and bite anything that comes near them. In fact, that is how rabies usually is **transmitted**—through the bite of an infected animal. The virus that causes the disease lives in the animal's saliva. Pasteur tried intently to **isolate** the virus that causes the disease.

Pasteur with his rabbits in his laboratory, around 1884

Finding the Virus

Whenever his friends heard of a rabid dog, they would send a telegram to Pasteur. The scientist then would send some of his assistants to catch the dog.

Once, two of Pasteur's assistants tied up a mad bulldog with a rope and held him down on a table. Pasteur put a glass straw in his own mouth. He moved close to the bulldog and sucked the dog's foaming saliva from its lips. Pasteur's action was either brave or foolhardy. One slip would have meant a fatal dog bite to his face.

Despite his efforts, Pasteur never found the virus that causes rabies. That's because viruses are extremely tiny organisms. They could not be seen by the best microscopes Pasteur had in his lifetime. The rabies virus wasn't found until 1903, nearly 20 years later.

Fighting the Unseen Organism

Even though Pasteur couldn't find the rabies virus, he developed a vaccine that would cure the disease. He did it by using a clever plan. He **deliberately** infected rabbits with saliva from mad dogs. He used rabbits because they usually don't carry rabies. Any animal that doesn't carry a disease probably has a way of killing it within its body.

First, Pasteur **euthanized** the rabbits. Then he cut out and crushed parts of their spinal cords—the thick cord of nerve tissue inside the backbone. The crushed rabbit

Vo•cab•u•lar•y

transmitted (trans•**mi**•tid)—passed from one to another

isolate (**eye**•suh•layt)—to separate from others

deliberately (di•**lib**•uhr•it•lee)—on purpose

euthanized (**yoo**•thuh•nyzd)—put to death in a painless way spinal cords were aged, which weakened the virus. The aging took from one day to two weeks. The longer the aging period, the weaker the virus.

Pasteur then vaccinated a healthy dog with the rabbit tissue. That is, he injected the tissue into the animal's brain. He did this once a day for 14 days in a row. He used the oldest spinal tissue first. Each day, the virus that he used had been aged a little less. Finally, he put the vaccinated dog into a cage with a rabid dog. After a few days, he removed the "healthy" dog from the cage. It had been attacked and bitten by the rabid dog, but it showed no sign of rabies. Pasteur continued to test the dog for a year. When it failed to develop rabies, he knew he had found an effective vaccine against the disease.

Strategy

Make Connections by relating information that I already know about the subject to what I'm reading.

Write notes on your own paper to tell how you used this strategy.

The First Human Test

One healthy dog was no guarantee that Pasteur's rabies vaccine would work on humans. He needed to test his medicine on a person. That happened on July 4, 1885, the day that nine-year-old Joseph Meister was bitten by a rabid dog.

Louis Pasteur watched as nine-year-old Joseph Meister received the rabies vaccine in his stomach.

Meister was walking to school when the dog knocked him down and bit him again and again. The boy covered his face with his hands. A bricklayer who was walking by saw the attack and beat the dog off him using an iron bar. Another neighbor brought out his gun and shot the dog.

Meister's parents took the boy to Pasteur in Paris. The youngster was so stiff from his many wounds that he could hardly walk. Meister would certainly die if he went untreated. Pasteur decided to try his vaccine on the boy.

Strategy

Make Connections by relating information that I already know about the subject to what I'm reading.

Write notes on your own paper to tell how you used this strategy.

An "Old Softy"

Because Pasteur used and often killed animals in his experiments, a lot of people thought he must be a cruel man. In reality, however, he was an "old softy." Although he knew his work was necessary, he hated what he had to do to the test animals. He couldn't even assist in many of the operations that were required to perform the experiments.

Likewise, when Pasteur began trying his vaccine on Joseph Meister, he grew very **anxious**. He was unable to work and he couldn't sleep. He even had a nightmare in which he saw young Joseph suffocating in his own saliva.

Joseph Meister received 12 shots in 11 days. The last one contained rabies vaccine that had been aged for only one day. The virus in it was still strong enough to kill. But young Joseph trusted Pasteur. That night, he said, "Dear **Monsieur** Pasteur, kiss me good night." The sick boy slept very well. Pasteur hardly slept at all.

Joseph Meister's doctor kept him under observation for ten more days. **Eventually,** he sent him home, completely cured. The news brought many people to Pasteur's laboratory. They were seeking cures to other diseases. But Louis Pasteur was a chemist, not a physician. His assistants had to explain, "He does not cure individuals. He only tries to cure humanity."

The Work of the CDC

Louis Pasteur was one of the first modern medical detectives who tracked down invisible killers, such as rabies. Today, many of these detectives work in Atlanta, Georgia, at America's "FBI of diseases"—the Centers for Disease Control and Prevention (CDC). The agency works both in the United States and around the world.

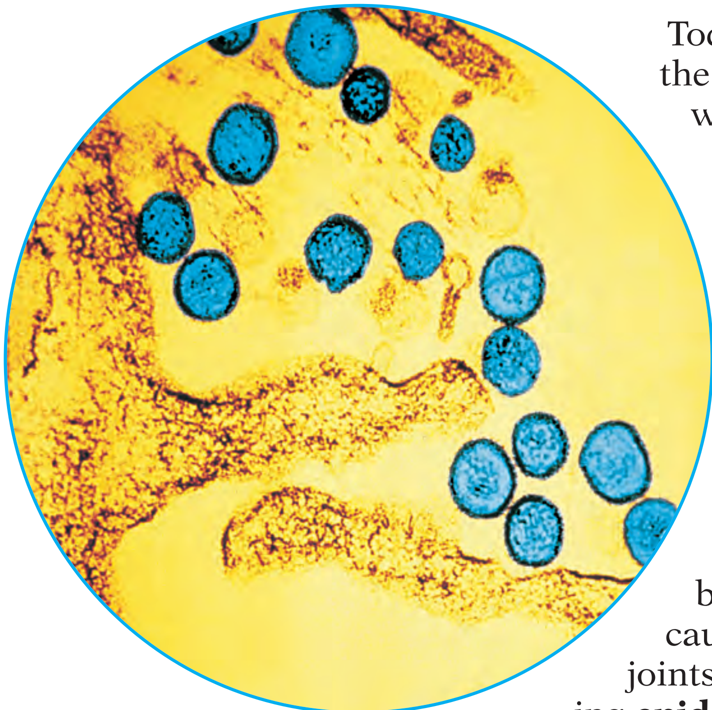
Over the past two decades, the CDC has become important in the education about and prevention of HIV. Like rabies, HIV is a deadly virus. It weakens the body's immune system, which defends the body against illness. HIV can be spread in several ways. Most often, however, the virus is spread from infected people through sexual contact and drug use.

Vo•cab•u•lar•y

anxious (**angk**•shuhs)—worried

Monsieur (muh•**syur**)—the French word for "Mister"

eventually (i•**ven**•choo•uh•lee)—after some time



Hantavirus

Today, HIV is probably the best-known virus for which the CDC is seeking a cure. But there are others as well. Hantavirus is a deadly virus spread by mice. Hantavirus is found mostly in the southwestern United States.

Dengue fever is also caused by viruses. It is known as "break-bone fever" because it causes severe pain in the joints. The disease is reaching **epidemic** proportions in South and Central America. The CDC also tracks outbreaks of rabies and influenza, as well as diseases caused by bacteria.

Searching for Clues

When an outbreak of a disease occurs, CDC investigators first try to find out what the victims have been doing and what they might have in common. They collect information from the doctors who treated the victims. If possible, they also collect blood and tissue samples. Then, like detectives, they try to find a pattern: Did all these people eat at the same pizza parlor?

How the CDC Investigates a Disease

Gather information from victims: Ask victims where they have been, what they have had to eat and drink.

↓

Collect blood and tissue samples from victims (if possible).

↓

Look for and identify patterns among victims.

↓

Determine cause of disease.

Using Text Features

Chart Review the sequence of steps in the chart. Could the CDC change the order of the steps in their investigation? Why or why not?

Vo•cab•u•lar•y

Dengue fever (**deng**•gee)—an infectious disease marked by high fever, rash, headache, and severe muscle and joint pain

epidemic (ep•i•**dem**•ik)—rapid spreading of disease to many people at the same time

Did they go to the same dog show? Did they buy ground beef from the same supermarket?

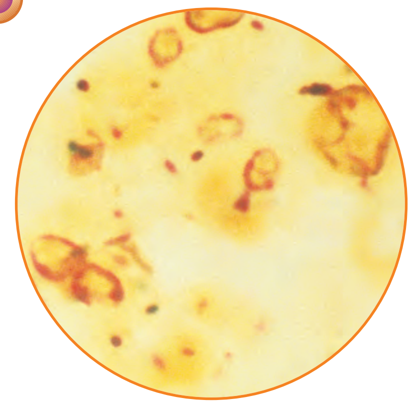
Strategy

Make Connections by relating information that I already know about the subject to what I'm reading.

Write notes on your own paper to tell how you used this strategy.

An Unusual Outbreak

CDC scientists tracked down a new disease in a hotel in Philadelphia, Pennsylvania, in 1976. There, at a meeting of a group called the American Legion, more than 150 people had become ill. Twenty-nine of them died.



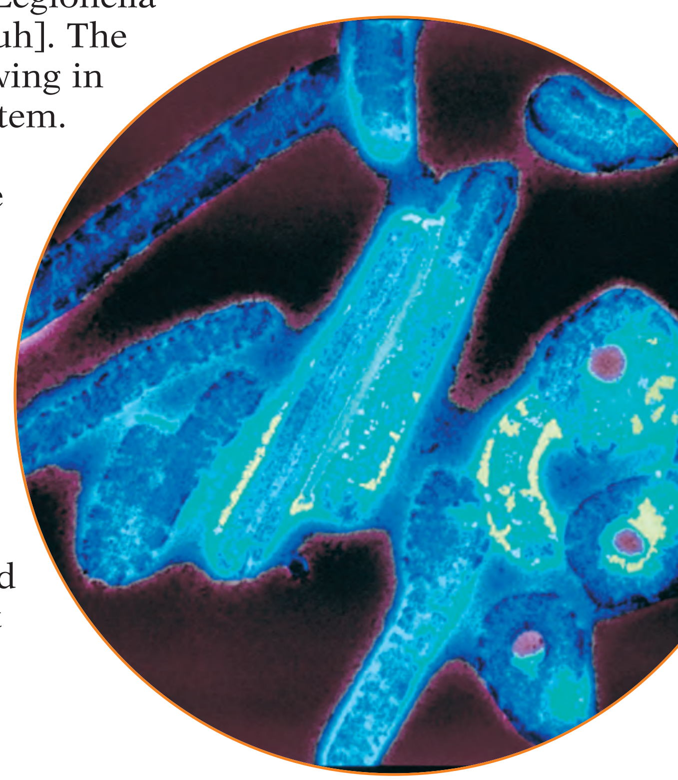
Lung infected with Legionella pneumophila

Stories began appearing about possible causes of the disease, which is now known as "Legionnaires' disease." For example, some people thought that the victims had been poisoned. Others believed that the people had caught the flu. One person even said that the illnesses were caused by visitors from outer space!

The real answer was pretty dull, but very dangerous. The **culprit** was a **strain** of bacteria. It eventually was given the scientific name Legionella pneumophila [noo•moh•**feel**•uh]. The bacteria were found to be growing in the hotel's air conditioning system. Once the bacteria had been identified, the disease could be controlled by antibiotics.

A Deadly Strain

In 1995, a laboratory worker died in the town of Kikwit, Zaire [zeye•**eer**], in central Africa. (Today Zaire is known as the Democratic Republic of the Congo.) He had undergone two operations, but doctors believed his death was caused by a virus. Many of the people who had assisted at the operations also became ill.



Ebola virus

Vo•cab•u•lar•y

culprit—a person or thing that is guilty

strain—a particular type

Blood samples of 14 of the sickest people were sent to the CDC. The agency discovered that they all were infected with the Ebola virus. The Ebola strain acts very quickly. It kills by turning the internal organs into liquid. This causes severe bleeding. Victims of Ebola can die within a few days.

Cities in Quarantine

Back in Zaire, the government completely closed off Kikwit, a city of half a million people. Armed guards were stationed at checkpoints around the city to turn away visitors. Kinshasa, Zaire's capital, a city of 5 million people, also was closed. When the outbreak in Kikwit was over, about 250 people had died from Ebola.

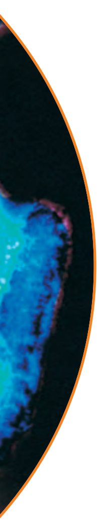
Even though there is no cure for Ebola, there are ways to fight it. The virus has a very short incubation period—about 4 to 16 days. The disease is most easily transmitted during this period. So, someone who has it cannot infect other people for very long. The way to fight Ebola is to isolate its victims until the **incubation** period is over. Also, Ebola is not easy to transmit. Usually a person has to come into direct contact with infected blood or body fluids in order to catch the virus.

Strategy

Make Connections by relating information that I already know about the subject to what I'm reading.

Write notes on your own paper to tell how you used this strategy.

Manhattan Mystery



In the summer of 1999, the CDC investigated two strange disease outbreaks in New York City. One outbreak affected people; the other involved animals.

Outside the city, on Long Island, 23 horses had a disease that was unknown to local veterinarians. Nine of the horses died. Mysteriously, hundreds of wild crows were dying as well.

Meanwhile, back in Manhattan, 60 people became ill with **encephalitis,** a virus that causes swelling of the brain. Seven eventually died. Could there be a connection among all the animal and human victims?

After Labor Day weekend, Dr. Tracey McNamara, the Bronx Zoo's **pathologist,** started getting calls about the dead crows around the city. Dead crows also were turning up on the zoo grounds. At the same time, McNamara noticed that some of the zoo's birds were ill. One bald

Vo•cab•u•lar•y

incubation
(in•kyuh•**bay**•shuhn)—a period of time between infection and onset of symptoms

encephalitis
(en•sef•uh•**leye**•tis)—a virus that causes swelling of the brain

pathologist
(pa•**thol**•uh•jist)—a doctor who determines a cause of death

Strategy

Make Connections by relating information that I already know about the subject to what I'm reading.

Write notes on your own paper to tell how you used this strategy.

eagle was shaking. A **cormorant** spent his last hours before he died swimming in circles. A Chilean [chil•**ay**•uhn] flamingo and a snowy owl also died. Dr. McNamara wondered if the illnesses affecting the birds and the people were the same. At first, no one believed her. "If I had a nickel for every person who told me I was nuts, I'd retire," she said later.

Some scientists thought the disease affecting people might be St. Louis encephalitis, a disease usually seen in more southern areas. This dangerous illness is spread by mosquitoes. But it had never affected birds before. The mystery deepened.

Two special laboratories, one in Ames, Iowa, and one in Fort Collins, Colorado, examined samples of dead bird tissue and samples of human tissue. Both labs confirmed what McNamara thought—the same disease was affecting the animals and the people. But it wasn't St. Louis encephalitis. The mysterious illness turned out to be West Nile virus. This virus had caused encephalitis in people and in horses in Africa, Australia, the Middle East, and Europe. Further tests showed that the people, horses, crows, and zoo birds in New York that had become sick in this outbreak had all caught the West Nile virus. That information solved the mystery, but not the problem.

Cause and Cure of Some Diseases

Disease	Cause	Treatment/ Cure
Rabies	Virus spread through the saliva of infected animals	Pasteur's vaccine
Ebola	Virus spread through infected blood or body fluids	No treatments; No cure
AIDS	Virus spread through infected blood or body fluids	Antiviral drugs slow virus growth; No cure
Legionnaires' disease	Bacteria	Antibiotic drugs
West Nile virus	Virus spread through infected mosquitoes	No treatments; No cure

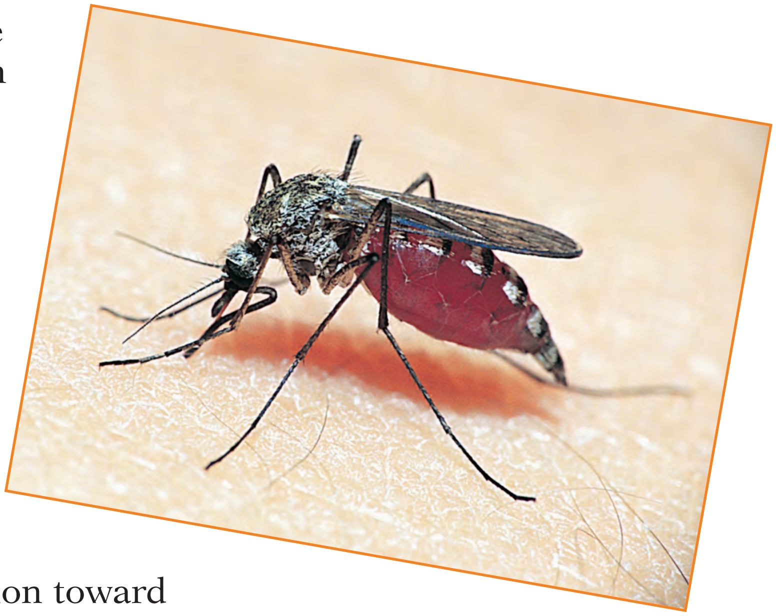
Blame It on the Mosquito

Other recent virus outbreaks that the CDC has dealt with are SARS and the H1N1 virus, popularly called "swine flu." SARS is believed to be caused by coronaviruses. This type is associated with respiratory illnesses. It is spread from person to person and has been found in over 20 countries, primarily China.

Entomologists (scientists who study insects) have discovered that the West Nile virus comes from the bite of an infected mosquito. Mosquitoes get it when they feed

Vo•cab•u•lar•y

cormorant (**kor**•muhr•uhnt) —a large sea bird



on infected birds. If pesticides are sprayed in areas that are common breeding grounds to mosquitoes, they die, which can slow the outbreak of the virus.

Is the threat of these disease-carrying mosquitoes gone? Unfortunately, no. The West Nile epidemic of 2002 has made this apparent. But researchers have developed a vaccine that prevents the spread of the virus in mice, which is a step in the right direction toward having a vaccine for humans. Testing will begin on humans in the immediate future.

The drama of the West Nile virus continues. So do similar stories around the globe. Luckily for us, most of these microscopic "suspects" are no match for the medical detectives at the CDC. Like Pasteur before them, these scientists and doctors will continue to track down the clues they need to solve medical mysteries.

Think About the Strategy

AFTER READING

Recall by summarizing the selection in writing or out loud.

Write notes on your own paper to tell how you used this strategy.

Developing Vocabulary

Synonyms

Synonyms are words that have the same or similar meaning. In "Medical Detectives: In Search of Microscopic Suspects," the word *anxious* is defined as "*worried*." *Anxious* and *worried* are synonyms.

Writers use synonyms either when they do not want to repeat a particular word, or when they want to use the best word to express their idea. Although *anxious* and *worried* are synonyms, they have different degrees of meaning. Someone who is *anxious* is, in fact, very *worried*. *Anxious* can be used to describe animals, but *worried* usually describes people. When you use a new synonym, it is a good practice to look it up in a dictionary to make sure you use the word correctly.

Below are five synonyms for **anxious**. On a separate sheet of paper, complete the sentences that follow with the words in the list. Remember to use a dictionary if you need help.

terrified	alarmed
uneasy	apprehensive
agitated	

1. I was _____ about going to camp this year because my friends from last summer were not returning.
2. The evening news showed people who were _____ by the falling buildings during an earthquake.
3. The principal was _____ when he heard that the fugitive was only blocks away from the school.
4. My mother becomes _____ if I don't get home from school on time.
5. When I was hiking, I saw a deer become _____ by a small airplane passing overhead.

Journal Entry

Louis Pasteur probably took notes to record his experiments and investigations. Imagine you are reading from his journal. Practice reading the entry out loud, then perform it for your class.

Fluency TIP

As you practice reading and performing this entry, try to read it from the pont of view of a serious scientist who is worried about a sick child.

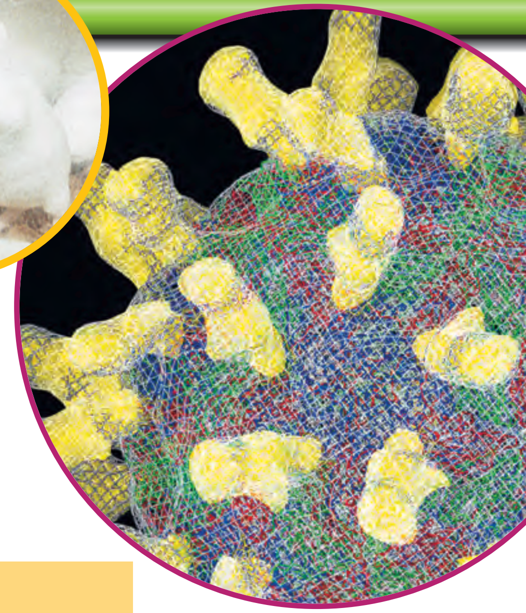
Notebooks From Medical Detectives

Editor's Note:
July 6, 1885 8:00 PM

It is 60 hours since Joseph Meister, a boy of 9 years, was attacked and bitten by a rabid dog. (Large amounts of grass, straw, and wood chips in the dog's stomach assure me that it was indeed mad.)

The boy has not less than 14 bites. His condition is severe. Without treatment, he has no chance of survival. However, it is not without great unease that I have agreed to inoculate the boy with the rabies vaccine.

Drs. Vulpian and Granter will assist. The first treatment will be one-half syringe of spinal cord of a rabbit. The rabbit died of rabies on June 21, and the spinal cord has been conserved in a flask of dry air for 15 days. It will be injected under a fold of skin in the right hypochondrium.



Think About the Strategies

BEFORE READING

Preview the Selection

by looking at the title and headings to predict what the selection will be about.

DURING READING

Make Connections

by relating information that I already know about the subject to what I'm reading.

AFTER READING

Recall

by summarizing the selection in writing or out loud.

Use your own paper to jot notes to apply these Before, During, and After Reading Strategies. In this selection, you will choose when to stop, think, and respond.

Curing the Common Cold

Have you ever "caught" a cold? Most of us get at least 2 colds a year, and many of us get 4. It's not unusual for young children to get as many as 12 colds every year! You may have wondered why there is no cure for the common cold; after all, medical researchers have found cures for more serious diseases. So why haven't they figured out the cold? It's because the common cold may be common, but it's certainly not simple.

What Is a Common Cold?

Common colds cause sneezes, sore throats, and runny, stopped-up noses. Sometimes you get a cough; sometimes you have a slight fever. You feel tired, and your muscles usually ache. You might get a more serious **infection,** such as **pneumonia** or **bronchitis,** after a cold because your body's resistance to infection is weak.

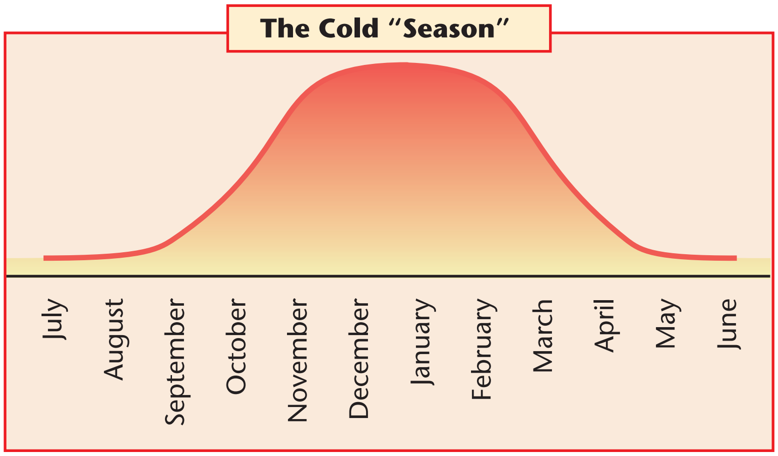
Vo • **cab** • u • lar • y

infection (in•**fek**•shuhn)—a disease caused by germs

pneumonia (noo•**mohn**•yuh)—a disease that causes the lungs to become inflamed

bronchitis (bron•**keye**•tis)—an illness caused by infection and swelling of the bronchial tubes

Although colds are mild illnesses, they have a big impact on human lives. Millions of days of school and work are lost every year because of colds. Students who go to school with a cold are probably not able to learn as much as they would if they were well.



You can catch a cold any time of year. The cold "season" lasts from September to May. This chart shows the difference among the months.

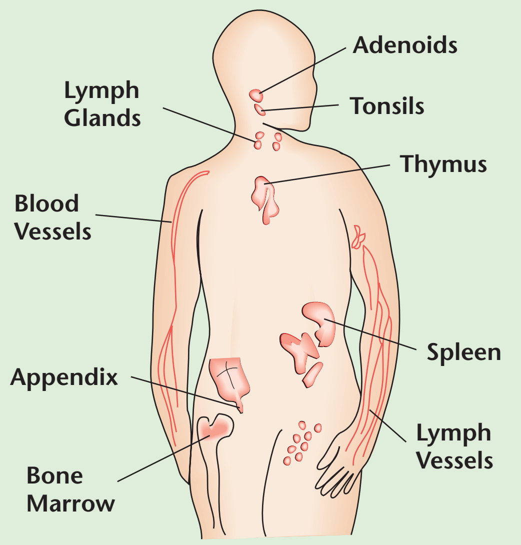
We can catch a cold any time of the year, but we are more likely to catch a cold in the winter. This isn't exactly because of the cold temperatures. It's because the air is drier when it is cold outside, and moisture in the air that usually helps protect the lining of our noses is absent. Being cold doesn't give us a cold. In fact, trying to stay warm may help make us sick. We are more likely to stay indoors when it is cold outside, and we are exposed to more cold germs in the enclosed spaces.

What Causes a Cold?

Colds are caused by viruses, which are tiny organisms that can't live on their own. They survive only in the living cells of another living creature. We "catch" a cold by inhaling a cold virus that someone has coughed or sneezed into the air or by getting a virus on our hands and then touching our eyes, nose, or mouth. A cold virus can't live long on its own—up to three hours outside someone's body. When a cold virus enters a living cell, it uses the cell's energy to grow. The virus reproduces itself and enters other living cells, and then the host cell is destroyed. This process eventually produces a disease, such as a cold.

When you have a cold, your body may be home to as many as 10,000 cold viruses! You probably have about 1,000 viruses when you first start to feel a cold coming on. Unlike bacteria, viruses do not respond to medicines such as penicillin, which can quickly eliminate a bacterial infection. The medicines that many people take for a cold only help alleviate cold symptoms—the stopped-up nose, achy muscles, and cough. They don't kill the viruses.

The Immune System



The parts of your immune system work together to help your body fight diseases.

Our Valuable Immune System

Our bodies have an **efficient** system for fighting diseases. That immune system includes cells, tissues, and organs that work together to fight the germs—bacteria or virus—that make us sick. Blood vessels, skin, tears, and even the hairs in your nose are all part of your immune system. Blood vessels carry **antibodies** and white blood cells that combat disease. Skin prevents many harmful germs from entering your body. Tears prevent germs from entering through your eyes. Throat cells collect germs that sneak through your mouth. Your immune system is a powerful force. The aches and fever that are part of a cold are signs that the immune system is working.

The immune system is very specialized. Specific cells do specific jobs: Some cells recognize organisms or substances that don't belong in the body, others mark the invaders, while still other kinds of cells prepare for the actual attack. The immune system attacks in two ways: To fight some kinds of infections, it makes antibodies, which are special proteins that are carried by the blood and destroy invading germs; to fight viruses, the immune system sends out killer T cells, which attack and kill the cells in which the viruses live. Remember, viruses cannot live on their own; they live in other cells. By killing the host cells, the T cells destroy the virus.

Vo•cab•u•lar•y

efficient (i•**fish**•uhnt)—getting results with the least possible effort or waste

antibodies—disease-fighting organisms

As amazing as this is, the immune system is smart and even has a memory. The immune system recognizes germs it has met before, so when it meets these germs again, it kicks into action more quickly, and you don't get as sick. You may not get sick at all.

How do vaccines work? When you receive an **immunization** for a disease such as measles, you get a weak dose of the disease. Your immune system revs up to take care of the invading viruses. The dose is big enough to teach your immune system what this disease's viruses are like, but small enough so that you don't get really sick. If the immune system remembers diseases, why do we keep getting colds? If scientists can make vaccines, why haven't they developed a cold vaccine?

Can We Cure the Common Cold?

A scientist determined that a cold virus is complex when he made an exact model of one. His creation looked like a miniature planet filled with mountain peaks and deep canyons. There are more than 200 different cold viruses that belong to 5 viral families. The immune system must treat each virus as something new, because learning about one cold virus doesn't help your body defend itself against another. To complicate matters, these viruses keep changing, which makes it hard for the immune system to recognize and fight them. That's why we keep catching colds.

Because a vaccine is developed to help the immune system fight a disease, these same conditions apply. One vaccine works only on one virus that is formed a particular way. This has made it impossible for scientists to develop a vaccine for the common cold.

Testing Cold-Cure Drugs

Testing the effectiveness of new cold drugs is tricky. With most drugs, scientists first run laboratory tests. They test the drug on animals, usually rats and mice. They infect the animal with the disease, then give the drug to the animal to see if it works. These animal tests also help scientists observe the drug's **side effects**.

Vo • cab • u • lar • y

immunization (im•yuh•ni•**zay**•shuhn)—a treatment to make a person resistant to a disease

side effects—unwanted reactions to drugs

Mice do not get sick from human cold viruses.

However, the cold viruses that bother humans do not give rats and mice a cold. Scientists have been able to infect chimpanzees with cold viruses, but the chimps don't get sick. This means that after running laboratory tests, scientists must test new drugs on humans. Because of the possibility of side effects, they don't usually test a drug on people without first testing it on animals. The exception would be a drug to treat an unusual or dangerous disease—certainly not the common cold!

A Cold Spray

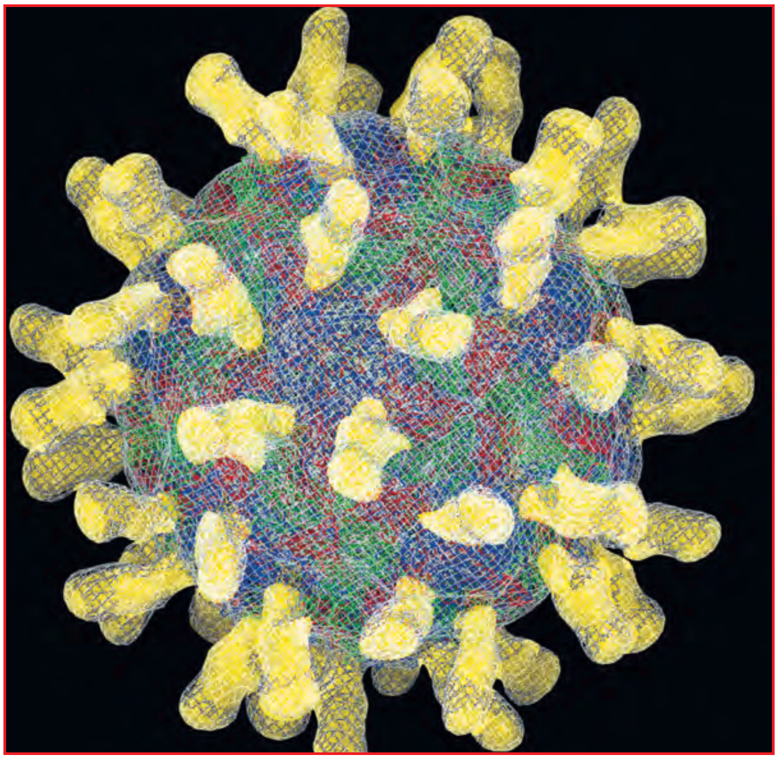
In the late 1990s, scientists developed a spray that helps ward off cold viruses. In test cases, people who were exposed to colds and used the spray didn't get as sick as people who didn't use the spray. Some people using the spray didn't catch the cold at all. This spray isn't something you spray in the air to kill cold viruses. It's a spray to use in your nose.

To understand how the spray works, you need to know two things. First, one family of cold viruses is the rhinovirus. This is a big family and accounts for more than 40 percent of the colds we get—more than any other family. This group attacks your **respiratory** system. Most rhinoviruses enter your body through your nose (*rhino* actually means "nose").

The second thing to understand is that the cells in our bodies are coated with special molecules. These molecules sit on the outside of the cells and act as a sort of glue. They help substances stick to each other and also help cells stick to each other. The cells in the lining of your

Vo•cab•u•lar•y

respiratory (**res**•puhr•uh•tor•ee)—having to do with breathing



Reconstruction of a human rhinovirus attached to ICAM-1 receptors. The virus is the sphere, and the ICAM-1 receptors are the cylinders.

nose are covered with a coating called ICAM-1, so when you breathe in a rhinovirus, it grabs onto a cell coated with ICAM-1 and gets an easy ride into a cell.

You probably remember that scientists have been frustrated by the changing nature of cold viruses. If the form of these viruses keeps changing, would the virus keep being **attracted** to an ICAM-1? Although the shape of cold viruses changes, the point at which a cold virus attaches to an ICAM-1 stays the same. Discovering that helped scientists develop the nasal spray.

Here's how the spray works. The mist in the spray contains lots of fake ICAM-1s. When you use the spray, you fill your nose with these fakes. The cold viruses don't seem to know the difference, so many of them latch onto the fakes. The viruses that grab a fake ICAM-1 can't get to a cell in your body. The virus dies, and the cold goes away.

Developing Other Cold Cures

This spray is just one possible cold treatment. Even though it seems to work, it will be a long time before it becomes available. Drug companies need to figure out when people should begin to take the spray, how often they can use it, and how much of it they should take at a time. In the meantime, scientists are experimenting with substances that will protect the ICAM-1s from the cold viruses. One substance they developed works by disconnecting cold viruses and ICAM-1s that have already become attached. Another is **interferon,** a substance the body naturally makes to fight disease. Scientists can now make interferon in a laboratory.

Research for the cure of other diseases may help cure the common cold. Cures or **preventative** drugs for AIDS are very important in the medical research world. AIDS, a

Vo•cab•u•lar•y

attracted (uh•**trak**•tid)—drawn to

interferon (in•tuhr•**feer**•on)—a substance made by the body to fight disease

preventative (pri•**ven**•tuh•tiv)—able to keep from happening severe disorder, is caused by a virus that weakens the immune system. Scientists involved in AIDS research are learning a great deal about the immune system. Their work helps scientists who are researching cures for other viral diseases, including the common cold.

What Does All This Mean?

Because there are five different cold virus families and hundreds of different viruses, it will probably be a rather long time before there is a successful cure for the common cold. So what do we do? We should try hard not to get a cold in the first place. If we do get one, it is important that we take care of ourselves so we get better faster.

Avoiding a cold may be easier than you think. Wash your hands often and keep them away from your nose, mouth, and eyes. Eat a balanced diet that includes many fruits and vegetables, and drink at least eight glasses of water a day. Try to get a good night's sleep every night. Exercise regularly, and spend time with people you enjoy. All these things help keep your immune system strong. These tips are common sense, and you've heard them all before, but the key is to actually follow them!

Colds may be bothersome, but they aren't necessarily dangerous. You'll get a cold two or three days after you've been exposed to the virus. Most colds last about a week, but the cough might last longer. When you do get a cold, use common sense. Get plenty of rest, and drink warm, soothing liquids. Cover your mouth with a tissue when you cough or sneeze. Throw away used tissues immediately and wash your hands often, so that you don't infect other people. If you spend time with young children who are not yet in school, you may have a difficult time avoiding colds. Young children catch a lot of colds because their immune systems haven't learned how to fight the cold viruses.

So, the next time you get a cold, sit back and relax. Take care of yourself and your cold. Just think: This is one cold you'll never have again!

Developing **Vocabulary**

The Prefix *anti-*

The **prefix** *anti-* is Greek. It means "against" or "opposite." When you see the prefix *anti-* at the beginning of a word, it suggests that the word probably means "against" or "opposing" something.

Anti- is often used in medical terms. Look at the example from "Curing the Common Cold."

> *Blood vessels carry antibodies and white blood cells that combat disease.*

In this example, the meaning of the word part *bodies* is unclear. Look at the other words in the sentence for context clues. The words *combat* and *disease* suggest that *bodies* means "disease." From the context clues and the prefix *anti-*, you know that *antibodies* means "organisms that fight against disease."

Read the following sentences. Each sentence contains a medical term with the prefix *anti-*. Figure out the meaning of the boldface words from the prefix and context clues. Write your answers on a separate sheet of paper. Then compare your answers to the definitions in a dictionary.

1. Hydrogen peroxide and iodine are common **antiseptics**.
2. She took an **anti-inflammatory** medicine to relieve the swelling in her knee.
3. Doctors give **anticoagulants** to stop blood clots.
4. We'll know in a few days if the **antibiotic** can stop the spread of infection.
5. After eating chili for breakfast, he needed an **antacid**.

Limericks

A limerick is a short, rhyming poem that is also funny . While we usually do not think of a cold as being funny, reading or writing about one in a limerick can sometimes ease the pain. Practice reading the following limericks out loud. Then read them to your class.

Fluency TIP

Try to read each limerick in a light and lively way. Then read the limericks in different voices that reflect sadness, tiredness, silliness, and seriousness.

Home From School

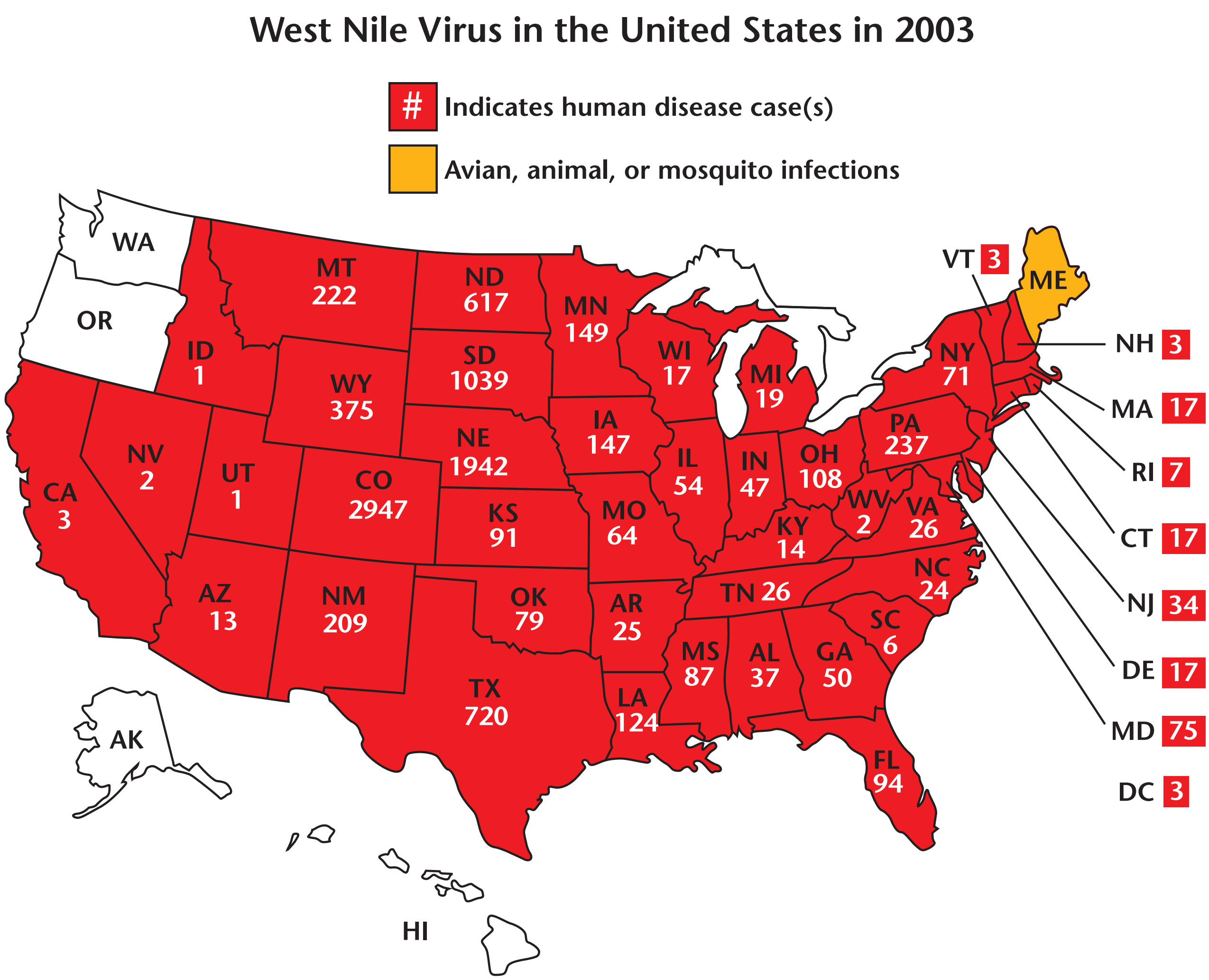
There once was a young girl named Rose,
Who for days stayed at home in bedclothes.
Her head, it was achy.
Her voice low and shaky
When she said, "I've a code in by dose."

Runaway Nose

A puzzled young man from Boston
Had a nose more annoying than fun.
It seemed to be swelling
And was too clogged for smelling,
And yet, it continued to run.

READING in the Real World

Map



West Nile virus is spread by infected mosquitoes, which get the virus by feeding on infected birds. You cannot get West Nile virus by just touching or kissing someone who has it.

Four of every five people who get West Nile virus have no symptoms. One of every five people has mild symptoms, such as fever, headaches, and vomiting. One in every 150 infected people will become seriously ill. These people may suffer permanent effects or even die.

Discussion Questions

Answer these questions with a partner or on a separate sheet of paper.

1. Which three states had the highest number of cases of West Nile virus at the time this map was created?

2. What does the map tell you about the states with the most cases of this virus?

a. The states are all on the coast.
b. The states all have very warm weather in the summer.
c. The states are all in the middle of the nation.
d. The states also have the largest population in the nation.

3. Which states below had no reported human cases when this map was made?

a. Utah, Nevada, Arizona
b. Washington, Maine, Hawaii
c. Massachusetts, Rhode Island, Delaware
d. All states had some reported human cases.

4. This map is updated each week. Why do you think that is necessary?

5. Based on this map, which state is more likely to have the first human case of West Nile virus, Maine or Hawaii? Why?

6. Based on your knowledge of mosquitoes, what kind of weather helps spread this virus?

a. cold
b. wet
c. windy
d. dry

7. How would the numbers on this map change if West Nile virus were spread by touching or coughing?

a. The most crowded states would have the most cases.
b. The least crowded states would have the most cases.
c. Most of the cases would be in the South.
d. Most of the cases would be in the North.

8. What does the map tell you about the cases of West Nile virus in California?

a. The cases are all around large cities.
b. The cases are mostly on the coast.
c. There are few cases in the desert areas.
d. There are few cases compared to the state's population.

CONNECTING to the Real World

Explore More

Work With a Partner

Research and write a report on one of the viruses mentioned in the unit. Include a diagram or a chart. Then present your report to the class.

Imaginary Disease

Create a health information pamphlet to describe an imaginary disease's symptoms, how it is spread, and its cure.

Mock Interview

Work with a partner to portray a news reporter and a doctor. The reporter should ask the doctor questions about the latest research on the common cold.

"Cold Care Package"

Assemble one for an imaginary friend who has a cold. Include all of the items you think are necessary to make a friend feel better.

Flow Chart

Show the process medical investigators might use to track down the cause of an outbreak of an unknown disease.

Song

Perform for the class. The song should consist of tips to help your fellow students remember how to prevent catching a virus, such as the flu.

Related Books

Aronson, Virginia. *The Influenza Pandemic of 1918*. Chelsea House Publishers, 2000.

Brynie, Faith Hickman. *101 Questions About Your Immune System You Felt Defenseless to Answer—Until Now*. Twenty-First Century Books, 2000.

Cefrey, Holly. *The Plague*. Rosen Publishing Group, 2001.

—*Yellow Fever*. Rosen Publishing Group, 2002.

De Hahn, Tracee. *The Black Death*. Chelsea House Publishers, 2002.

Derkins, Susie. *The Immune System*. Rosen Publishing Group, 2001.

Donnellan, William Lorne. *The Miracle of Immunity.* Benchmark Books, 2003.

Edelson, Edward. *The Immune System*. Chelsea House Publishers, 2000.

Getz, David. *Purple Death: The Mysterious Flu of 1918*. Henry Holt, 2000.

Isle, Mick. *Everything You Need to Know About Colds and Flu*. Rosen Publishing Group, 2000.

Kittredge, Mary. *The Common Cold*. Chelsea House Publishers, 2001.

Marrin, Albert. *Dr. Jenner and the Speckled Monster: The Search for the Smallpox Vaccine*. Dutton Children's Books, 2002.

Monroe, Judy. *Influenza and Other Viruses*. LifeMatters, 2002.

Ridgway, Tom. *Smallpox*. Rosen Publishing Group, 2001.

Walker, Pam, and Elaine Wood. *The Immune System*. Lucent Books, 2003.

Yount, Lisa. *Disease Detectives*. Lucent Books, 2001.

Interesting Web Sites

To learn more about the subjects you read about in this unit, visit:

http://www.commoncold.org

http://www.nlm.nih.gov/medlineplus/commoncold.html

http://www.amnh.org/exhibitions/epidemic/

http://www.pbs.org/wnet/secrets/previous_seasons/case_plague/index.html

http://www.cdc.gov

http://www.who.int/en