

Through a Microscope



Written by Cheryl Reifsnyder

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Focus Question

How do microscopes help people learn about the world?

Words to Know

antennae	electron
artificial	microorganisms
compound	microscope
contaminate	nutrients
crystal	product
distortions	specimens

Front cover: A magnified image shows the detailed surface of a damselfly's eye.

Title page: A magnified view of a butterfly wing shows yellow and black scales and dark-brown veins.

Page 3: A magnified view of a raised number on a credit card reveals tiny imperfections.

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Through a Microscope

A Reading A-Z Level W Leveled Book
Word Count: 1,374

Connections

Writing

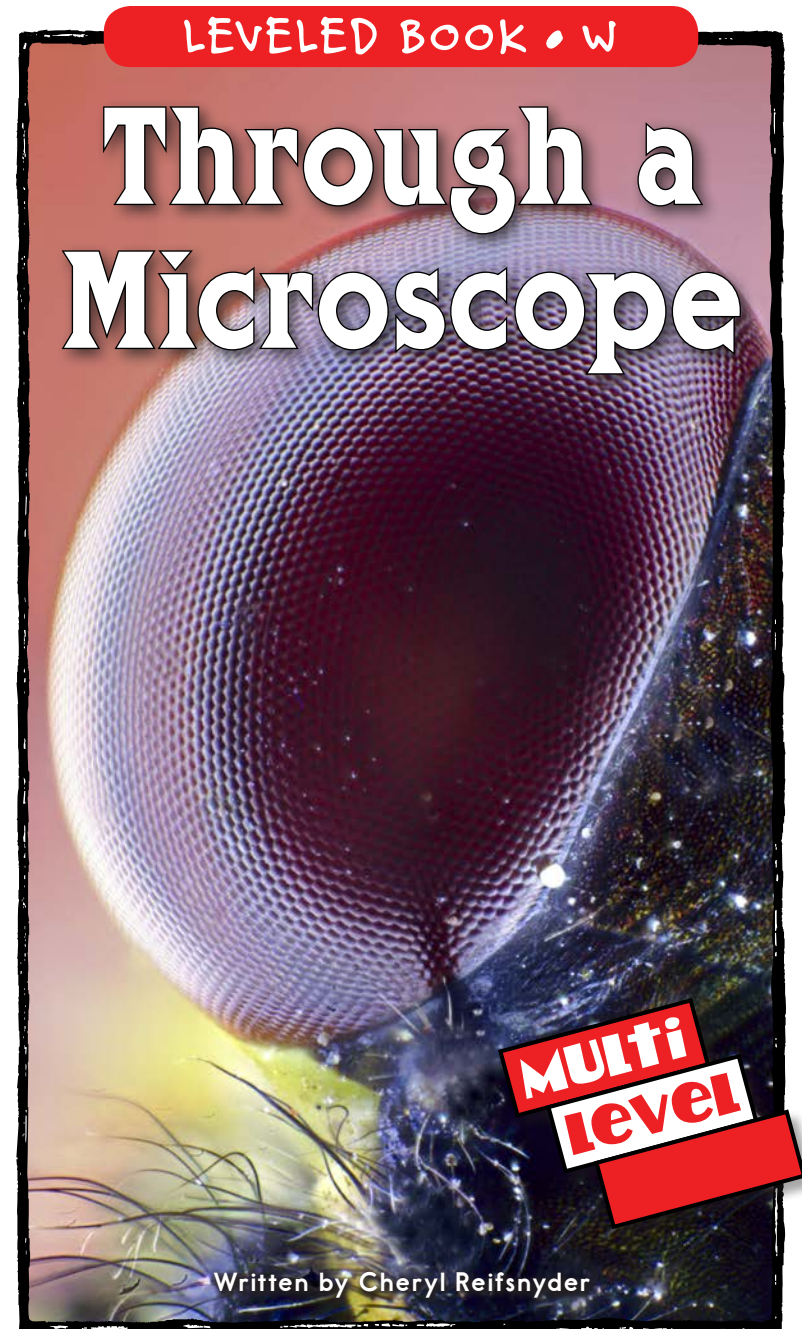
View an object through a microscope.
Draw a picture and write a descriptive paragraph of what you see. Invite a partner to guess what you are describing.

History

Research the life of Antonie van Leeuwenhoek. Write a short biography about his major accomplishments and influence on the world.

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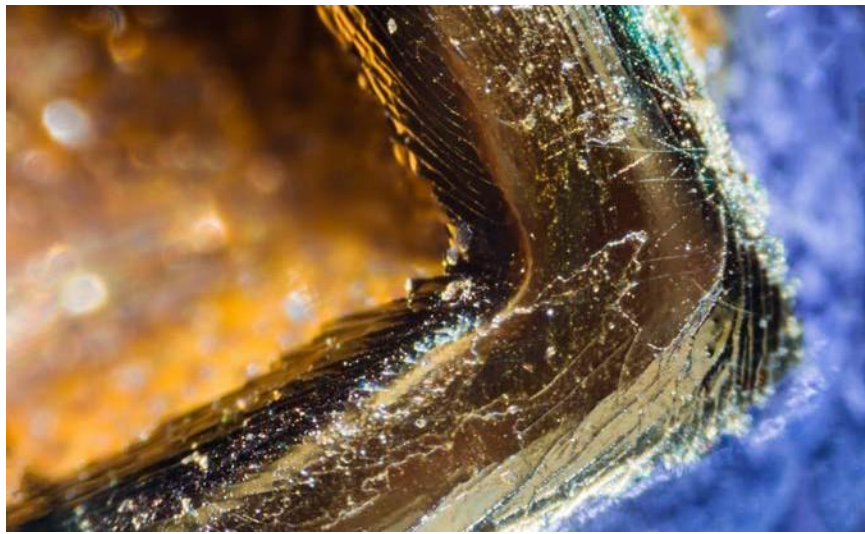


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A green blowfly's body would look very different if you could make yourself really small.

Barely Visible

A human hair—which is about one-tenth of a millimeter (0.0039 in.) in width—is one of the smallest things the human eye can see. Imagine, though, if you could shrink yourself until that hair looked as thick as your arm. Imagine if the hair looked as fat as a tree trunk. What would you see?

The hairs on a fly's legs would look like enormous spikes. The fly itself would look like a monster with gigantic eyes!

That's the close-up view a **microscope** provides, and it changes how we see the world.

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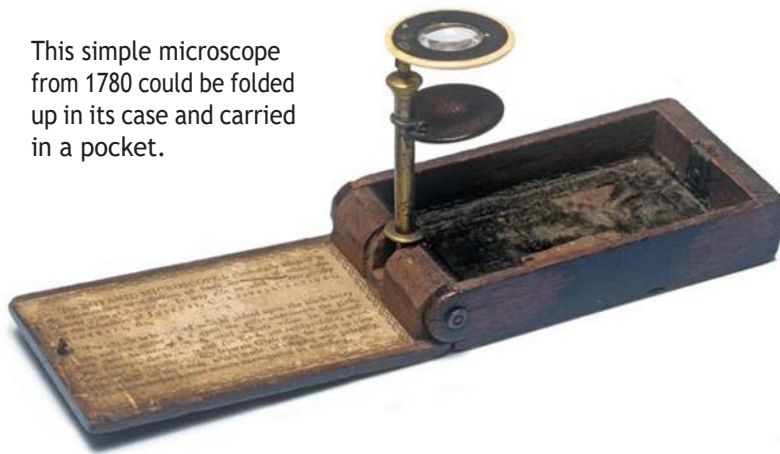
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The First Simple Microscopes

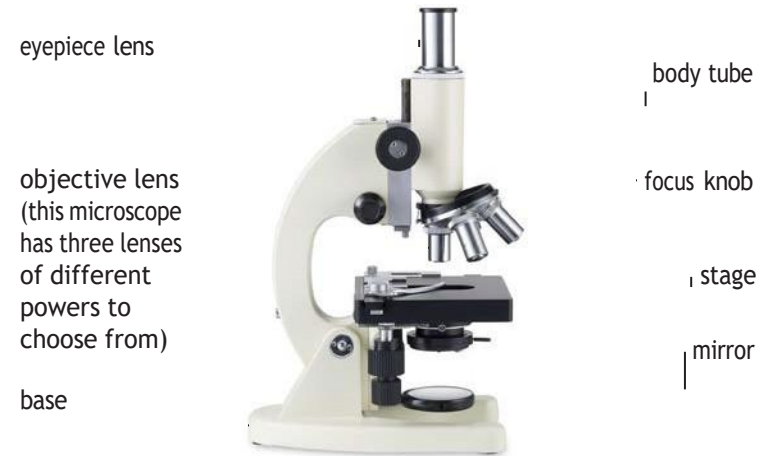
For thousands of years, people have been interested in taking a closer look at their world. The ancient Greeks used glass globes filled with water to make objects appear larger. In the first century *ce*, the Romans discovered how to make things appear larger with glass that was thick in the middle and thin on the edges—the first magnifying glass. When people started to figure out how to make better glass lenses in Europe in the 1600s, the microscope was invented.

At first, the microscope was just a sort of fancy magnifying glass. It had a single glass lens mounted above a holder for **specimens**. Most magnifying glasses only make objects appear about five to ten times (5–10x) larger in size. That was the magnifying power of the first simple microscopes.

This simple microscope from 1780 could be folded up in its case and carried in a pocket.



Parts of a Modern Compound Microscope



Compound Microscopes

Early microscope users figured out that they could put two magnifying glasses in line with each other to get even more magnification. The second lens magnified the image from the first lens, multiplying its power of magnification. With the combination of two lenses in a single microscope, the **compound** microscope was born.

The compound microscope's total magnification is the **product** of the power of both of its lenses. For example, if the first lens provides ten times (10x) magnification and the second lens provides forty times (40x) magnification, the specimen will be viewed at four hundred times (400x) its actual size. Today, compound microscopes can magnify objects to make them appear up to fifteen hundred times (1,500x) larger than their actual size!



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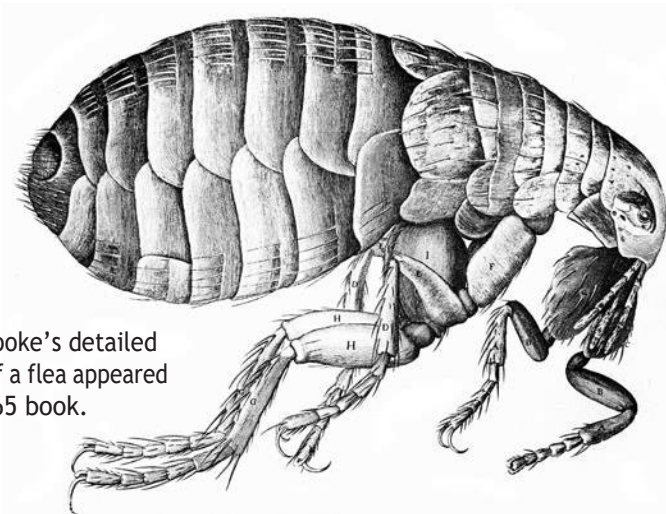
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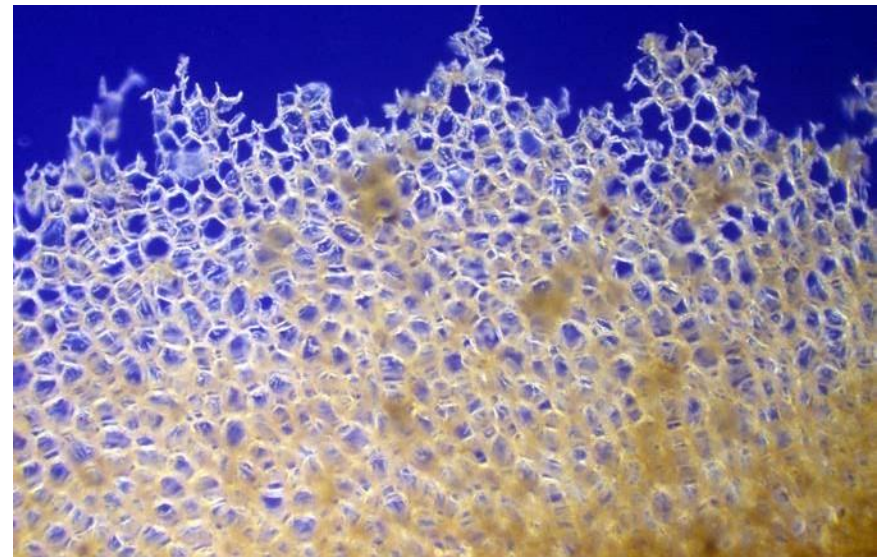
Magnified Twenty to Thirty Times (20–30x)

One of the first early microscope users was a British scientist named Robert Hooke. Hooke improved the early compound microscopes, which could only magnify objects about twenty to thirty times (20–30x) their actual size. He was also one of the first people to take detailed notes on what he saw through a microscope. Hooke published his observations in 1665 in a book called *Micrographia*. It was the first book on microscope use written by a scientist.

In *Micrographia*, Hooke included drawings of close-up views of a louse and a flea. He drew the compound eyes of a fly in greater detail than anyone had ever seen before. He sketched the individual hairs that cover a fly's body, the delicate **antennae**, and the complicated mouthparts.



Robert Hooke's detailed drawing of a flea appeared in his 1665 book.



This magnified view of a thin slice of cork shows that it is made up of many tiny “cells.”

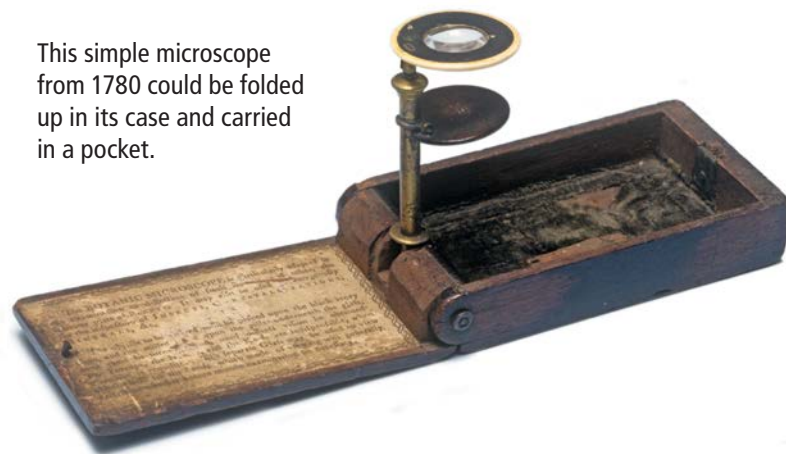
Hooke also sketched sections of plants and seeds. When he examined a thin section of cork under a microscope, he discovered that it was made up of hundreds of tiny chambers. He described those tiny chambers as “cells.” They reminded him of the small rooms, called *cells*, used by monks in a monastery. Eventually, the term *cell* became used to describe the tiny building blocks of all living things.

Today, examining thin slices of plants lets us see how seeds are formed. It reveals how cells make up the veins and tissues of plant leaves. It shows the cells that allow water and **nutrients** to move in plant stems, which helps us understand how plants live and grow.

The First Simple Microscopes

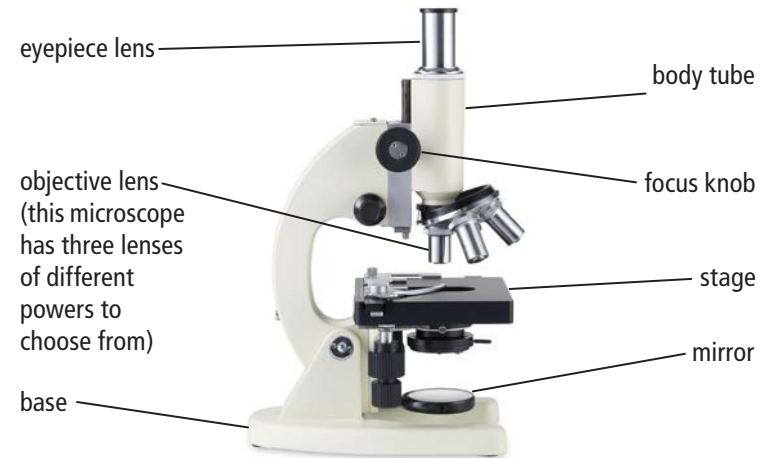
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Magnified Fifty to Two Hundred Times (50–200x)

Historians believe that Hooke's *Micrographia* inspired another early microscope user, Antonie van Leeuwenhoek (LEY-vun-hook). Van Leeuwenhoek was a Dutch cloth merchant, not a trained scientist. However, he used magnifying glasses to examine the different types of fabric he bought and sold. When he saw Hooke's drawings of the microscopic world, Van Leeuwenhoek started making lenses of his own.

Van Leeuwenhoek discovered a way to create better lenses. As a result, he was able to make microscopes that magnified objects to more than two hundred times (200x) their real size. He assembled more than five hundred microscopes in the late 1600s and early 1700s.

Using these stronger microscopes, Van Leeuwenhoek discovered red blood cells. He also discovered tiny life forms called **microorganisms** living in lake water and in the scrapings from someone's teeth. Before Van Leeuwenhoek's time, no one knew that microorganisms—living things too small to see with the naked eye—even existed. Microscopes revealed that microorganisms live everywhere.



Looking through a microscope can reveal the tiny living things in pond water.

Today, if you use a microscope in the classroom, it probably magnifies objects about the same amount as Van Leeuwenhoek's early microscopes. Although two hundred times (200x) magnification might not seem like a lot, it's enough to reveal details invisible to the naked eye.

Even something as simple as sand is seen in a new light under a microscope. Without magnification, sand looks ordinary and plain. Under magnification, it's clear that sand from the ocean's edge contains microscopic shells, shell fragments, coral, and volcanic rock.

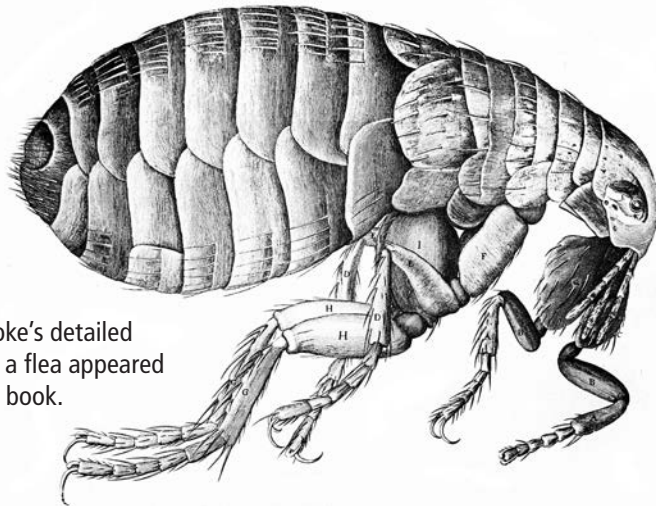


Plain beach sand is really made up of many tiny, colorful items.

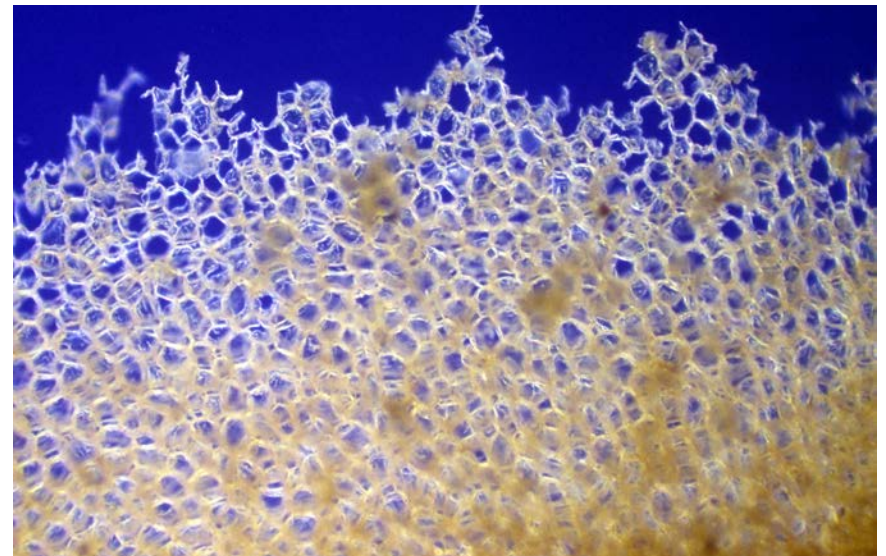
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