



#8816

# THE MICROSCOPE: OUR WINDOW ON THE WORLD

Grade Levels: 4-8

14 minutes

ALLEGRO PRODUCTIONS 1999

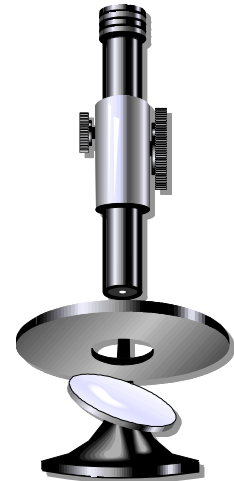
## DESCRIPTION

Gives a general introduction to microscopes, a device invented 400 years ago. Begins with a simple magnifying glass and moves to the optical, confocal, electron, scanning electron, and the scanning tunneling microscopes. Shows that each one "sees" with increasing detail. The microscope opens invisible worlds and aids scientists in improving ours.

## ACADEMIC STANDARDS

### Subject Area: Science

- ◆ Standard: Understands the nature of scientific inquiry
  - Benchmark: Uses appropriate tools and simple equipment (e.g., thermometers, magnifiers, microscopes, calculators, graduated cylinders) to gather scientific data and extend the senses



## INSTRUCTIONAL GOALS

1. To know what is a microscope.
2. To identify various kinds of microscopes.
3. To see how the microscope has developed since the 1500s.
4. To indicate the uses of microscopes.

## BACKGROUND INFORMATION

From its rudimentary beginnings in the late 1500s, the microscope has evolved into a complex and sophisticated instrument. Because these instruments are dependent on light, much like our eyes, they are termed "optical microscopes."

The most basic form is the simple microscope comprised of a single lens mounted on a handle. The compound microscope significantly improves magnification through

the use of more than one lens. The scientific knowledge gained as a result of the early optical microscopes was revolutionary in its day.

The next step in microscopes used a laser as a light source. Finding that light itself had limitations that couldn't be overcome, scientists then harnessed the electron. The first commercial electron microscopes were built in the 1930s. However, specimens must be viewed in a vacuum, therefore eliminating the possibility of examining living creatures. And some objects must be covered in a thin gold coating. To overcome these problems, scientists turned to x-rays. With a new microscope that used x-rays, we were able for the first time to get a detailed look at living structures.

The improvement in microscopes continues. Future microscopes are even now being developed—ones that use sound waves, high-voltage electrons and electron clouds. Aided by these microscopes, scientists are sure to make discoveries that will affect all our lives.

## VOCABULARY

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- |                        |                                   |
|------------------------|-----------------------------------|
| 1. bacteria            | 9. microbe                        |
| 2. confocal microscope | 10. microscope                    |
| 3. diatoms             | 11. optical microscope            |
| 4. electrons           | 12. retina                        |
| 5. electron microscope | 13. scanning electron microscope  |
| 6. laser               | 14. scanning tunneling microscope |
| 7. lens                | 15. specimens                     |
| 8. magnify             |                                   |

## AFTER SHOWING

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### Discussion Items and Questions

1. What is an *optical microscope* and how does it work?
2. What does it mean to *magnify* an object?
3. Name three ways the microscope has enhanced scientific understanding.
4. What do you call a sample studied under a microscope?
5. What is the magnification power of the electron microscope?
6. Describe the limitations of the electron microscope.
7. Discuss how x-rays improved our ability to study specimens.



### Applications and Activities

1. Examine a compound microscope and learn the name of its parts.
2. Study samples of tap water under a simple and compound microscope.
3. Draw something as seen through a magnifying glass and a microscope.

## RELATED RESOURCES

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### Captioned Media Program

- Discovering the Cell #2554
- The Microscope and Its Incredible World #2089



### World Wide Web



The following Web sites complement the contents of this guide; they were selected by professionals who have experience in teaching deaf and hard of hearing students. Every effort was made to select accurate, educationally relevant, and “kid-safe” sites. However, teachers should preview them before use. The U.S. Department of Education, the National Association of the Deaf, and the Captioned Media Program do not endorse the sites and are not responsible for their content.

- **SCANNING ELECTRON MICROSCOPE**

<http://www.mos.org/sln/sem/>

From the Museum of Science, click on topics such as “Image Gallery” to see how a variety of specimens appear under the microscope, and “How the SEM works,” or “Microscope Links.”

- **BUGSCOPE**

<http://bugscope.beckman.uiuc.edu/bugscope99/>

Schools from all over the United States can participate in this Bugscope program. Click on photos to enter in the database to see hundreds of images.

- **ELECTRON MICROSCOPE GALLERY**

<http://www.pbrc.hawaii.edu/~kunkel/gallery/gallery-welcome.html>

Click on the “Image Catalog” to read text about that particular thumbnail image, which can be viewed as a larger photo. Also has a “Light Microscopy Gallery.”