

OBJECTIVES

1. To determine the focal length of a hand lens.
2. To correctly use microscopes to make observations
3. To observe the microscopic features of organisms

WHAT YOU NEED

- Hand lens (magnifying glass)
- Stereo microscope
- Compound microscope
- Microscope slides (some with wells if possible)
- Plastic cover slips
- Small jar
- ruler
- Sticky tape
- Newspaper
- Hay or dried grass
- Sterile water (cooled, boiled water)
- Paper towel



Prepare the "E" slide

WHAT TO DO

1. Cut out the letter "e" from a sheet of newspaper.
2. Use a piece of sticky tape to attach the letter "e" to a flat glass microscope slide. (Alternatively place the letter "e" between two pieces of sticky tape.)

Making a Hay Infusion

WHAT TO DO

1. Wash the jar with hot tap water and allow to cool.
2. Place a handful or crumpled hay or grass in the bottom of the jar.
3. Fill the jar with sterile water and cover with paper toweling.
4. Leave the jar for a few days until the grass begins to sink or the water becomes cloudy.
5. Place a drop of water from the jar onto a microscope slide and cover with a cover slip.

Note: Eventually toxic waste products in the infusion will begin to kill the organisms living in it. A new infusion can be started by transferring a dropper full of the infusion to a new jar containing sterile water and hay/dried grass.

QUESTIONS

1. How has the water in the jar changed over time?
2. What do you think might be happening in the pond water to have caused these changes?

Using the Microscope

WHAT TO DO

1. Observe the slide using a hand lens. Complete an outline drawing of what you see. Label your diagram and record all the important information.
2. Adjust the Stereo microscope to low power.
3. Place the slide on the microscope stage. Focus the microscope and draw and label what you see.
4. Adjust the compound light microscope to low power.

5. Put your slide on the microscope stage with the sample over the hole in the stage. Draw and label what you see.
6. Adjust the compound microscope to high power and draw and label what you see.

QUESTIONS

1. Which gave the clearest image, the hand lens, the stereo microscope or the compound microscope? Why? How does the field of view change as you go from low to high power?
2. What did you observe in the pond water?
3. Were there any similarities between the water from the pond and from the haywater infusion?

REAL WORLD APPLICATIONS OF MICROSCOPES

Hospitals - In the pathology lab, microscopists take tissue removed during surgery and prepare it for light or electron microscopy. The tissue is studied to aid in diagnosis; the patient's treatment is often based partly on these findings, so the microscopist's role is literally one of life or death.

The Police - Microscopists in the forensic science lab can often help by identifying small pieces of hair, fabric or other materials found at the scene of a serious crime. A person's guilt or innocence is often decided partly on the results of such findings.

Universities and Colleges - Microscopy plays a part in almost every area of study. In biology, materials science, microelectronic design and fabrication, ecology and conservation, medical research, and not least in training the next generation of microscopists.

Museums - Pollen analysis, tree ring dating and other methods help archaeologists date their finds. Microscopy also helps curators understand the structure and state of their exhibits and so plan how to stabilize and preserve fragile objects for display.

Industry - Quality control, analysis of structural failure, product design and development all depend partly on the application of microscopical methods. Many large companies like IBM, Shell and ICI retain large teams of microscopists in well-equipped labs similar to those in universities.

Source: Jefferies, C. (1995). Accessed 18 June 2009. *Making a Living from Microscopy - The Professional Scene*. <http://www.microscopy-uk.org.uk/mag/indexmag.html?http://www.microscopy-uk.org.uk/mag/articles/profess.html>

RESOURCES USED TO DEVELOP THIS ACTIVITY

1. Wood, M. (1995). *Magnificent Microworld Adventures*. USA: AIMS Education Foundation.
2. Jefferies, C. (1995). Accessed 18 June 2009. *Making a Living from Microscopy - The Professional Scene* <http://www.microscopy-uk.org.uk/mag/indexmag.html?http://www.microscopy-uk.org.uk/mag/articles/profess.html>

