

# TRB 6:5 - Activity 6 - Microbes and Health

## Summary

This lesson is designed to acquaint students with the concept of how microorganisms cause disease.

## Materials

### Activity A

- cups of water (one per student)
- sodium hydroxide solution or liquid ammonia cleaner
- phenolphthalein
- eye dropper

### Activity B

- copy of Symptoms Cards (see following page)
- copies of Waterborne Disease Analysis Key (one per student)
- create overhead transparencies of enlarged symptom card removing the disease names at the end of each description.

### Activity C

- cooking spray or vegetable oil
- cinnamon
- soap
- paper towels
- warm faucet water
- cold faucet water

## Additional Resources:

Infection Detection Protection, (student magazine), Published by the American Museum of Natural History, purchase a classroom set for \$25. E-mail your request to [center@amnh.org](mailto:center@amnh.org), or visit [www.amnh.org/nationalcenter/infection/](http://www.amnh.org/nationalcenter/infection/) for an interactive microbe experience.

## Background for Teachers

This lesson is designed to acquaint students with the concept of how microorganisms cause disease. Many diseases are caused by microorganisms, little creatures too small to see. A large number of microorganisms thrive in water. They include bacteria, viruses, and protozoa. Infected people may pass them by sneezing, hand contact, or through sewage. Usually microorganisms cannot be seen, smelled, or tasted.

Many deaths in developing countries are caused by diarrhea and related dehydration. Poor sanitation contributes to the spread of bacterial disease, such as cholera, food poisoning, and shigella (shigellosis). Bacteria are everywhere, including our water supplies. Water supplies in the U.S. are tested and treated regularly, so we can normally drink water without concern. However, waterborne diseases are common in many other parts of the world where water is not tested and treated.

Grocery stores and restaurants in the United States must follow many health standards concerning food safety. They are responsible for providing us with quality, safe food. Health inspectors routinely inspect these stores and restaurants to make sure they are following the guidelines. If health inspectors find that a business is not in compliance, they can penalize them by closing the business for a specific amount of time or perhaps indefinitely.

In the United States, we are fortunate to have a government that makes food safety a priority. In some countries food may be produced or imported, but it is spoiled by pests or microorganisms due to poor storage techniques. Pests (insects and rodents) and microorganisms (bacteria, mold, yeast) are the two chief causes of food spoilage. Food must be transported, stored, and prepared correctly

to ensure safety.

All food will spoil if it is not preserved in some way. Some foods such as nuts and grains can be stored for a long time without spoiling. Other foods such as bread and milk must be consumed quickly. Foods can be preserved in many ways. Canning, freezing, and dehydrating are just a few methods. Spoilage may occur before there is a change in taste or odor. Therefore, consumers should read expiration dates before eating food products bought from grocery stores.

People can reduce their risk of food-borne illness by handling it properly. Eighty-five percent of the cases of food-borne illness caused by bacteria can be avoided with proper food handling. Keys to food safety are washing hands, checking expiration dates, washing surfaces and utensils with hot, soapy water, refrigeration and freezing, rinsing fruits and vegetables, and storing foods in proper places.

### Intended Learning Outcomes

- 1-Use science process and thinking skills
- 3-Understand science concepts and principles
- 5-Demonstrate awareness of social and historical aspects of science

### Instructional Procedures

#### Activity A: How Did I Get Sick?

##### Invitation To Learn:

Begin the lesson by discussing worldwide causes of death. Be sensitive to students in your class who may have had a tragedy in their lives. If this strikes too close to home for them, skip this invitation.

List student-suggested causes on the chalkboard. Indicate that the number one killer is diarrhea.

Worldwide, thousands of children die of diarrhea each year. This is not the case in the USA because of proper sanitation and food and water purity.

##### Instructional Procedures:

Invite a volunteer to take a drink from either of two glasses of water. Tell him/her you spit into one glass before class. (optional) Discuss the response and reasons why we don't drink water we think is contaminated.

Continue the exploration by indicating that the class is going to play a "kissing game." Distribute the pre-prepared glasses of liquid to each member of the class. Prior to class time, add 1/8 teaspoon of sodium hydroxide to two of the glasses of water. CAUTION: Warn students not to taste any of the samples.) Each student should have a glass of liquid. Indicate that you are going to exchange water from the cups ("kiss"). The procedure is to allow someone to pour some water from their glass into yours. For each amount added, each individual must pour this amount into another person's glass. Continue this exchange for three minutes.

After the water exchange, indicate that two of the cups contained germs (a chemical, ammonia or sodium hydroxide). As with most microorganisms, it is not easily seen but can be detected with a chemical. Speculate on how far you think the germ was spread during the three minutes. Add a few drops of phenolphthalein to each glass. If the germ (ammonia or sodium hydroxide) is present, the water will change color. Those with colored water will have been infected. Discuss the results.

#### Activity B: What is My Diagnosis?

Indicate that some class members have exhibited some alarming symptoms or role-play with students some "make believe" symptoms you are having. Let them know that you have reason to believe that some microorganisms caused the diseases.

Separate the class into seven cooperative learning groups. Distribute one Symptoms Card to each group and the Waterborne Disease Analysis Key to each student. NOTE: If students have not previously used dichotomous keys, acquaint them with procedures before continuing.

Have a reporter from each group share their group's Symptom Card information using the overhead transparency as a visual aid for the entire class to view. Each group should then use this information to key the disease. Do this for all seven Symptom Cards.

#### Activity C: Wash Your Hands!

Talk with the students about safe food handling practices at their homes. Do they thoroughly wash dishes? Do they refrigerate food properly? Do they look for expiration dates on packages? Do they wash their hands with soap and warm water?

Use this activity to show students the importance of washing hands with soap and warm water.

Apply cooking spray or vegetable oil to each student's hands. (Or you may choose to use a couple of volunteers to demonstrate the activity.)

Sprinkle cinnamon on the palms, backs, and in-between each student's hands. The cinnamon represents germs that get on our hands.

Try to get rid of the cinnamon using only cold water. Discuss the results.

Try to get rid of the cinnamon using soap and cold water. Discuss the results.

Try to get rid of the cinnamon using soap and warm water. The cinnamon "germs" will rinse right off the student's hands and into the sink.

Ask the students why the cinnamon stayed on their hands until they used soap and warm water. How is this similar to washing germs off our hands? Is it important to use soap and warm water for hand washing?

#### Extensions

##### Activity A: Guess My Microbe

Explain to your students that they are going to design a "Get a Clue, Guess My Microbe" riddle. Assign each student a disease caused by a microbe and ask him/her to investigate his/her microbe by using the Internet or other library resources. Students should not tell each other what disease they have drawn.

Ask student to read their clues out loud to the class and see if they can guess the disease.

##### Activity B: Other diseases for further research

Botulism, Campylobacteriosis, Listeriosis, Perfringens, Salmonellosis, Shigellosis, Staphylococcal, Boils, Gonorrhea, Meningitis, Pneumonia, Scarlet Fever, Strep Throat, Anthrax, Diphtheria, Plague, Tetanus, Typhoid Fever, Cholera, Syphilis, African Sleeping Sickness, Malaria.

##### Activity C: Show Them the Germs! Glo Germ TM

Purchase Glo Germ TM oil liquid and or the powder and a UV lamp (order materials from Glo Germ TM 1-800-842-6622 "<http://www.glogerm.com>" [www.glogerm.com](http://www.glogerm.com)). These materials illustrate (with the aid of a UV light) how germs are spread and emphasizes the importance of proper hand washing. Glo Germ TM can help student to visualize "germs." Glo Germ TM products are made of tiny plastic particles that are only visible under an ultraviolet light. The florescent glowing particles represent "germs."

Before class, rub some Glo Germ TM liquid or powder on your hands. Shake hands with students as they enter your classroom. About halfway through class, students should place their hands under an ultraviolet light. Their hands will be glowing, indicating that the teacher's "germs" were passed to them. Furthermore, anything the students touched with their hands will be glowing and will show how quickly germs can spread.

As an exercise to teach proper hand washing, students can rub some Glo Germ TM on their hands. Then, they should repeatedly wash their hands for varying lengths of time. After washing their hands, any remaining germs, especially under fingernails, will be visible under the ultraviolet light.

#### Bibliography

This lesson is part of the Sixth Grade Science Teacher Resource Book (TRB3) <http://www.usoe.org/curr/science/core/6th/TRB6/>. The TRB3 is designed to be your textbook in teaching science curriculum to your students. This book covers all the objectives of each standard and benchmark. If taught efficiently, a student should do well on the End-of-Level (CRT) tests. The TRB3 is designed for teachers who know very little about science, as well as for teachers who have a broad understanding of science.

### Authors

[Utah LessonPlans](#)