



The Case of the Invisible Invaders



Prep **10** minutes



Activity **45** minutes



Grades **3-5**

OBJECTIVE:

To introduce students to the idea that microscopic creatures called microbes, or germs, can cause illness.

MATERIALS:

- *The Case of the Invisible Invaders* Handout
- Microscopes
- Microscope slides
- Cover slips
- Cotton swabs
- Distilled water
- Eyedroppers or pipettes
- Computer with internet access

EDUCATION STANDARDS:

Health: 1.5.3 Describe ways in which safe and healthy school and community environments can promote personal health.

Science: A.2.c Simple instruments, such as magnifiers, thermometers, and rulers, provide more information than scientists obtain using only their senses.

INSTRUCTIONS

1. Have students read *The Case of the Invisible Invaders* handout. Discuss the idea that germs, which can't be seen without a microscope, can make us sick. You may want to mention or show images of some of the microbes commonly found on our bodies.
 - www.xtalent.com.au/gallery/index.php (search for bacteria)
 - www5.pbrc.hawaii.edu/microangela/index.html
 - www.ebiomedia.com/BioGalleries/Living-Bacteria-Through-The-Microscope.html
2. Select several places in the classroom where germs are likely to be found. For this project, hard surfaces work best like door knobs, desktops, or light switches.
3. Have students examine the area you selected, and make notes about what they see. Encourage them to focus on evidence of whether or not the area is clean.
4. Have students swab the area using a cotton swab. Have them re-assess the cleanliness of the area based on what they see on the swab.
5. Next, have students create a microscope slide from the swab by doing the following:
 - Place a drop of distilled water on a slide.
 - Rub the cotton swab through the water several times.
 - Place another drop of water on the slide.
 - Place a slipcover over the slide, being careful not to trap any air bubbles under it.
 - Wipe off any excess water.
6. Have students examine their slides under a microscope, looking for evidence of microbes. Students are most likely to find bacteria, which come in many different shapes, such as round, thin, hairy, etc. Living microbes may move in the water. Note that depending on the area being swabbed, bacteria may not always be visible. If students can't see bacteria under the microscope, you can show them images of some common bacteria (See Step 1 for websites).
7. To conclude, have students write up a brief *Case Report* on their handouts, sharing the evidence they found of invisible invaders.



Interactive Whiteboard Extension

1. Show students an image of the human body on the whiteboard: www.human-body-facts.com/human-body-muscle-diagram.html.
2. Ask students to label the body's external defenses which keep out germs that can cause illness. Examples include skin, mucous membranes in throat and nose, nose hairs, sweat, and tears.
3. Ask students to draw images inside the body to represent the body's immune system, which fights germs once they have entered the body. Examples include white blood cells and antibodies.



The Case of the Invisible Invaders

Johnny and Ella were really glad to see Harry waiting for them in front of the school on Thursday morning. Harry had been absent all week.

"Where were you?" Ella asked. "Did you go on vacation?"

"I wish!" Harry said. "I've been sick all week."

"Ugh," Johnny made a face. "I hate being sick."

"Tell me about it!" Harry said. "I'm glad you guys aren't sick. The doctor said that lots of kids at our school had the same thing, and I probably got it at school."

"Wait," Johnny said, looking a little worried. "The thing that made you sick is here at school? Where?"

"I don't know exactly," Harry said. "The things that made me sick are called germs, and you can't really see them."

"Great!" grumbled Johnny. "Evil invisible things are lurking in

our school just waiting to jump out and..."

"Hold on," laughed Ella. "You are being a little dramatic. Harry is describing microbes, or germs. Microbes are really tiny living things—so tiny you can't see them without a microscope. Like us, they need certain things to live. Some of them live in our bodies or on our skin. Some of them can make us sick, but some of them are helpful, too."

"Oh!" Johnny said. "You mean like the bacteria that live in our intestines and help us digest food?"

"Exactly!" said Ella. "Those bacteria are helpful, but some bacteria can cause illness—like sore throats. Viruses can cause us to get sick, too. They have to have a living host to survive. Fungi and protozoa, which live in water, are other microbes that can sometimes make us sick."

"Well," said Johnny, "it is good to know that not all microbes are harmful. But I would feel better if I could see them."

"Hmmm," said Harry, "maybe there is a way we can."

"Of course!" Ella said excitedly. "We just have to use our science investigation skills to find these invisible invaders!"



Help Ella, Johnny, and Harry investigate *The Case of the Invisible Invaders*.

1. Your teacher will give you an area of the classroom to investigate. Use your observation skills and describe what you see.

2. How clean is the area you are investigating? What evidence do you have of this?

3. Look at microscope images of microbes found in the area you investigated or in areas like it. Describe what you observe.



Case Report: Now that you have investigated the scene, it is time to file your report on *The Case of the Invisible Invaders*. Describe how the evidence was different when seen under a microscope from what you saw when you first investigated the area. Explain what this tells you about judging whether an area is clean and germ-free.
