

We3 Bridging Document: Department of Health

Growing Germs in a Petri Dish

Grade 7

Abstract

This activity provides a hands-on demonstration of how disease is caused by other organisms and spread through contact with hard surfaces. Students will swab several hard surfaces in the classroom/school and touch them to a Petri dish. Petri dishes are left for three days to allow anything that was on the hard surfaces to grow.

Connection to State Science Standards (Grade 7)

Strand I – Life Science

Sub-Strand B – Human Organism

Standard – The student will understand human body systems and their relationship to disease.

Benchmark

1. The student will recognize that disease can be caused by genetics, infection by other organisms, exposure to environmental factors, or a combination of these.
2. The student will identify risks associated with natural, chemical, and biological hazards.

Activity

Growing Germs in a Petri Dish

Go to *Activity Guide: SOS: Safe or Sorry—Handwashing Prevent Disease & Outbreak Intervention* (7-page guide for 6-8 grade) www.health.state.mn.us/handhygiene/curricula/curriculumsos.pdf

Specific activity on page 5

“Experiment #2: Growing Germs in a Petri Dish”

Students’ prior knowledge or alternate conceptions about key concepts/ideas and implications for teachers/advisors

- † Go to: www.project2061.org/publications/bsl/online/index.php?chapter=15§ion=C&band=6
- † Choose 6. *The Human Organism*.
- † Scroll down to 6e. *Physical Health*.
- † Go to *Germs*. Gives conceptions and misconceptions by elementary students about germs. Some of these persist into later grades.

Another misconception that may persist into adulthood: All bacteria cause illness in humans. Specific contexts to address this misconception include role of vitamin K-producing bacteria in the colon for digestion; the normal flora of the body, that is, the surface layer of helpful bacteria and fungi found on the skin, which prevent the attachment of more pathogenic species; and biotechnology such as the production of cheese, yogurt, enzymes, vaccines, and medicines.

Implications

The idea that all bacteria causes illness can be corrected by citing examples of helpful bacteria.

Materials

- Sterile Petri dishes (1 per student or per every 2 students) Petri dishes can be obtained from a local hospital or clinic. When they have reached an expiration date, the facility cannot use them for tests. They still will work for this experiment.

or

- cups & jello—Small sample plastic cups from a local deli containing red jell-o made with less water.
- sterile swabs or Q-tips
- distilled water
- masking tape
- permanent markers

Key concepts/ideas

- Infection by other organisms (including living microbes such as bacteria, fungi, and protozoa) and through environmental factors (including “non-living” microbes such as viruses and archaea) are two of the ways that disease can be caused in humans.
- Microbes, or germs, are present on surfaces in the school and can be transferred to other people who touch the surfaces.
- Germs can cause disease if (1) they enter the body through openings such as the mouth and eyes, and (2) the body’s immune system does not successfully fight them off.
- By regularly washing hands, students can remove the germs from their hands and minimize the risk of infection.
- Washing your hands helps to prevent the spread of diseases.

Connection to Minnesota Environmental Literacy Scope and Sequence Benchmarks

- Social and natural systems may not continue to function if some of their parts are missing. (preK–2)
- When the parts of social and natural systems are put together, they can do things they couldn’t do by themselves. (preK–2)
- In social and natural systems that consist of many parts, the parts usually influence one another (3-5)
- Social and natural systems may not function as well if parts are missing, damaged, mismatched, or misconnected. (3-5)
- Social and natural systems can include processes as well as things. (6-8)
- The output from a social or natural system can become the input to other parts of social and natural systems. (6-8)
- Social and natural systems are connected to each other and to other larger or smaller systems. (6-8)

For the full Minnesota Environmental Literacy Scope and Sequence, see www.seek.state.mn.us/eemn_c.cfm

Connection to State of Minnesota Environmental Education Goals

To view Minnesota State Statute § 115A.073, “Environmental education goals and plans,” go to www.seek.state.mn.us/eemn_g.cfm and scroll down to Statute 115.073. It is the second statute listed on this page.

Instruction tips

This activity can be part of a unit on causes of diseases and natural hazards. The activity takes students through the growing of microorganisms on Petri dishes. To complete the activity, **discuss** the implications. How does the control Petri dish compare to the other dishes after 3 days? What differences can be seen between Petri dishes containing swabbed patches from different locations in the classroom/school? You can also have students look at the germs under a microscope. As an **extension**, have students research and report on what types of germs (microbes) are typically found on hard surfaces and how they effect the human body. Students can also research how illness effects student attendance at school.

Background knowledge for teachers

What is a Germ? <http://kidshealth.org/kid/talk/qa/germs.html>

What is a Microbe (germ) and the Five types
www.microbeworld.org/microbes/

Effects of “germs” Using hand washing to diminish spread of germs, www.washup.org/page03.html

Infection by germs. The body’s defenses
www.amnh.org/nationalcenter/infection/03_inf/03_inf.html

Absenteeism is Expensive: www.health.state.mn.us/handhygiene/schools/expensive.html

Statistics, Minn. Dept. of Health high school/adult hand-washing handbook (pdf), See Part 2 www.health.state.mn.us/handhygiene/curricula/curriculumadult.pdf

How to make this activity relevant to students’ learning and lives

This activity relates directly to students’ lives. By observing the germs that become visible to the human eye after several days of cultivation in a Petri dish, students see what is living on surfaces in the school. By washing their hands, students can decrease their chances of becoming ill, and thus the chances that they will feel bad and miss school and other activities.

Additional background knowledge for teachers

- Germs are also called microbes. Germs, or microbes, are single-cell organisms so tiny that millions can fit into the eye of a needle.
- There are 5 types of germs: bacteria, viruses, fungi, protozoa, and archaea.
- Bacteria, fungi, and protozoa are living organisms. Viruses and archaea are made up of material found in living organisms, but they don’t exhibit the characteristics of living organisms.
- Germs can be harmful, helpful, or neutral to humans.
- Skin covers most of the human body and protects it from germs. Germs can enter the body through openings in the skin such as the mouth and eyes.
- Humans can spread germs by touching surfaces and then touching another surface.
- If a person touches their eyes or mouth after touching a hard surface, germs can potentially enter the body.
- Humans can decrease the number of germs that enter the body by washing their hands with soap and water.

- Some germs that enter the body are fought off through the body’s natural defense system, the immune system.
 - Once germs invade the human body and survive, they settle in for a long stay. They take up nutrients and energy, and can produce toxins, which are like poisons. Those toxins can cause symptoms of common infections, like fevers, sniffles, rashes, coughing, vomiting, and diarrhea.
 - By looking at samples of blood and other fluids under a microscope or sending these samples to a laboratory for more tests, doctors can tell which germs are living in your body and how they are making you sick.
 - According to the Centers for Disease Control, there are more than 52 million cases of the common cold each year among Americans under the age of 17. Nearly 22 million school days are lost due to the common cold alone. Some viruses and bacteria can live from 20 minutes up to 2 hours or more on surfaces like cafeteria tables, doorknobs, and desks.
 - Children have about 6 to 10 colds a year, according to the National Institute for Allergy and Infectious Diseases. One important reason colds are so common in children is because they are often in close contact with each other in daycare centers and schools. In families with children in school, the number of colds per child can be as high as 12 a year. Adults average 2 to 4 colds a year, although the range varies widely.
-

Related state agency K-12 outreach resources

- View the other activities in *Safe or Sorry* www.health.state.mn.us/handhygiene/curricula/curriculum_sos.pdf
 - Minnesota Dept. of Health, *Teaching Handwashing*, materials for all ages, www.health.state.mn.us/handhygiene/curricula/index.html
-

Assessment options

See the We Save section below. Students can create educational materials, which can also be used to assess their understanding of the information.

We save—Ideas for action

1. Conduct an anonymous written survey asking students if they wash their hands and how often. A good survey example can be found at www.washup.org/page04.html. Students can launch a campaign in the school to educate students about the importance of hand washing, sharing information about school days missed and effects of illness. Students can create posters, develop a public service announcement for the school TV or PA system, create a brochure to hand out or a display, or any other creative means.

See *Handwashing Project Ideas for Students* www.health.state.mn.us/handhygiene/curricula/projectideas.html
