

RESOURCE LIBRARY | ACTIVITY : 2 HRS

Research a Microbe and Develop an Argument about its Eradication

Students prepare to create a public service announcement (PSA) that introduces a particular microbe to their community, including an evidence-based argument regarding the value of eradicating the microbe. In this activity, they collaborate in their project groups to conduct research on their focal microbe and then develop their argument about its eradication.

GRADES

6, 7, 8

SUBJECTS

Biology, Health

CONTENTS

2 PDFs, 6 Links

OVERVIEW

Students prepare to create a public service announcement (PSA) that introduces a particular microbe to their community, including an evidence-based argument regarding the value of eradicating the microbe. In this activity, they collaborate in their project groups to conduct research on their focal microbe and then develop their argument about its eradication.

For the complete activity with media resources, visit:

<http://www.nationalgeographic.org/activity/research-microbe-and-develop-argument-about-its-eradication/>

In collaboration with

DIRECTIONS

This activity is part of the Misunderstood Microbes unit

1. Prepare students for their collaborative project work for the Misunderstood Microbes unit.

- Assign students to their project groups and focal microbe based on student input from the Harmful Microbes activity.
- Explain the goal for students' research on their microbe: to have all of the information they will need to decide if the microbe should be eradicated, with supporting evidence and reasoning. They will then use this information and argument to create their PSA, which is the final product for the unit.
 - Promote excitement and engagement about the final product by presenting the options that students will have for creating their PSA and aspects of the context (timing, audience, venue) for their final presentations.
 - Review the Misunderstood Microbes: PSA Project Rubric so students can ensure their PSA will meet the project and assessment goals.
- Walk through Part A of the Misunderstood Microbes PSA Project Builder.
- Given the limited time that students have for conducting research, suggest that students split up the research task by working in pairs to complete different parts of the table in Part A.

2. Students research their focal microbe and its impacts on the body.

- Model how to use and navigate the provided links from the Centers for Disease Control and Prevention (CDC) at the top of the project builder:
 - E. coli, Botulism, Measles, Giardia, Valley Fever and Ringworm
 - Students will likely be able to get all of the information they need from the CDC, but, if needed, they can conduct further online research via the sites listed in the Resources section.
 - Encourage students not to dive too deeply into other online resources and limit their research to what they need to understand in order to decide if the microbe should be eradicated and create a PSA in support of their argument.
 - As needed, provide instruction about effective online research and online literacy.

- Circulate to support students' research process and use of Part A of the project builder.
- As students finish up their parts of the research, direct them to convene with their groups and share information.

3. Prompt groups to develop an evidence-based argument about the importance of eradication importance of their microbe.

- Students should follow the steps in Part B of the PSA Project Builder to develop their argument, drawing on their understanding of the body as a complex system.
- Circulate to help students develop their argument. Push their thinking by asking:
 - *Can you tell me more about that?*
 - *Can you say more about what is happening inside the body that we can't see?*
 - *What level of the body is being impacted by the microbe?*
 - *How does understanding your microbe's impact on the body help to demonstrate that the body is a complex system?*
- If different groups are working on the same microbe, consider having them convene to share their arguments. Encourage them to ask clarifying questions and press on other groups' thinking.

Informal Assessment

The Misunderstood Microbes PSA Project Builder can be used to assess group progress on their project work, as well as their understanding of their microbe. For individual-level assessment, at the end of the activity prompt students to complete a quick write in response to the following question:

Explain one way that your microbe impacts the human body at different levels of organization. Use at least two of the following terms in your explanation: cells, tissues, organ, system.

OBJECTIVES

Subjects & Disciplines

Biology

- Health

Teaching Approach

- Project-based learning

Teaching Methods

- Cooperative learning
- Research
- Writing

Skills Summary

This activity targets the following skills:

- 21st Century Student Outcomes
 - Information, Media, and Technology Skills
 - Information Literacy
 - Media Literacy
 - Learning and Innovation Skills
 - Communication and Collaboration
 - Creativity and Innovation
 - Critical Thinking and Problem Solving
 - Life and Career Skills
 - Leadership and Responsibility
 - Productivity and Accountability
- Science and Engineering Practices
 - Engaging in argument from evidence
 - Obtaining, evaluating, and communicating information

National Standards, Principles, and Practices

COMMON CORE STATE STANDARDS FOR ENGLISH LANGUAGE ARTS
& LITERACY

- **CCSS.ELA-Literacy.WHST.6-8.1.b:**

Support claim(s) with logical reasoning and relevant, accurate data and evidence that demonstrate an understanding of the topic or text, using credible sources.

- **CCSS.ELA-LITERACY.WHST.6-8.7:**

Conduct short research projects to answer a question (including a self-generated question), drawing on several sources and generating additional related, focused questions that allow for multiple avenues of exploration.

NEXT GENERATION SCIENCE STANDARDS

- **Crosscutting Concept 4:**

Systems and system models

- **Crosscutting Concepts: Cause and Effect:**

- **LS1.A: Structure and Function:**

In multicellular organisms, the body is a system of multiple interacting subsystems. These subsystems are groups of cells that work together to form tissues and organs that are specialized for particular body functions.

- **MS. From Molecules to Organisms: Structures and Processes:**

MS-LS1-3. Use argument supported by evidence for how the body is a system of interacting subsystems composed of groups of cells.

- **Science and Engineering Practice 7:**

Engaging in argument from evidence

- **Science and Engineering Practice 8:**

Obtaining, evaluating, and communicating information

Preparation

What You'll Need

MATERIALS YOU PROVIDE

- Printed handouts or digital access to student handouts

REQUIRED TECHNOLOGY

- Internet Access: Required
- Tech Setup: 1 computer per classroom, 1 computer per pair, Monitor/screen, Printer, Projector

PHYSICAL SPACE

- Classroom

SETUP

Before class, determine the project groups of three to four students by using students' rankings of the microbe choices from the *Harmful Microbes* activity, aiming to assign them to their first or second choice. Alternatively, you can let students choose their own groups. Students will work in these teams for the rest of the Misunderstood Microbes unit.

Review the Misunderstood Microbes PSA Project Builder so you are prepared to support students as they conduct research on their microbe and develop their argument regarding the value of eradication for their focal microbe.

So that you can share with students in Step 1, decide on the options for how they will create their PSAs. These could include some of the animation tools used in the sample PSAs shown throughout Lesson 2, creating short live action films, a visual poster, or collaborative presentation. Leverage resources available at your school, as well as students' interests and expertise where possible.

Additionally, consider how to provide an authentic context and audience for the final PSA presentations during Lesson 3. Some factors to consider:

- Time of day: Can the presentations be held after school or in the evening so that community members and/or relevant experts may attend?
- Audience: Who is an authentic audience for students' presentations (e.g., food prep workers for *E. coli* and *Clostridium botulinum*, parents for measles, lifeguards for *Giardia*)? Is it feasible to invite community groups, public health experts, and/or families and siblings?
- Venue: Is there a space outside of the classroom or school in which students could present their PSAs, to promote their message and community dialogue?

GROUPING

- Small-group learning
- Small-group work

RESOURCES PROVIDED: HANDOUTS & WORKSHEETS

- [PSA Rubric](#)
- [PSA Project Builder](#)

RESOURCES PROVIDED: ARTICLES & PROFILES

- CDC: E. Coli
- CDC: Botulism
- CDC: Measles
- CDC: Giardia
- CDC: Valley Fever
- CDC: Ringworm

BACKGROUND & VOCABULARY

Background Information

Microbes are organisms that are too small to be seen by the human eye and include bacteria, archaea, protists, viruses, and fungi. Although some microbes cause disease, they are also crucial to the functioning of human bodies through processes such as digestion and aiding the immune system. The microbes found on a person's body are collectively known as a person's microbiome, especially those found in body organs and systems such as their skin, hair, and digestive system.

Most of microbes' interactions with humans are neutral or beneficial. However, they also can make us sick by acting as infectious agents. Microbes can cause disease through a variety of body organs and systems, which has cascading effects throughout the whole system and human body. Depending on the nature of their impacts on humans, the importance of eradicating particular microbes may vary.

Public Service Announcements (PSAs) are a way to communicate important information (often about a social issue or health concern) to a broad audience. A successful PSA is short, engaging, and contains a persuasive message for the viewer to act on in their everyday lives.

Prior Knowledge

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Recommended Prior Activities

- [Deep Dive into the Cell](#)
- [Harmful Microbes](#)
- [Helpful Microbes](#)
- [Introduction to Microbes and Human Body Systems](#)
- [Microbe Eradication Complications](#)
- [Microbes Across the Tree of Life](#)
- [The Interconnected Systems of the Human Body](#)

Vocabulary

Term **Part of Speech** **Definition**

For Further Exploration

Reference

- [WHO: Fact Sheets](#)
- [Diseases and Conditions](#)



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