

How did a virus kill 2/3 of the Blackfoot Tribe in Montana in the 1837 Great Plains Smallpox Epidemic? Middle School Life Science

This Indian Education for All lesson about smallpox is designed to support instruction related to MS-LS-1. In the 5E Model, this lesson Engages and Explores. To meet the Montana science content standard, additional lessons allowing for student Explanation, Elaboration, and Evaluation should be taught.

Lesson resources for virology, disease transmission, background information on epidemic affecting Native American tribes:

Virus Engineering Lesson:

https://www.teachengineering.org/lessons/view/duk_virus_mary_less

Science News for Students – Explainer: What is a Virus?

<https://www.sciencenewsforstudents.org/article/explainer-what-virus>

AmericaPox: The Missing Plague:

<https://www.youtube.com/watch?v=JEYh5WACqEk>

The Infection Game:

<https://flusurvey.ie/media/uploads/Shape5InfectionGameSF.pdf>

Smallpox Outbreak in Montana 1837:

https://en.wikipedia.org/wiki/1837_Great_Plains_smallpox_epidemic

Montana Science Content Standards

MS-LS1 From Molecules to Organisms: Structures and Processes

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Students who demonstrate understanding can:		
<p>MS-LS1-1. Conduct an investigation to provide evidence that living things are made of cells; either one cell or many different numbers and types of cells. [Clarification Statement: Emphasis is on developing evidence that living things (**including Bacteria, Archaea, and Eukarya) are made of cells, distinguishing between living and non-living things, and understanding that living things may be made of one cell or many and varied cells. **Viruses, while not cells, have features that are both common with, and distinct from, cellular life.</p>		
The performance expectations above were developed using the following elements from the NRC document <i>A Framework for K–12 Science Education</i> :		
<p>Science and Engineering Practices <u>Planning and Carrying Out Investigations</u> Planning and carrying out investigations in 6–8 builds on K–5 experiences and progresses to include investigations that use <u>multiple variables</u> and provide evidence to support explanations or solutions.</p> <ul style="list-style-type: none"> Conduct an investigation to produce data to serve as the basis for evidence that meet the goals of an investigation. (MS-LS1-1) 	<p>Disciplinary Core Ideas <u>LS1.A: Structure and Function</u></p> <ul style="list-style-type: none"> All living things are made up of cells, which is the smallest unit that can be said to be alive. An organism may consist of one single cell (unicellular) or many different numbers and types of cells (multicellular). (MS-LS1-1) 	<p>Crosscutting Concepts <u>Scale, Proportion, and Quantity</u></p> <ul style="list-style-type: none"> Phenomena that can be observed at one scale may not be observable at another scale. (MS-LS1-1) <p style="text-align: center;">-----</p> <p style="text-align: center;">Connections to Engineering, Technology, and Applications of Science, Engineering, and Technology</p> <ul style="list-style-type: none"> Engineering advances have led to important discoveries in virtually every field of science, and scientific discoveries have led to the development of entire industries and engineered systems. (MS-LS1-1)
Articulation to DCIs across grade-bands: HS.LS1.A (MS-LS1-1)		



Montana State Standards Connections:

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. (MS-LS1-1)

Mathematics –

6.EE.9

Use variables to represent two quantities in a real-world problem that change in relationship to one another; write an equation to express one quantity, thought of as the dependent variable, in terms of the other quantity, thought of as the independent variable. Analyze the relationship between the dependent and independent variables using graphs and tables, and relate these to the equation. (MS-LS1-1)

Background Information Building

National Geographic - Small Pox

<https://www.youtube.com/watch?v=ZOW6gs9rZGI> Transcript

“Along with eager conquistadors, guns, cavalry, and Christianity, the Age of Exploration unintentionally brought what would become the number one destroyer of Native American populations. It is estimated that as much as 95% of Native Americans throughout North and South America were decimated by disease within a short time of the arrival of the Europeans. Killing more than any swords, guns, or armies combined, smallpox, a disease stemming from dense populations of domesticated animals, killed about 50% of the Inca population in the first epidemic during the early 16th century. Smallpox first appeared over 3,000 years ago, but because of the relative seclusion of the natives in the Americas, it was not known in the new world until its first recorded outbreak in 1518 – when crew members from a Spanish ship spread the disease to the native peoples of Hispaniola, today known as the Dominican Republic and Haiti. The disease rapidly wiped out over half of the native population there. In 1520, one of the soldiers under Spanish explorer Hernando Cortes unwittingly started an epidemic that spread the disease throughout the empire killing 1/3 of the Aztec population. Why were these outbreaks so seemingly one-sided? Why weren't European populations decimated by new world diseases? Most infectious diseases are a result of germs passed on to humans from close-quartered domesticated animals. And, while the Europeans had many more kinds of domestic animals than native peoples of the new world, they also had built up immunities that the natives lacked. Smallpox is considered one of the most perilous of infectious diseases in human history. The disease killed hundreds of millions of people over the centuries. In the 20th century alone it killed over 300 million people before it was finally declared eradicated in 1979.”

Procedure

Use PowerPoint and embedded video (4:30 mins) included with this lesson to Engage and Explore. Do the Montana Smallpox Activity for further engagement following the presentation.

Materials

- 30 Scenario cards (see chart below to maintain the correct populations if class size is smaller than 30)
- 4 different colors of paper cut into thirds along the length of the paper (this makes a perfect envelope in which to glue the scenario cards. The paper is folded in half to conceal the scenario until students are instructed to open them and read)
- Glue or tape

Suggestion: Mark the outside of the paper envelope with the three Blackfeet scenario cards where the person died from secondary complications with two dots. If the class size is less than 30, remove these three scenarios first. Mark the four Blackfeet scenario cards where the individual survives and moves to live with the Cree with one dot. If the class size is less than 27, remove these cards next. Follow the chart below as a guide.

Procedure

- Following the presentation, which includes a 4:30 video about smallpox and Jenner's vaccination, pass out the scenario cards instructing students not to look at the inside yet.
- Instruct students to form groups based on their paper color and stand together in a corner of the room.
- Next, the students open the paper and read their card. The students should then further organize themselves according to the information on the card.
- Instruct all students with a skull and cross bones to sit down.
- Have one representative from each subgroup read their cards aloud.
- Encourage discussion that emphasizes:
 - how American Indians in Montana, especially the Blackfeet Tribe, were devastated by smallpox,
 - why it might be that the military, most missionaries, and the Hudson Bay Trading Company were the first to receive vaccinations (was this fair?),
 - how it was that the Hudson Bay was able to acquire the vaccine,
 - how the Indian Vaccination Act of 1832 made no efforts to actually supply enough vaccines for all Indians

The point of the smallpox activity is to demonstrate the impact of devastation on the Blackfeet population, it is a good idea to mark the outside of the envelopes that contain Blackfeet story card with a dot or star. If class sizes are smaller than 30, it will be important to make sure that the ratios of the scenario cards are correct to convey how deadly these viruses were to non-dominant populations.

Class Size	Blackfeet Scenarios	Cree Scenarios	Missionary Scenarios	US Army Scenarios
30	21	3	3	3
25	16	3	3	3
20	11	3	3	3
15	9	2	2	2
10	7	1	1	1

Evaluate

There are several formative assessment strategies that could be implemented here depending upon class size and time allotted.

1. Two-minute quick write: What did you learn today?
2. A 3-2-1 quick write: 3 things you were fascinated by; 2 things you learned; 1 thing that confuses you
3. One and Done: One sentence about what inspired you about science and viruses today?