NCSS notable trade book lesson: using *Evidence!* for argumentation and inquiry modeling

Social Studies Research and Practice

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Evidence! How Dr John Snow Solved the Mystery of Cholera
By *Deborah Hopkinson*
Illustrated by Nik Henderson
Random House Children's Books/Alfred A. Knopf.
40pp.
Trade ISBN 9780593426814.
Review DOI 10.1108/SSRP-07-2025-0045

Evidence! How Dr John Snow Solved the Mystery of Cholera tells the story of the 1854 Broad Street cholera epidemic in London and Dr John Snow's quest to prevent its spread. In this lesson, students will learn to be detectives themselves by examining Dr Snow's process of inquiry and argumentation. Using *Evidence!* as a mentor text and Dr Snow as a model, students identify, examine, and illustrate the component steps of inquiry and argumentation. In whole class, small group, and individual settings, students refine their argumentative writing skills. In this interdisciplinary lesson, students define and visualize several Nature of Science characteristics from the Next Generation Science Standards (NGSS Lead States, 2013). Students discover connections between the nature of science and social studies, and practitioners of social studies are (social) scientists as well. Lastly, students engage in a self-directed inquiry into a local issue of interest and take action to educate their peers and community on the topic.

Book is recommended for grades preschool–3
Lesson is recommended for grades 3–5
This class is designed for several class periods (varies based on period length)

Book summary
Evidence! How Dr John Snow Solved the Mystery of Cholera is a picture book that is set during the 1854 Broad Street cholera in London and describes Dr Snow's process of proving that the disease was spread by contaminated water. This book is the author's 12th to be selected as an NCSS Notable Trade Book.

Standards
NCSS standards
3 – People, Places, and Environment,
8 – Time, Continuity, and Change
9 – Global Connections

C3 Framework standards
D1.5.3-5. Determine the kinds of sources that will be helpful in answering compelling and supporting questions, taking into consideration the different opinions people have about how to answer the questions.

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D3.1.3-5. Gather relevant information from multiple sources while using the origin, structure, and context to guide the selection.

D3.3.3-5. Identify evidence that draws information from multiple sources in response to compelling questions.

D4.1.3-5. Construct arguments using claims and evidence from multiple sources.

D4.2.3-5. Construct explanations using reasoning, correct sequence, examples, and details with relevant information and data.

NTSA Next Generation Science Standards
Appendix H – The Nature of Science (grades 3-5)

(1) Scientific Investigations Use a Variety of Methods

(2) Scientific Knowledge is Based on Empirical Evidence

(3) Scientific Knowledge is Open to Revision in Light of New Evidence

(4) Science is a Human Endeavor.

Materials

(1) Hopkinson (2024). *Evidence! How Dr John Snow solved the mystery of cholera* (Henderson, N., Illus.). Alfred A. Knopf.

(2) Jigsaw puzzle that is age-appropriate for students

(3) Whiteboard and dry-erase markers

(4) Chart paper

(5) Markers

(6) Technology for research

(7) Document camera (optional)

(8) Projector (optional)

(9) Teacher's computer (optional)

Big ideas

(1) The steps of inquiry and argumentation are the same in social studies and in science.

(2) The steps of inquiry and argumentation can be applied to any questions we have about the world around us.

(3) We can discover how to make positive changes in our community through inquiry and argumentation.

Objectives
Students will

(1) Identify problems, questions, claims, sources, and evidence encountered by Dr John Snow as he investigated cholera

(2) Illustrate the inquiry process of gathering evidence from different sources to support claims

(3) Write an argumentation paragraph about how historical and/or current diseases are spread

(4) Describe how Dr John Snow's investigation demonstrated the nature of science

(5) Identify how the characteristics of the nature of science are seen in social studies

(6) Investigate a question they have about a school/local community issue

(7) Create a written argumentative product based on the evidence collected

Lesson vocabulary for teachers from *C3 Framework for social studies state standards*

Argument (coherent, reasoned) - In the C3 Framework, an argument is a claim or collection of claims supported by relevant evidence, which can be considered an answer to the question investigated by the research. In historical research, a coherent argument is one in which the evidence cited supports the claim; a reasoned argument is one in which the evidence is used in a logical and critical way.

Claim - In the C3 Framework, claims are statements of belief or opinion rooted in factual knowledge and evidence that result from the analysis of sources in an inquiry.

Counterclaim - Counterclaims are statements that challenge or respond to claims, using evidence that contradicts a claim. (might be used in extension activity)

Evidence - In the C3 Framework, evidence is information taken during an analysis of a source that is then used to support a claim made in response to an inquiry question.

Source - The materials from human and natural activities that can be studied and analyzed. Sources can be written, visual, oral, or material. Historians often also use the terms accounts and documents to refer to sources.

Procedures

Exploration

Warm up/Hook – Jigsaw puzzle analysis.

(1) The teacher will find an age-appropriate jigsaw puzzle to use for this activity

(2) The teacher will either project the puzzle pieces onto a screen (using an online jigsaw puzzle or a document camera) or put it on a table and have students gather around so all can see it.

(3) Based on time, student need, and grade level, the class can interact with the puzzle in the following ways:

- Students can work on solving the puzzle themselves (if using an online puzzle or puzzle on a common table).
  - Online puzzles can be found at National Geographic Kids (https://kids.nationalgeographic.com/games/puzzles), Puzzle Factory (https://puzzlefactory.com/puzzles-for-kids), Room Recess (https://www.roomrecess.com/pages/JigsawPuzzles.html), and via web search.
- Students can give step-by-step directions to the teacher on solving the puzzle (if using document camera, online puzzle, or table puzzle).
- Students can observe the puzzle pieces and proceed to answer the question about solving a puzzle seen in the following step (brief hook/reduced time option).
- Or another process with a jigsaw puzzle that stages students to answer the question about solving a puzzle seen in the following step.

(4) Students will answer the following question as a whole class out loud: *How do we solve a puzzle?*

- Teacher will make a list of responses on the board for students to see and refer back to when doing the Nature of Science and Chain activities.
- Possible answers could be to look at the box to see what the finished piece should look like, to organize pieces, to find corner pieces, to find edge pieces, to put together the outside pieces, to put together groups/clusters of the same color/segment of puzzle
- *Note*: if students don't bring up groups/clusters—the teacher should bring it up in order to reference back to it during the Read Aloud (Dr Snow is looking at clusters of cholera cases during the story).

Read Aloud.

(1) Students will be instructed to pay attention during the read aloud of *Evidence! How Dr John Snow Solved the Mystery of Cholera*

- This book is available electronically on Libby (free app for eBooks from local libraries) and other eBook retailers.

(2) During the read aloud, the teacher will pause to ask clarifying and probing questions about the text. These questions will also address the nature of science and the path of inquiry (that will be explained/defined in following activities). Students can take note of these answers and write them down individually, the teacher or a class scribe can write these answers in an visually accessible location for all students, or another recording process of the teacher's preference.

Suggestions for clarifying and probing questions for students to answer:

(1) *What is the problem?* (dirty/shared conditions [pp. 5–7], people sick [pp. 7–10], cholera [pp. 9–10])

(2) *What do people claim is causing it?* (bad air [p. 10])

(3) *Who is looking for answers to what is causing cholera?* (Dr John Snow [p. 13])

(4) *What is he?* (doctor, detective [p. 13])

(5) *What do detectives do?* (solve mysteries/puzzles, ask questions, find answers)

(6) *Note*: ensure that students understand that detectives look for evidence to prove their claim

(7) *What does Snow claim is causing cholera?* (water [pp. 17–18])

(8) *Where is Dr Snow looking for/finding evidence?* (observing people [p. 14], street maps [pp.14, 16], interviews [pp. 23, 26, 28–29, 33])

(9) *What evidence does Dr Snow find?* (cholera causing stomach problems [p. 15], cholera breaks out in clusters [p. 16], sick people are getting water from the same pump [pp. 17, 26–27], he collects water from the Broad St. pump [p. 20], workers at the Lion Brewery didn't get sick because they had a separate water source [p. 28], Susannah Eley had gotten sick even though she didn't live in the same neighborhood but she drank water from Broad St. pump [p. 31–33]).

Development
Inquiry & argumentation chain.

(1) The teacher will introduce the concept of argumentation by asking the class to explain what an argument is. Suggestions for questions for students to answer:

- *What is an argument?* (e.g., a fight, when people disagree, when you want things your way and someone says no, etc.)
- *Who is involved?* (e.g., people, at least 2 people, etc.)
- *What happens during it?* (e.g., people yell, people talk, people say what they want, people try to convince you, etc.)
- *How do you win an argument?* (e.g., by getting your way, by the other people quitting/walking away, by both sides making a plan, by both sides saying they will do something and shaking hands, etc.)

(2) The teacher will tell students that we also "argue" in social studies when we defend claims (statements of belief/opinion rooted in factual evidence) with evidence (information from a source). The teacher will then tell students that during the read aloud, they had already identified building blocks for argumentation in social studies according to the *C3 Framework*. The teacher will discuss these building blocks of argumentation (listed below) with the class using examples from the read aloud:

- Snow's compelling question/s: How does cholera spread? How do people get sick with cholera?
- Snow's claim: cholera spreads through water
- Snow's multiple sources: maps, personal observations, interviews
- Snow's evidence: listed previously

(3) As a whole class, students will make/fill out a flowchart showing the path of inquiry and developing an argument using Dr Snow and *Evidence!* as a model (examples of flowcharts can be seen in Figure 1). The teacher will prompt the class to discuss the flow/order of the argumentation steps discussed above (question, claim, sources, evidence, conclusion). The class will create/complete the flowchart, label the stages, and give specific examples from the story for each stage. The teacher will discuss each stage before asking students for examples from the *Evidence!* read aloud. Here are some options on how this can be done based on time available, grade level, and student ability:

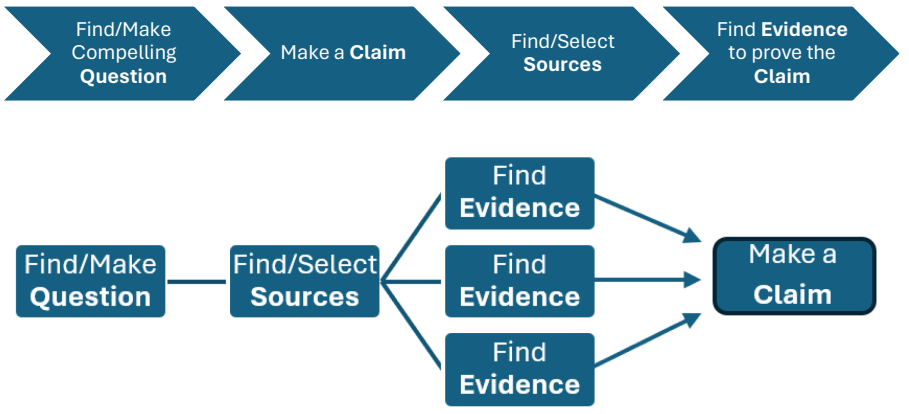

Figure 1. Example flowcharts. *Source.* Figure is the creation of the author

- The class can create a flowchart, with the teacher drawing it on a whiteboard, chart paper, or creating it on a computer and projecting it for the class. The entire class can work to label and fill in the flowchart with examples from the story
  - Additionally, students can copy this class flowchart individually and fill in their flowchart with information from the class board flowchart.
- The teacher could also provide a blank flowchart worksheet where students can fill in the step labels and examples from the story (see Figure 2).
  - This can be completed as an entire class, in small groups, in pairs, or individually.

Argumentation paragraph practice – using Evidence!.

(1) Using the flow chart, as a whole class students will practice writing an argumentative paragraph drawing details from the chart. A sample format for this argumentative paragraph can be seen in Figure 3.

(2) Students will write one paragraph answering the question: *What causes cholera?* Here are some options on how this can be done based on time available, grade level, and student ability:

What is your question?	What is the claim?	What sources are you using?	What is your evidence that supports your claim?
		1. 2. 3.	1. 2. 3.

What is your question?	What are your sources?	What is your evidence that supports your claim?	What is your claim?
	1.	1.	
	2.	2.	
	3.	3.	

Figure 2. Example flowchart worksheets. *Source.* Figure is the creation of the author

Claim	Dr. Snow claimed that cholera spreads by drinking water.
Evidence from source #1-map	Clusters of people got cholera.
Evidence from source #2-neighborhood interviews	People who got sick were drinking from the same water pump on Broad Street.
Evidence from source #3-worker interviews	Workers at the Lion Brewery didn't get sick because they drank from a different water pump.
Evidence from source #4-news & Eley family interview	Susannah Eley didn't live by the Broad Street pump, but she drank water from it and got sick.
Conclusion	Water, not dirty air, spread cholera in London in 1854.

Figure 3. Sample paragraph outline and response. *Source.* Figure is the creation of the author

- Students together as a class can write the paragraph.
  - The teacher will guide the process to emphasize and identify the multiple sources that Dr Snow used to find evidence.
  - Students will create this argumentative paragraph step-by-step guided by the teacher by making (1) a claim sentence, then (2) 2–4 sentences with a single piece of evidence per sentence, and (3) a conclusion sentence that restates the claim of the paragraph.
- Students can write the paragraph individually.
  - The teacher will remind students to identify the multiple sources Dr Snow used to find evidence to use in their response.
  - Students will create an argumentative paragraph consisting of (1) a claim sentence, then (2) 2–4 sentences with a single piece of evidence per sentence, and (3) a conclusion sentence that restates the claim of the paragraph.

Claim paragraph - diseases.

(1) As a small group or individuals (depending on grade level and student ability), students will write an argumentation paragraph using the class-modeled paragraph format about what causes other diseases that we talk about in social studies. They can choose a disease from p. 39 of *Evidence!* (also listed below) or suggest one of their own.

- Coronavirus Disease (COVID-19)
- HIV
- Influenza
- Malaria
- Plague
- Polio
- Smallpox

(2) Before starting students off to research their disease, the teacher will reference back to Dr Snow as an example for students to gather evidence from multiple sources. Students will gather evidence from different sources (e.g., using the internet, campus library, books the teacher has gathered for this activity, etc.) to support their claim about what causes/spreads their disease.

- Students can create a blank flowchart for brainstorming their claim and recording the evidence they find on their disease (if students created a flowchart in *Development-Inquiry & Argumentation Chain Step 3*)

- Teachers can provide a blank flowchart for students to brainstorm their claim and record the evidence they find on their disease (if the teacher provided a flowchart in *Development-Inquiry & Argumentation Chain Step 3*)
- See *Further Reading* toward the end of this lesson for books about these diseases, other pandemics, and vaccines that can serve as a starting point for students' research.
- If searching online, teachers and/or districts might want students to use filters for web searches. Examples are Safe Search Kids, Google Kid Search, Fact Monster, Kidtopia, and Kiddle.
- Some options for online databases/references for students to use are ABC-Clio, PBS Learning Media, Gale in Context, Explora Elementary, Britannica Academic, Scholastic GO, and the World Book Online Reference Center.
- Teachers may also want to use a program like Flint or Rewordify to adjust resources to match students' reading levels.

(3) Students will share their argumentation paragraph with the class and teach their peers about the disease they researched. They can do this in multiple ways:

- Gallery Walk
- Jigsaws
- Class presentations
- Projecting their paragraph for the whole class to read using a document camera (handwritten) or shared file (1:1 classrooms)

Defining and identifying the nature of science in social studies.

(1) The teacher will project the four selected NSTA-NGSS Nature of Science characteristics on the board for the class. The teacher will introduce these characteristics by explaining that scientific knowledge can be described just like you and me by the characteristics they have and that define them:

- #1 - Scientific Investigations Use a Variety of Methods
- #2 - Scientific Knowledge is Based on Empirical Evidence
- #3 - Scientific Knowledge is Open to Revision in Light of New Evidence
- #7 - Science is a Human Endeavor.

Note: The description of each NGSS Nature of Science characteristic by grade band can be found here: https://www.nextgenscience.org/sites/default/files/Appendix%20H%20-%20The%20Nature%20of%20Science%20in%20the%20Next%20Generation%20Science%20Standards%204.15.13.pdf

(2) The students, guided by the teacher, will make a "class" definition of these characteristics one by one. The teacher will chunk these phrases and ask students what they think these words/phrases mean and to put them into their own words. The teacher will record the class definition for the next step of the activity and/or students can record the class definition in their notes (see Figure 4 as an example).

(3) For each characteristic, students will use *Evidence!* and Dr John Snow to find an example to illustrate each characteristic (i.e., Science is a Human Endeavor = students can discuss Dr Snow's socioeconomic background and path to becoming a doctor). This can be done individually, in partners or small groups, or as a whole class.

Nature of Science Characteristic	Sample Student-Friendly Definition	Sample Dr. Snow and/or *Evidence!* example
#1 – Scientific Investigations Use a Variety of Methods	We use questions and more than one way to answer questions to do science.	- Dr. Snow's question: What is causing cholera and how to stop it? - Dr. Snow finding clues through maps, observations, interviews - Dr. Snow deciding to interview people when he doesn't see anything under his microscope
#2 – Scientific Knowledge is Based on Empirical Evidence	Scientists look for clues and patterns with tools.	- Dr. Snow uses maps to track who got sick - Dr. Snow looking at the water under the microscope
#3 – Scientific Knowledge is Open to Revision in Light of New Evidence	We can change how we explain things in science if we want when we get new information/evidence.	- Cholera being caused by bad air changes to being caused by bad water
#7 – Science is a Human Endeavor	Anyone can become a scientist. Science is teamwork and it is everywhere. Scientists think outside the box.	- Dr. Snow grew up poor in a big family - Dr. Snow worked with Rev. Henry Whitehead (p. 38) to find cholera's cause - Dr. Snow interviewed people when the microscope didn't show anything - Dr. Snow suggested taking the handle off the pump to prevent people from drinking the water

Figure 4. Sample Nature of Science Responses. *Source*. Figure is the creation of the author

(4) Students will share out their examples for each Nature of Science characteristic. Teachers can use this to check for understanding and clear up any misconceptions.

(5) Students might notice that these characteristics are not limited to just scientific knowledge. The teacher will ask if there are other places/knowledge that we see these characteristics.

(6) The teacher will discuss with the class that these characteristics are seen in social studies too—that there are many types of scientists, and that people who study social studies are *social scientists.*

- Social scientists study people and how they interact with the world around them where scientists study the natural world and technology.
- In social studies we have questions, make claims, gather evidence, find evidence using multiple sources

Expansion
Making and researching claims – Taking Action.

(1) The teacher will set the stage for Taking Action by announcing that students will now become social scientists and detectives as they will investigate an issue of their own choosing, based on their local or school community using Dr Snow's investigation as a model or inspiration.

(2) Students will identify an issue they are curious about and develop a question they want answered.

OR

Students will brainstorm issues as a class to identify potential issues they are curious about before students individually develop questions they want answered.

(3) Students will research the answer to their question using multiple sources (e.g., the internet, campus library, classroom library, etc.) to gather evidence.

- Teachers may want to provide question stems to help students in creating their question for inquiry based on grade level and student ability.
- Students can create a blank flowchart for brainstorming their claim and recording the evidence they find on their chosen issue (if students created a flowchart in *Development-Inquiry & Argumentation Chain Step 3*)
- Teachers can provide a blank flowchart for students to brainstorm their claim and record the evidence they find on their chosen issue (if the teacher provided a flowchart in *Development-Inquiry & Argumentation Chain Step 3*)

(4) Students will write an argument about their issue based off the evidence they have collected, using the previously modeled argumentative paragraph format.

(5) Student's argumentation paragraphs can be shared out to the school community via hallway bulletin boards, newsletters, announcements, etc.

Closure. Students will debrief the lesson after the conclusion of their personal investigation. Ideally students are sharing what they learned in the lesson, how it might counter their prior knowledge, and questions they might have still have. Some closure activity ideas that can be adapted based on student need and grade level:

(1) *Whip Around:* Students share 1 item of interest to them (something they learned, something they are now questioning, etc.) to the whole class. Everyone participates, and no duplications.

- Note: You might want to give students a minute to collect their thoughts, write down answers, come up with options before starting to share.

(2) *Three W's:* Students write and/or discuss the answers to the following questions in a whole or small group setting:

- What did we learn today?
- So What? (relevancy, importance, usefulness)
- Now What? (how does this fit into what we are learning, does it affect our thinking, can we predict where we are going, etc.)

(3) *3-2-1:* Students write down 3 things they learned, 2 things they have a question about (could be for clarification of the content or a bigger philosophical question on the topic or the nature of history), and 1 thing they want the instructor to know. This can be shared in whole or small group setting.

Assessment
Formative.

(1) *Throughout:* Participation in whole class and small group activities

(2) *Development:* Class definitions of concepts/terms and Dr Snow examples for NSTA-NGSS Nature of Science characteristics

Summative.

(1) *Development:* Small group/individual argumentation paragraph about other diseases demonstrates use of multiple sources, factually correct evidence, written claims supported by evidence.

(2) *Expansion:* Taking Action written product about school/local community question demonstrates critical thinking about local issues, development of a compelling question to answer, use of multiple sources to research issue, and the development of a claim supported by evidence.

Extension activities

(1) Students can extend their argumentation pieces by including counterclaims with evidence or counterarguments which they will disprove with evidence (e.g., originally people thought cholera was spread by bad air).

(2) Students can present their argumentation pieces in alternative formats: as an advertisement or poster, a radio advertisement/announcement, a TikTok video, etc.

(3) Students can investigate public health issues in their local community and can create a campaign to bring awareness to students on their campus (by creating PSAs, hallway posters, school announcement segments, social media posts [with parental permission], etc.)

Digital resources

(1) History of Infectious Disease Outbreaks and Vaccines Timeline - https://www.mayoclinic.org/diseases-conditions/history-disease-outbreaks-vaccine-timeline

(2) Contagion: Significant Diseases Throughout History - https://curiosity.lib.harvard.edu/contagion/feature/significant-diseases-throughout-history

(3) World Health Organization (Eastern Mediterranean Region): Epidemic and Pandemic-Prone Diseases - https://www.emro.who.int/pandemic-epidemic-diseases/outbreaks/index.html

(4) Cholera's Seven Pandemics - https://www.cbc.ca/news/science/cholera-s-seven-pandemics-1.758504

(5) Past Pandemics That Ravaged Europe - http://news.bbc.co.uk/2/hi/health/4381924.stm

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References

Hopkinson, D. (2024), *Evidence! How dr. John Snow Solved the Mystery of Cholera*, (N. Henderson, Illus.), Knopf, New York, NY.

National Council for the Social Studies (2013), *The College, Career, and Civic Life (C3) Framework for Social Studies State Standards: Guidance for Enhancing the Rigor of K-12 Civics,*

Economics, Geography, and History, National Council for the Social Studies, available at: https://www.socialstudies.org/standards/c3

NGSS Lead States (2013), *Next Generation Science Standards: For States, by States*, The National Academies Press.

Further reading

Barnard, B. (2015), *Outbreak! Plagues that Changed History*, Dragonfly Books, New York, NY.

Bates, M. (2022), *Malaria*, Core Library, Minneapolis, MN.

Brown, D. (2021), *A Shot in the Arm!*, Amulet Books, New York, NY.

Farndon, J. (2017), *Plague! Epidemics and Scourges Through the Ages*, (V. Dean, Illus.), Hungry Tomato, Truro.

Gardy, J. (2014), *It's Catching: The Infectious World of Germs and Microbes*, (J. Holinaty, Illus.), Owlkids, Toronto.

Getz, D. (2017), *Purple Death: The Mysterious Spanish Flu of 1918*, (P. McCarty, Illus.), Square Fish, New York, NY.

Hopkinson, D. (2021), *The Deadliest Diseases Then and Now*, Scholastic Focus, New York, NY.

Jenner, E., Wilson, K. and Roberts, N. (2020), *Coronavirus: A Book for Children*, (A. Scheffler, Illus.), Nosy Crow, Somerville, MA.

Kawa, K. (2019), *The AIDS Crisis*, Gareth Stevens Publishing, New York, NY.

Krohn, K. (2007), *Jonas Salk and the Polio Vaccine*, (A. Milgrom, Illus), Capstone Press, Mankato, MN.

Marshall, L.E. (2020), *The Polio Pioneer: Dr. Jonas Salk and the Polio Vaccine*, (L. Anchin, Illus.), Books of Wonder, New York, NY.

Murphy, J. (2003), *An American Plague: The True and Terrifying Story of the Yellow Fever Epidemic of 1793*, Clarion Books, New York, NY.

Murphy, J. and Blank, A. (2003), *Invisible Microbe: Tuberculosis and the Never-Ending Search for a Cure*, Clarion Books, New York, NY.

Nunes, J. and Nunes, M. (2010), *Little Things Make a Big Difference: A Story about Malaria*, (M. Schroder, Illus.), Concordia Publishing House, St. Louis, MO.

Peters, S.T. (2004), *Epidemic! The 1918 Influenza Pandemic*, Cavendish Square, New York, NY.

Peters, S.T. (2005), *Smallpox in the New World*, Cavendish Square, New York, NY.

Polinsky, P.V. (2022), *Vaccines: A Graphic History*, (D, Ginerva, Illus.), Graphic Universe, Minneapolis, MN.

Robbins, D. (2021), *Thank you Dr. Salk!*, (M. Dutton, Illus), Farrar Straus Grioux, New York, NY.

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