

Three Primary Sources

Instruction: Examine the images and read their titles below. Based on what you can learn and infer from them:

1. Write your inferred definition of “diphtheria toxin,” “anti-diphtheritic serum,” and “diphtheria antitoxin” in the table below.



Image 1. Injecting a horse with diphtheria toxin,
New York City Health Department, 1940s
Courtesy Library of Congress

“diphtheria toxin”:



**Image 2. Anti-Diphtheritic Serum, Parke,
Davis & Company, ca. 1898**

Courtesy National Museum of American History

“anti-diphtheritic serum”:

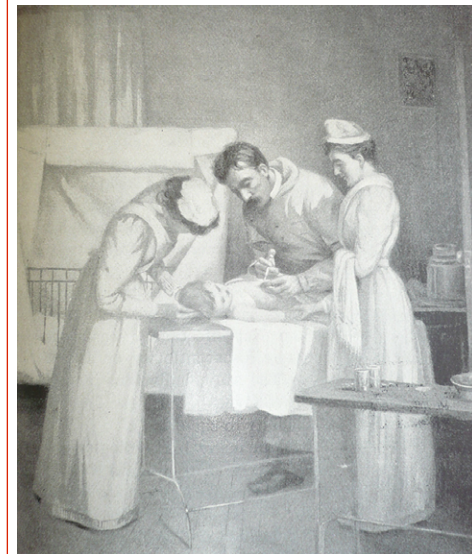


Image 3. Injecting diphtheria antitoxin, 1895
Courtesy The Historical Medical Library of The College of
Physicians of Philadelphia

“diphtheria antitoxin”:

Three Primary Sources

2. Describe or draw how the three images may be related.

Teacher's Three Primary Sources

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Image 1. Injecting a horse with diphtheria toxin,
New York City Health Department, 1940s
Courtesy Library of Congress

"diphtheria toxin":

Drawing from the understanding of what a "toxin" is, students may define this phrase as some kind of poison, harmful material from "diphtheria" that may be interpreted as number of organic or inorganic materials.



Image 2. Anti-Diphtheritic Serum, Parke, Davis & Company, ca. 1898
Courtesy National Museum of American History

"anti-diphtheritic serum":

Students can build on their knowledge of the "anti-" prefix, and may define this phrase as medicine, or even a liquid/extract, that fights "diphtheritic" illness. Given the titles of the other two images students may note "diphtheritic" as an adjective form of "diphtheria."

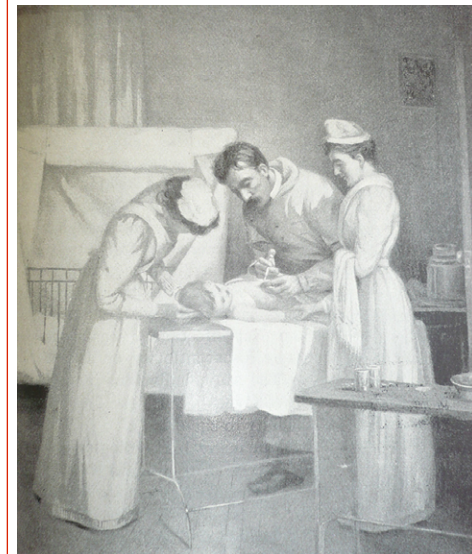


Image 3. Injecting diphtheria antitoxin, 1895
Courtesy The Historical Medical Library of The College of Physicians of Philadelphia

"diphtheria antitoxin":

Students can build on the image and what they already know of "anti" and "toxin," and may reword this phrase as medicine/treatment.

Teacher's Three Primary Sources

2. Describe or draw how the three images may be related.

Students may construct many different connections among the three images in the table. The teacher guides students' creating thoughtful guesses about what the three images show and how they may be related to one another. For example, after examining both images and their descriptive titles, some students may infer and define "diphtheria" as a disease or a disease-causing germ or substance. Others may consider that "diphtheria" is a name of a medicine for a disease that may occur both in horses or people. Some students may even consider that horses help make medicine for human patients in the past, after noting that the images come from late 1800s and mid-1900s. These connections students construct will translate into several graphic representations of connections among horses (animals), people (patients and scientists), and medicine (companies and hospitals).

Diphtheria: Cause and Treatments

Instructions: Answer the following questions after reading and examining the featured items and text in the “Living Factories” part of the From DNA to Beer exhibition website. As a part of your answer, note the exhibition source(s) from which you found the answers.

1. What kind of organism causes diphtheria illness in people?

(Exhibition source: _____)

2. How did the intubation kit save the lives of children with diphtheria?

(Exhibition source: _____)

3. How did the patient receive the diphtheria antitoxin serum?

(Exhibition source: _____)

4. What were some animals used to develop and produce the diphtheria antitoxin serum?

(Exhibition source: _____)

5. How did horses serve as “living factories” that make antitoxin medicine for people?

(Exhibition source: _____)

Teacher's Diphtheria: Cause and Treatments

Instructions: Answer the following questions after reading and examining the featured items and text in the "Living Factories" part of the From DNA to Beer exhibition website. As a part of your answer, note the exhibition source(s) from which you found the answers.

1. What kind of organism causes diphtheria illness in people?

(Exhibition source: *"Intubation kit" description text; "How did they make diphtheria antitoxin?" illustration*)

Diphtheria is caused by a bacterium. [optional: clarifying bacterium is singular form of bacteria.]

2. How did the intubation kit save the lives of children with diphtheria?

(Exhibition source: *"Intubation kit" interactive and description text*)

The kit contains tools and tubes to open the airways of the children with diphtheria infection, so that they are able to breathe and prevent suffocation.

3. How did the patient receive the diphtheria antitoxin serum?

(Exhibition source: *"Injecting Diphtheria Antitoxin" illustration; "Anti-Diphtheritic Serum and syringes" products*)

The antitoxin serum was injected into a patient using a syringe.

4. What were some animals used to develop and produce the diphtheria antitoxin serum?

(Exhibition source: *Photos of guinea pigs and the laboratories; Guinea pig holder photo and "The Voges holder for guinea-pigs" illustration; Animal record card and book; etc.*)

Guinea pigs for testing serums and toxins, and horses for producing the antitoxin serum.

5. How did horses serve as "living factories" that make antitoxin medicine for people?

(Exhibition source: *"Recovering the diphtheria serum from horse blood in Marburg, Germany" illustration; "Injecting a horse with diphtheria toxin" photos; "How New York City's Health Department Makes Serums and Vaccines for the United States Army" article; Animal record book pages; "How did they make diphtheria antitoxin? Illustration"*)

The horses were injected the toxin from the diphtheria-causing bacterium, which made their immune system fight the toxin by producing antitoxin in their blood. Then the blood was drawn from the horses and processed to be made into antitoxin medicine for people.

Immune System Vocabulary

Instructions: Look up the words or phrases numbered 1-7 using the medical dictionary on the MedlinePlus website at <http://www.merriam-webster.com/medlineplus/>. Write under each word its definition using your own words. Also note above the underlines, the matching related words/phrases from the bottom—numbered a-g.

1. Diphtheria

2. *Corynebacterium (C. diphtheriae)*

3. Antitoxin

4. Toxin

5. Acquired immunity

6. Passive immunity

7. Serum

Related Words/phrases:

- a. A portion of blood
- b. Horse's producing diphtheria antitoxin
- c. Antibody
- d. Disease
- e. Treating people with antitoxin serum
- f. Pathogen
- g. Poison

