

Bill of Rights in Action



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WHO WAS HYPATIA OF ALEXANDRIA?



Yale Center for British Art, Paul Mellon Collection

A 19th century British artist's depiction of Hypatia teaching at Alexandria. As you read, notice how people's perceptions of Hypatia's story have varied over the centuries.

Hypatia of Alexandria was a philosopher, astronomer, mathematician, and political advisor of great renown in her day. Unfortunately, it is likely that none of her philosophical or mathematical written work survives. But several historical accounts of her life and work do. Her violent death in 415 CE at the hands of a Christian mob has been a source of debate ever since.

Hypatia was born sometime between 350 and 370 CE in Alexandria in northern Egypt. The Greek conqueror Alexander the Great founded the city in the third century BCE. Alexandria later became a cosmopolitan crossroads of the Roman Empire and was a major seaport and center of learning and industry.

Hypatia came from an academic family. Theon, her father, headed a school in Alexandria known as the Mouseion. Hypatia later taught there. (The Mouseion was named for the Greek muses, and it is the origin of the English word *museum*.)

In the 4th century CE when Hypatia lived, one major school of philosophy was Neoplatonism, which literally meant “new Platonism.” Neoplatonism was a renewal of Plato’s philosophy that forms (ideas) are more real than the physical world. Ideas could take on mystical and spiritual qualities. Neoplatonist philosophy even influenced several Christian thinkers in its time, as well as Jewish and Islamic thinkers later in the Middle Ages.

As a Neoplatonist, Hypatia had a primary interest in discovering the mathematical structures that undergird the natural world. Hypatia may have written commentaries on the works of Euclid and Ptolemy that were influential in her day but are now lost to history. She also studied astronomy. She is one of the only people in the world who was able to construct a plane astrolabe (see sidebar on page 2).

SCIENCE MATTERS

The first article in this issue analyzes the life and death of the philosopher, astronomer, and mathematician Hypatia of Alexandria in the Roman Empire. The second article examines the controversy surrounding a successful inoculation program against smallpox in the 18th century and Cotton Mather’s key role in it. The third article is an updated account of a 2002 BRIA article on current political and scientific issues related to human-caused global warming.

World History: *Who Was Hypatia of Alexandria?* by Aimée Koeplin, Ph.D.

U.S. History: *Cotton Mather and Boston’s Smallpox Inoculation Fight* by longtime contributor Carlton Martz

U.S. Government/Current Issues: *Global Warming and the Paris Agreement* by Carlton Martz, with contributions by Damon Huss

Supplemental Activities!

Teacher-leaders from CRF’s T2T Collab have created innovative activities for lessons in this issue! Look for the T2T symbol to access activities in the online editions.

T2T

The Mouseion met in and around the buildings surrounding the celebrated Library of Alexandria and the temple of the Egyptian-Greek sun god Serapis. We know that Hypatia was a highly sought-after teacher in the Mouseion.

Her students and disciples included members of Alexandrian society as well as prominent families from all over the Roman Empire. Many of her students at the Mouseion were Christians. Some went on to become bishops in the Christian church. She was an advisor to Orestes, the Roman prefect (governor) in Alexandria. He, too, had been her student.

Visiting dignitaries and Roman emissaries visited Alexandria to hear Hypatia's lectures and ask her advice on matters of state. Hypatia may have even traveled to Athens for some years as a visiting scholar.

Religious Tensions

When Hypatia was born, all of the prominent ruling families of Alexandria were pagans who worshipped the Greek gods. Hypatia also was a pagan. In 313 CE, Christianity became legal throughout the Roman Empire. For many years, pagans and Christians coexisted peacefully in Alexandria.

Toward the end of the 4th century CE, tensions between old-guard pagans and newly ascendant Christians rose. In 380 CE, Christianity became the official religion of the Roman Empire. This marked a profound social change. The religious balance in Alexandria shifted very quickly, and Christians who had been previously criminalized for their religious beliefs became the ruling class. In 391 CE, Theophilus, the Christian bishop of Alexandria, ordered the destruction of the highly regarded Temple of Serapis, an important location for members of Hypatia's Mouseion. A mob cut the statue of Serapis into pieces and then burned them.

Alexandria also had the largest Jewish population of any ancient city outside of ancient Israel. During conflicts in 414 or 415, Bishop Theophilus's successor, St. Cyril of Alexandria, expelled the Jewish community from the city, seizing their property and places of worship.

Caught in the Middle

Hypatia found herself in the crossfire of several political feuds. She was a pagan in a time when Christianity was expanding. As Christians increased in number, they gained political influence. And conflicts with pagans increased, too.

A Plane Astrolabe



Hypatia was one of the few people who had the knowledge necessary to construct a plane astrolabe. The plane astrolabe measures the inclined position of heavenly bodies (stars and planets). Astronomers used it to predict the movements of heavenly bodies. Sailors used it to navigate at sea. Others used it to survey land and for timekeeping. The plane astrolabe had a more compact and easily usable size than the globe astrolabe, and it remained in use into the 19th century.

Bishop Theophilus declared one school of Neoplatonic thought to be a heresy. Heresy is a belief that conflicts with established Christian beliefs. But Theophilus favored Hypatia's version of Neoplatonism and allowed its study to continue.

When Theophilus died unexpectedly in 412, a dispute broke out over who would succeed him. Would the new bishop be Timothy, Theophilus's acolyte and heir apparent? Or would it be Cyril, Theophilus's nephew? Hypatia backed Timothy, who had been a student of hers at the Mouseion. But Cyril was eventually chosen to be bishop.

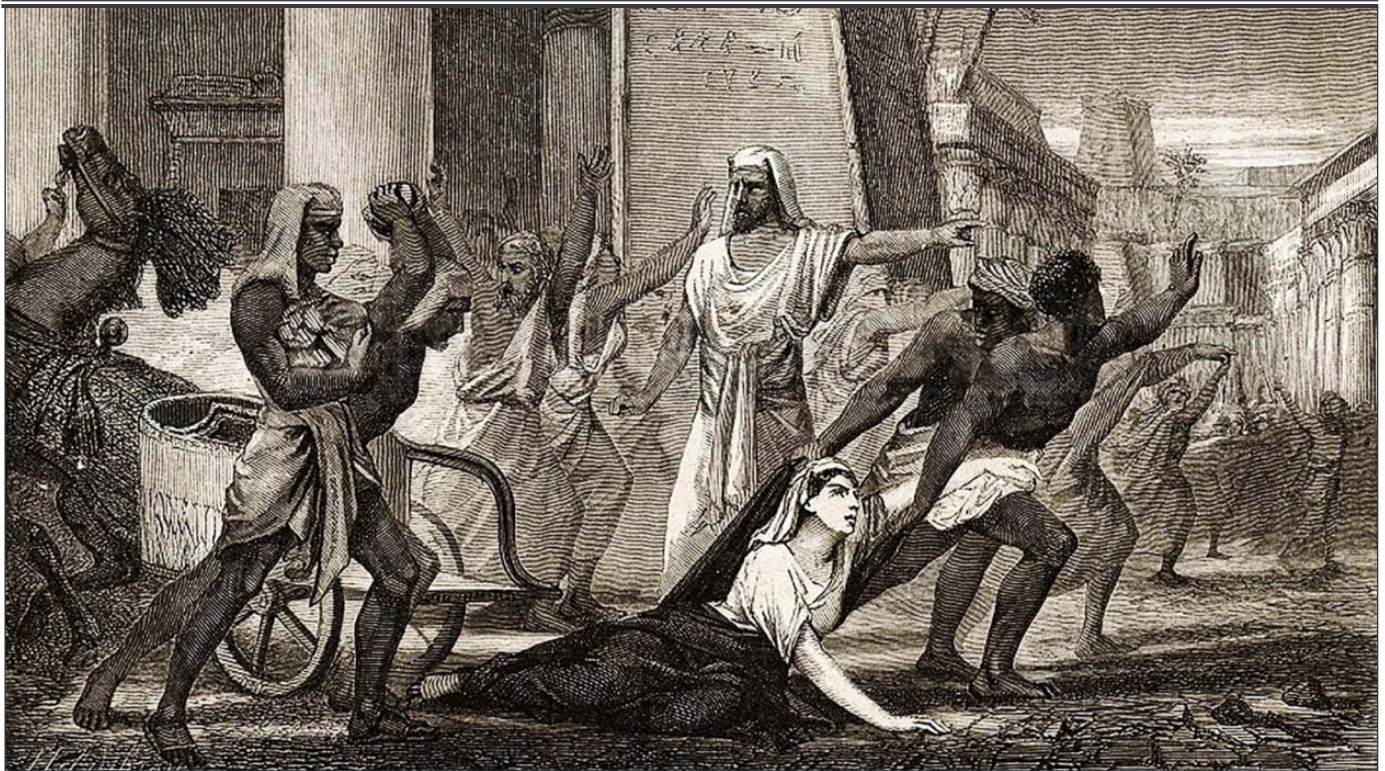
Cyril entered into a bitter dispute with the governor of Roman Egypt, Orestes — another student of Hypatia's. Orestes was a former pagan who recently converted to Christianity. He and Cyril clashed over who would have greater authority in the Egyptian province. Orestes represented Roman authority, while Cyril represented local Christian authority.

When Cyril expelled Jews from Alexandria, Orestes was outraged. Cyril attempted to make peace with Orestes, but Orestes refused. Some Christian monks falsely accused Orestes of being pagan and even attacked him in the street. Orestes, in turn, had a prominent monk tortured to death. Other Christians accused Hypatia of counseling Orestes not to make amends with Cyril and for keeping him away from the influence of the Church.

In March of 415, Hypatia became a victim of these tensions. On her way home from a lecture, an angry Christian mob linked to Bishop Cyril captured her carriage.

Hypatia found herself in the crossfire of several political feuds.

Wikimedia Commons/
Luis Garcia (CC BY 3.0)



A depiction of Hypatia's death published in France in 1865.

They dragged her through the streets and into a church known as the Caesareum. This was the main church in the city and the seat of Bishop Cyril.

Inside the Caesareum, they stripped Hypatia naked and hacked her to death with “ostraka.” (*Ostraka* could be translated as either “roof tiles” or “oyster shells.”) As with the statue of Serapis, the mob dragged her dismembered limbs into the streets and burned them outside the city walls. She was probably over 60 years old when she died.

Interpreting Hypatia

How should we understand Hypatia's story? After all, it is difficult to know after the centuries everything that really happened. We have only five documents that are considered primary sources for Hypatia's life and death. Of these five, three seem especially useful for understanding her story.

The first account we get of her death is Socrates Scholasticus's *Ecclesiastical History* (ca. 440). Scholasticus wrote 25 years after Hypatia's murder. He was a Christian and attributes her death to political rivalries between Cyril and Orestes.

The second account was Damascius's *Life of Isidore* (ca. 465). Damascius was a pagan who had recently been exiled by the Christian emperor Justinian. So we can infer that he had a less favorable attitude toward Christianity. Damascius wrote 50 years after the incident. He seems to attribute Hypatia's murder to Bishop Cyril's jealousy of her wisdom, her learning, and the number of students she attracted.

The third account was John of Nikiu's *Chronicle* (ca. 690), written more than 250 years after the incident. John of Nikiu was a Christian bishop who cast Hypatia as deserving of her fate. He invoked the idea of sorcery and claimed that she “beguiled many people through Satanic wiles.” He also claimed that Hypatia “enchanted” Prefect Orestes and led him away from the church.

The Story of Saint Catherine

Hypatia's story bears a striking resemblance to the legendary story of St. Catherine of Alexandria. According to legend, Catherine lived from 287 – 305 CE. She was a well-educated Alexandrian, conversant in philosophy and mathematics. At age 14, Catherine converted to Christianity after having a vision of the Madonna and Child.

Christianity was still an illegal, underground religion during Catherine's life. Eventually, pagan authorities discovered Catherine's faith. Like other Christians at the time, she was imprisoned and whipped by order of the Emperor Maxentius.

According to medieval sources, Catherine had great spiritual power. During her imprisonment, 200 visitors came to see her. All of the visitors converted to Christianity and were subsequently martyred, or executed for their beliefs. Torture failed to get Catherine to renounce her faith, so the emperor deployed 50 pagan philosophers to persuade her with reason. But instead of convincing Catherine, Catherine persuaded all 50 philosophers of the truth of Christianity. The philosophers were then martyred by burning.

Finally, Catherine was sentenced to death by a torture device known as “the spiked wheel.” But the wheel broke as soon as she touched it. (The broken wheel, or Catherine Wheel, became an artistic symbol of St. Catherine in the Middle Ages). Catherine was then beheaded.

Scholars note that we do not have any primary source documents recording the story of St. Catherine. The earliest written account of St. Catherine does not appear until the year 976 CE. Historians say her story seems to be derived from the Hypatia story, only with the Christian as the victim.

Later Interpretations

Hypatia’s story has captured people’s imagination throughout the years and even today. Different groups interpret Hypatia’s story in different ways, often for their own purposes.

In his history *The Decline and Fall of the Roman Empire*, published in 1776, Edward Gibbon takes the view that her death was the result of Christian aggression. A student of the Enlightenment, Gibbon generally portrays Christianity as intolerant of science and most learning. “[T]he murder of Hypatia,” Gibbon wrote, “has imprinted an indelible stain on the character and religion of Cyril of Alexandria.”

In the Victorian period, Charles Kingsley wrote a fiction novel, *Hypatia: New Foes with an Old Face*. Kingsley places the blame solely on Roman Catholics. Kingsley’s novel was adapted into stage plays that ran in Europe and the U.S. And so while Kingsley’s work did

a lot to popularize the Hypatia story in the modern era, it has been described as “militantly anti-Catholic.”

Christianity has sometimes gotten a reputation of taking a less than favorable view of women. Hypatia’s murder represents a perfect storm of suspicion of intellectualism plus misogyny. The 2009 Alejandro Amenàbar movie, *Agora*, follows Gibbon in this portrayal of Hypatia’s murder.

Hypatia was an example of a woman of great learning and renown in the ancient world. Her fame as a scholar in the Roman world inspires women in today’s academia. Many women philosophers and mathematicians especially consider her a hero. The leading journal in feminist philosophy in the English-speaking world, for example, is *Hypatia: a Journal of Feminist Philosophy*.

WRITING & DISCUSSION

1. Explain the tensions between the main religious groups in Alexandria in the 4th century CE.
2. One historian claims that “Hypatia’s death sent shockwaves throughout the empire.” What evidence is there in the article that that is true? What evidence is there in the article that that is untrue?
3. Is it possible to know which interpretation of Hypatia’s story is most accurate? How might the identity of an author, the historical time period of a written account, and any other factors affect the accuracy of an interpretation of her story? Cite three examples from the article in your answer.

ACTIVITY: The Meaning of Hypatia’s Life and Death

As disclosed in the article there are different interpretations about Hypatia’s life and death. Consider these three hypothetical statements:

Statement 1: Hypatia is a symbol of Christian oppression of pagan philosophy and religion.

Statement 2: Hypatia’s death was the result of the political feud between Prefect Orestes and Bishop Cyril.

Statement 3: Hypatia is a powerful symbol for female scientists because of her status as a mathematician, philosopher, and astronomer, and because of her death at the hands of those wanting to suppress women.

Conduct a discussion following these steps:

1. Divide the class into groups of four or five students each.
2. Review each statement with reference to the article and discuss: What evidence supports this statement? What evidence contradicts this statement? Based on the evidence, is the statement valid?
3. In a whole-class discussion, each group should report and discuss its findings.



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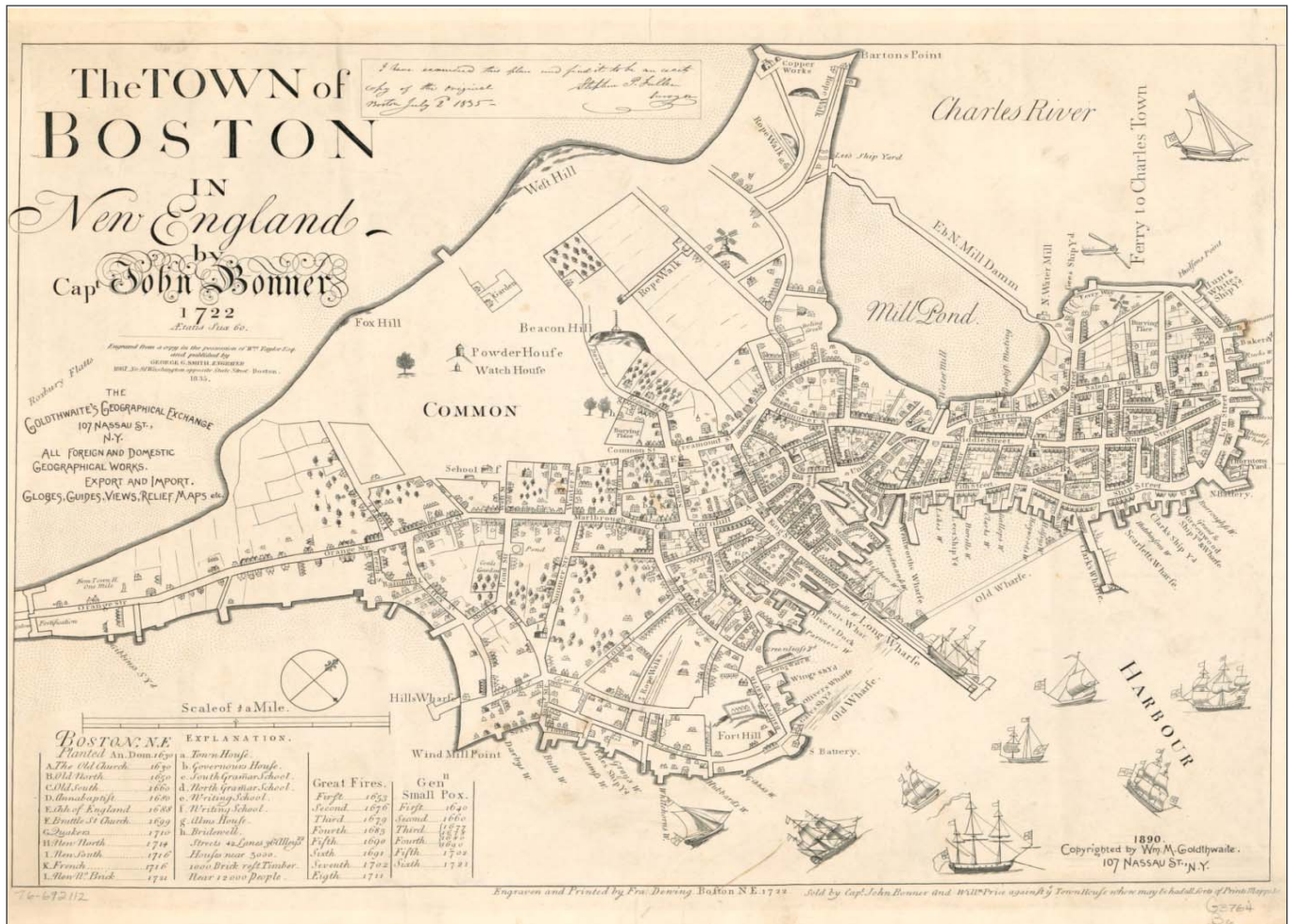
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COTTON MATHER AND BOSTON'S SMALLPOX INOCULATION FIGHT



Map of Boston around the time of the smallpox epidemic in 1721 – 1722.

In 1721, colonial Boston had one of its deadly smallpox epidemics. But this time Puritan minister Cotton Mather and a doctor teamed up to inoculate some people against the disease. Inoculation was unknown in England and America, seemed to go against common sense, and bitterly divided the city.

In April 1721, the British warship *Seahorse* stopped at the island of Barbados in the Caribbean on the way back to its homeport of Boston. The deadly smallpox virus was on the island and made its way aboard the *Seahorse*, probably on infected clothing. The smallpox virus can live for days even without a human to infect.

Smallpox begins with a fever, then a red rash followed by pus-filled blisters that usually appear nine days after infection. Nearly 30 percent of those infected in the 18th century died. The survivors' faces were usually disfigured by scars left by blisters called pustules.

By the time the *Seahorse* reached Boston, one crewman had become infected and was contagious. But the telltale pustules had not yet erupted on his skin. So he

and other crewmen, many probably infected by him, left the ship and roamed the Boston streets for several days. The first crewman eventually got severely sick and died. By then, the smallpox virus had begun to spread among the people of the city.

The Natural Way

Boston, then Britain's largest port in its American colonies, had a smallpox epidemic on average every 12 years. Those who survived the smallpox infection developed immunity to the disease. Everyone has an immune system in their bodies that releases microscopic antibodies to fight off germs. When someone's antibodies successfully fight off the germs of a disease, then that person is immune for life from that disease.

The people who survived the smallpox epidemics in the colonies became immune to smallpox for life in what was then known as the "natural way." Today, we call this *natural immunity*. After about a dozen years, the population of Boston grew with people not infected



Cotton Mather in Boston in 1728, the same year that he died.

in the last epidemic, who were vulnerable to a new wave of smallpox.

No one at that time knew that invisible viruses caused smallpox, usually spread by sneezing or physical contact with infected persons, clothing, and bedding. The prevailing idea was that rotting garbage on the streets caused a “miasma” of fumes that somehow spread the disease. Many believed smallpox and other epidemics were God’s punishment for human sinfulness.

To fight smallpox, doctors bled patients; people fasted; town officials ordered streets to be cleaned; and churches held prayer meetings, which probably spread the disease because of the crowding. The most effective control was to quarantine or isolate those already sick. Those who could afford it left town. But there was no effective way to make people immune to smallpox except through the “natural way.”

Man of God, Man of Science

Cotton Mather was born in 1663 into an important family of Boston Puritan ministers. He graduated from Harvard at 15. In 1685, he replaced his father, Increase Mather, as the chief minister of one of Boston’s oldest Puritan Congregational churches.

Mather became a popular preacher, and was known as an expert on the invisible world of demons and witches controlled by the devil. When the Salem witch trials near Boston took place in 1692, Mather was not directly involved. But he provided advice to the judges who accepted his authority about witchcraft.

Mather had doubts about “spectral evidence,” witness testimony about dreams and visions that was used to convict and execute 20 people, most of them women. But he believed that a confession alone was enough to convict. And he was convinced that there was a conspiracy of witches led by the devil to overthrow Puritan authority in New England. One day, he personally witnessed the hanging of five supposed witch-leaders, all of whom proclaimed their innocence.

After the colonial governor stopped the witch trials, many realized there had been an injustice. The chief judge, Samuel Sewall, apologized for his role, but Mather never did. As a result, he became less popular, and many of his church members left for other churches.

While Mather was a man of God, he was also a man of science. Since his youth, he, like his father, studied the latest scientific developments of the Age of Enlightenment, a time in which human reason challenged religious faith.

Mather, however, did not see a conflict between faith and science. To him, science was another way to reveal the glory of God’s works. He exchanged letters with scientists in Europe and contributed to the journal of the British Royal Society of physicians and scientists.

Mather accepted what later was termed the “scientific method.” This method is the way of explaining natural events through observation, experimentation, and testing of hypotheses.

In 1710, Mather wrote a book that “doing good” should be the moral measure for Christians. The “do-good” philosophy meant that doing charitable deeds for the less fortunate — the poor, the sick, the elderly, and the weak — was its own reward. It also meant that the clergy should help the community using science, especially medicine.

When smallpox hit Boston in 1721, Mather faced his greatest challenge, both as a man of God and a man of science. In a sermon, he portrayed “the destroying Angel standing over the town.” He declared it was the time to repent one’s sins to avoid God’s punishment.

Mather himself was immune from smallpox the “natural way,” having survived it in an earlier epidemic. But two of his teenage children were not immune. He prayed that the Angel of Death would pass over them. But he also turned to science in his quest for “doing good.”

Mather did not see a conflict between faith and science.

Boylston’s Experiment

Several years before the *Seahorse* delivered the smallpox virus to Boston, Mather had read in the Royal Society’s journal about the inoculation of people in Turkey against the disease. Matter from the pustules of an infected person was put into a cut on a healthy person’s arm. A mild fever resulted, but the person recovered quickly and was then immune for life.

Mather also had a conversation about inoculation with his slave whom he had named Onesimus (from a Greek word meaning beneficial). Onesimus relayed that he had undergone a similar treatment in Africa and showed Mather the inoculation scar. Mather interviewed other Africans living in Boston, and they confirmed Onesimus’s experience. Inoculation was practiced in Africa, and it worked.

Mather also read about scientists who discovered invisible “animalcules” through a microscope. He

suspected these “swarming insects” carried the smallpox disease that infected people. This was long before viruses and bacteria were accepted as the causes of infectious diseases.

In June 1721, after further study, Mather wrote a letter to Boston’s doctors, presenting his evidence for inoculating people to immunize them against smallpox. Only one doctor said he was willing to try such a radical procedure.

Zabdiel Boylston was apprenticed to a Boston doctor and became a successful surgeon and owner of an apothecary shop (pharmacy). He agreed to try the inoculation procedure as proposed by Mather. Boylston read his evidence and re-interviewed the Africans who had been inoculated.

Dr. William Douglass was the only physician in Boston with a European university medical degree (no medical school yet existed in the American colonies). Douglass, who rejected Mather’s inoculation plan, owned Boston’s sole copy of the Royal Society journal that described the successful inoculation against smallpox in Turkey. When Boylston asked to see the journal, Douglass refused. But, on June 25, Boylston decided to proceed with his inoculation experiment anyway.

Boylston himself was immune to smallpox, like Mather. He decided to start the experiment by inoculating his six-year-old son followed by his African slave and his two year-old son. It was a leap of faith.

Both boys developed a mild fever and in nine days produced a relatively small number of skin pustules. The boys quickly recovered. Boylston’s slave had no reaction at all, probably because he had survived smallpox without knowing it as a child. When word spread of Boylston’s successful experiment, people began to beg him to inoculate them, too.

The Fight Over Inoculation

Boylston wrote an account of his continuing inoculations in two Boston newspapers. This set off a furious fight over them. Boston’s selectmen (elected city leaders) ordered him to stop, in part concerned that white men should not trust medical practices from Africa. But Boylston refused.

Boylston was called before a town meeting where Dr. Douglass led an attack against him. Inoculating healthy persons with poison from the pustules of smallpox victims went against common sense and would spread the disease, Douglass declared. Experimenting on people, even his own child, was immoral and invited God’s punishment.

However, Boylston was determined to treat all who wanted to be inoculated. He pointed to the success of the inoculations and invited the town selectmen and doctors to visit his recovering patients. But none did.

Silence Dogood

A key player in the fight over inoculation was a new newspaper, *The New-England Courant*, owned and operated by James Franklin with his apprenticed teenage brother, Benjamin. The *Courant* became the leading platform for Dr. Douglass and those against inoculation.

As a 16-year-old, Benjamin wrote several essays under the name Silence Dogood (likely a reference to Cotton Mather’s moral philosophy), mocking the New England Puritan clergy, and Mather in particular. Benjamin slipped the essays under the door of the *Courant*, fooling even his own brother as to the author’s true identity.

In one essay, Silence Dogood wrote, “The public hypocrite every day deceives his betters and makes them ignorant trumpeters of his supposed Godliness.”

Ironically, Benjamin Franklin actually admired Cotton Mather and read his essays on the “do-good” philosophy at age 11. A few years after the inoculation fight, they became friends. Sadly, Benjamin Franklin would later lose one of his own sons to smallpox.



The eighth essay by Silence Dogood in the *Courant* of July 22, 1722.

Mather and other ministers argued that God had enabled men, through science, to discover a cure for the scourge of smallpox.

The controversy over Boylston’s inoculations soon produced a war of words in newspapers, pamphlets, sermons, and speeches. Ironically, most of Boston’s Puritan ministers, led by Cotton Mather, defended the scientific experiment, while most of the town’s physicians, led by Dr. William Douglass, opposed it.

Opposition over Boylston’s continuing inoculations grew more heated as the epidemic reached its peak. Some called for Boylston’s arrest and hanging. Mather almost came to blows with newspaper publisher James Franklin on a Boston street. Mather complained in his diary, “This abominable town treats me in a most malicious and murderous manner for my doing as Christ would have me to do in the saving of lives of the people from a horrible death.”

A few days later, someone threw a firebomb into Mather’s house, but it failed to explode. An attached note said, “Damn You, I will Inoculate You with this, with a Pox to You.”

Despite his public support of Boylston, Mather hesitated about whether to have his teenage son and daughter inoculated. What if the inoculation failed to work? What if his children died because he denied it to them? His son, Samuel, lost his roommate at Harvard to smallpox and begged his father for an inoculation.

After weeks of indecision and prayer, Mather finally agreed to have the two youths inoculated. They both survived, although Samuel nearly died. The fact that his

pustules appeared early is evidence that he had probably already been infected when he was inoculated.

End of the Epidemic

The epidemic had finally run its course by the spring of 1722. But town officials still arrested Boylston, who promised to stop his inoculations. However, he realized that by this time a large majority of Bostonians were either immune from smallpox the “natural way” or had been inoculated. The virus had relatively few victims left to infect.

During the year-long epidemic, there were about 6,000 cases of smallpox, infecting half the population of Boston. Of these, 844 people, or 14 percent of the cases, died. Many others had become immune the “natural way” in past epidemics. Boylston inoculated 280 persons. Six of them died, or 2.4 percent. There was evidence that at least some had probably been already infected when inoculated.

In 1724, Boylston spoke before England’s Royal Society, which had elected him a member. He then published a book detailing each of his inoculation cases, one of the first times statistics was used in the field of medicine.

For his part, Mather gave all the credit to Boylston who “saved a whole town,” but Mather blamed those who opposed him as “accessory to the Innumerable Deaths.” The Royal Society also made Mather a member.

Together, Mather and Boylston carried out the first major achievement in preventative medicine. It did not take long for smallpox inoculation to become widespread. George Washington had his troops inoculated against smallpox during the Revolutionary War. Even Dr. William Douglass, the leading foe of Boylston in 1721, eventually adopted the practice.

Despite its success, inoculation against smallpox had some drawbacks. Those who were inoculated still suffered through a period of fever, although in most cases it was mild. But a small percentage became severely ill and died. Inoculated persons were contagious for a while and had to be quarantined, usually in private

hospitals at a cost that the poor could not afford. Some experienced more eruptions of pustules than others, causing permanent scarring of the face.

Mather recovered much of his reputation that he had lost after the Salem witch trials before he died at 65 in 1728. His son Samuel carried on the Mather family’s legacy by becoming minister of his father’s church. Boylston continued working as a doctor into his 70s, dying in 1766. His gravestone honors him as the man who “first introduced the practice of Inoculation in America.”

It was not until 1796 that a smallpox inoculation method was found that caused no fever or illness at all. In that year, English country doctor Edward Jenner inoculated a boy with cowpox fluid. Cowpox was a minor skin disease caused by contact with cows, but no one ever got smallpox if they previously had a cowpox infection. After the boy recovered with minor skin symptoms, Jenner inoculated him with smallpox. He then carried out similar inoculations on other children, including his year-old son. None developed any sign of smallpox.

In 1798, Jenner published his findings that the mild skin disease of cowpox protects persons from getting smallpox. He termed his procedure “vaccination” from the Latin *vaccinus*, meaning “of the cow.” In 1966, the United Nations World Health Organization (WHO) began a vaccination campaign to eradicate smallpox. The WHO declared the world smallpox-free in 1980.

WRITING & DISCUSSION

1. Medical science today would never approve experiments like those done by Boylston and Jenner who used children as guinea pigs. Was Dr. William Douglass right in opposing inoculation in 1721? Why or why not?
2. Do you agree that Cotton Mather could be at the same time a “man of God” and a “man of science”? Why or why not?
3. Why do you think there was such a strong reaction against Mather during the inoculation fight in Boston? Cite evidence from the reading.

ACTIVITY: Cotton Mather and ‘Doing Good’

Cotton Mather’s moral standard for pious (devout) Christians was “doing good.” In a small group, decide how you think Mather measured up to his own moral standard:

1. Review the description of his “doing good” idea in the section “Man of God, Man of Science.”
2. Consider all the activities from his lifetime described in the text. Rate the extent to which Mather measured up to the “doing good” standard on a scale of 1-10 with 1 meaning “not at all” and 10 meaning “entirely.”
3. List at least three examples from his life, as described in the text, to support your group’s rating of Cotton Mather.

Each group will choose a spokesperson to defend the group’s conclusions to the rest of the class.

On page 8A is a supplemental activity by teacher Jamie Davis, a curriculum facilitator at Southeast Guilford High School in Greensboro, North Carolina, and she teaches civics and economics online, in addition to having taught world history, U.S. history, and AP government. She is also a teacher-leader in Constitutional Rights Foundation’s Teacher-to-Teacher Collab: www.crf-usa.org/t2tcollab.



Cotton Mather and Boston's Smallpox Inoculation Fight

Overview

This lesson provides students the opportunity to practice their historical thinking skills with text about a smallpox epidemic in 1721 Boston that highlights:

- The emergence of and conflicts between religious values and scientific progress in colonial America.
- The role and power of the free press, which will become critical as the American Revolution approaches.
- The impacts of globalization and the influence of African culture in colonial America.

First, students do a close reading of the article “Cotton Mather and Boston’s Smallpox Inoculation Fight,” answering comprehension questions. Then students imagine they lived in Boston in 1721, and they will create a newspaper editorial or a newspaper ad of the time either supporting or opposing the inoculation of Boston’s residents.

Procedure

1. Before students begin reading, review key vocabulary with them to ensure accessibility.
 - a. **inoculation:** deliberate exposure of a person to a virus using live strains of a virus with the ultimate goal of the person’s immunity to that virus. Inoculation often causes mild reactions and sometimes mild symptoms of the disease in the inoculated person. The terms *inoculation* and *vaccination* are used interchangeably by the Center for Disease Control.
2. As students read, have them use one color highlighter or pen for *pro-inoculation evidence* in the text and another color for *anti-inoculation evidence* within the text.
3. Provide students with a copy of the Reading and Planning Guide for Boston’s Smallpox Inoculation Fight (next page). The comprehension and analysis questions will help students plan their editorial or newspaper ad.
4. Discuss questions 1-6 as a check for understanding.
5. Explain rubric requirements as well as the basic requirements of a newspaper editorial and/or newspaper ad. Be clear that students can be *for* or *against* the smallpox inoculation and they will present their stance in the format of a newspaper editorial or newspaper ad *as it would have appeared in 1721*. Therefore, they are basing their knowledge on what was known in Cotton Mather’s time, not on present-day knowledge of the effectiveness of vaccines.
6. Have students prepare their editorial or ad using the planning guide. This assignment can be completed individually or in pairs.

Additional Resources:

This collection of primary sources shows the intensity of the debate in Boston over inoculation in 1721. It provides students with examples of colonial newspaper editorials and newspaper ads. <http://nationalhumanitiescenter.org/pds/becomingamer/ideas/text5/smallpoxvaccination.pdf>

This article brings the smallpox epidemic to current relevance by making connections to Ebola while also emphasizing the key role that Cotton Mather’s slave, Onesimus, played in the development of the smallpox inoculation practice. <https://www.bostonglobe.com/ideas/2014/10/17/how-african-slave-helped-boston-fight-smallpox/XFhsMMvTGcV62YP0XhhZI/story.html>

Name: _____

Reading and Planning Guide for Boston's Smallpox Inoculation Fight

As you read, answer the following questions:

1. Considering what you know about Puritanism, why do you think there was such a strong reaction to the idea of inoculations?
2. Cite textual evidence that supports Cotton Mather was both a "Man of God" and a "Man of Science."

"Man of God" Evidence "	"Man of Science" Evidence

3. In what ways were Dr. William Douglass and his colleagues justified in opposing Dr. Boylston's and Cotton Mather's inoculation plan in 1721? Provide at least two pieces of evidence from the reading.
4. In what ways were Cotton Mather and Doctor Boylston right in their inoculation campaign? Provide at least two pieces of evidence from the reading.
5. What was the impact of the free press in the inoculation fight in 1721?
6. Summarize your viewpoint on the inoculation issue in 1721 Boston.

As you prepare your newspaper editorial or newspaper ad, use the following guide to ensure you are meeting rubric requirements:

Editorials have:

- An engaging headline
- An introduction, body, and conclusion
- Thorough explanation of the issue
- Clear outline of the editor's opinion with evidence. Use available statistics and examples from the reading (and, if applicable, the Additional Resources above)
- Opinions from the opposing viewpoint that are then refuted

Newspaper Ads have:

- An engaging and eye-catching headline
- An explanation of why action is necessary
- Critiques (criticisms) of the opposing viewpoint suggestive statistics, credible sources, relevant images, and dialogue

Remember, colonial ads were much wordier than our ads today.

Step 1: Choose the viewpoint your editorial or ad will promote. Viewpoint:

Step 2: List textual evidence to support this viewpoint

- a.
- b.
- c.
- d.

Step 3: List textual evidence of the opposing viewpoint.

- a.
- b.
- c.
- d.

Step 4: Draft your headline: _____

Step 5: List your credible sources and statistics you plan to use.

Create your editorial or ad following the rubric below.

Editorial or Ad Rubric				
Criteria	1	2	3	4
Viewpoint	Viewpoint is unclear and no explanation	Viewpoint and/or explanation is unclear	Viewpoint is stated and explained	Chosen viewpoint is clearly stated and adequately explained
Textual Evidence	No textual evidence	Textual evidence provided for only one viewpoint	Textual evidence is provided for both viewpoints	Textual evidence is thoroughly explained for both viewpoints.
Opposing Viewpoint	Opposing viewpoint is unclear and unrefuted	Opposing viewpoint and/or refute is unclear	Opposing viewpoint is stated and refuted	Chosen viewpoint is clearly stated and adequately refuted

GLOBAL WARMING AND THE PARIS AGREEMENT



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Delegates to the 2015 United Nations Climate Change Conference, from which the Paris Agreement emerged.

There is little doubt that the Earth is warming. But there is considerable controversy over global warming's future impact on the world's climate and what we should do about it.

Researchers at the University of Alaska, University of Washington, and the U.S. Geological Survey reported in 2015 that Alaskan glaciers had been sending 75 billion tons of water into the sea every year for 19 years. A consensus of the world's scientists (almost all scientists) has concluded that changes in the environment like this one provide convincing evidence of a gradual heating up of the Earth's surface. Scientists refer to this as "global warming."

For over 100 years, scientists have known about the physical mechanism that causes the Earth to warm. Today, they call it the "greenhouse effect." Generally, it works like this:

1. Radiation from the Sun in short wavelengths easily passes through the Earth's atmosphere and strikes the surface, which reflects much of it back as longer wavelengths.
2. Instead of going back into space, the longer wavelengths are absorbed by gases in the atmosphere.
3. The atmosphere reflects back to the Earth's surface a significant amount of the trapped radiation, which becomes heat.

Thus, the Earth warms much like a greenhouse or automobile does when the Sun's rays penetrate the glass, but are trapped inside as heat.

Water vapor and other gases in the atmosphere capture and return to Earth about 50 percent of the Sun's incoming radiation. The warming that results is necessary to prevent our planet from becoming extremely cold and hostile to life. But over the past few centuries, human activities on Earth have increased the concentration of some gases in the atmosphere that intensify heating. These gases include carbon dioxide, methane, nitrous oxide, and others, the so-called "greenhouse gases."

The Evidence of Climate Change

To be sure, there are a number of ways that the Earth can become warmer naturally. Periods of global warming in the past were caused by changes in the Earth's orbit, volcanic eruptions, and variations in the Sun's radiation output. But natural causes apparently cannot explain the current warming of the Earth.

In 1988, the United Nations established the Intergovernmental Panel on Climate Change (IPCC). The purpose of the IPCC is to review the work of scientists around the world to assess the evidence of climate change that results from global warming.

The IPCC found that during the 20th century, the Earth warmed by about one degree Fahrenheit. One degree does not seem like a lot. But scientists know that at various times in Earth's history, shifts of just a few degrees had a dramatic impact on the planet's climate and environment.

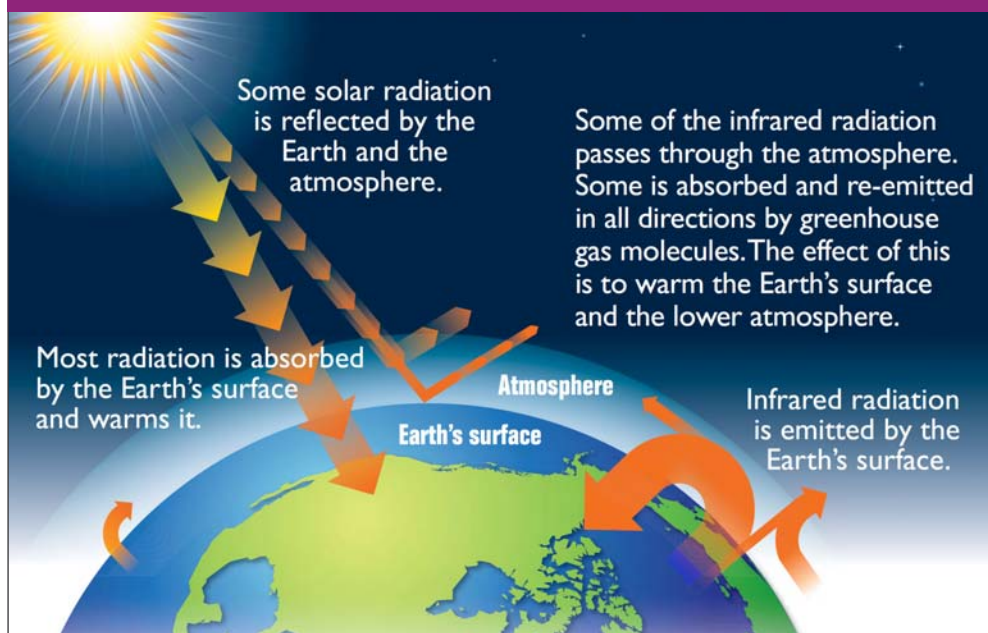
In 2014, the IPCC issued its fifth report. The IPCC found that the concentration of carbon dioxide in the atmosphere rose by about 30 percent during the last 200 years, the period of the Industrial Revolution. Carbon dioxide is the most important greenhouse gas that traps heat from the sun.

In addition, the IPCC discovered "new and stronger evidence that most of the warming observed over the last 50 years is attributable to human activities." About 75 percent of carbon dioxide emissions come from burning fossil fuels.

China is the largest producer of carbon dioxide emissions. In 2015, China emitted over 10 million kilotons of carbon dioxide, or 29 percent of global emissions. The United States is the second largest producer, emitting about half the amount of carbon dioxide that China emits. Americans are responsible for 35 percent of all greenhouse gases ever produced by humans.

The Greenhouse Effect

United States Environmental Protection Agency



'Climategate'

In 2009, hackers leaked emails from the Climatic Research Unit (CRU) at a university in Great Britain. The IPCC partly relied on information from the CRU. Of the more than 1,000 emails, one mentioned that "we can't account for the lack of warming at the moment." Another referred to a "trick" to "hide the decline" in temperatures in one particular data set. In several emails, scientists debated with each other about technical aspects of interpreting data.

The leaking of the emails was dubbed "Climategate" in

the press. Many people including a few scientists responded by calling global warming a "hoax." S. Fred Singer criticized the CRU and the IPCC due to allegedly "distorted raw data" revealed in the emails. U.S. Senator James Inhofe (R-OK) argued that the emails revealed "a fractured consensus on the state of climate science."

Analyses in news sources such as *The Guardian* and *The New York Times* demonstrated that the questionable emails were taken out of context. The word "trick," for example, was just a colloquial word for a technical way of compiling data. But the persistent minority had found evidence to be skeptical of the data used by most climate scientists.

What If We Do Nothing?

What is likely to happen over the next 100 years if we do nothing about global warming? The IPCC's fifth assessment report in 2014 includes the best available projections of likely impacts on the world's environment.

According to the IPCC:

- Global temperature will rise 4°C (Celsius) by the year 2100 if carbon emissions into the atmosphere continue at their present rate. Climate changes in the 21st century are very likely to be larger than those in the 20th century.
- Increasing temperatures will mean more droughts in many areas of the world, including parts of the United States, such as the Southwest. In these areas, crop yields will decline and more forest fires will occur. The decreased food supply will especially affect the urban poor, creating "hotspots of hunger."
- While some parts of the world will suffer from heat and dryness, other regions will experience extreme

Most of the remaining carbon dioxide emissions result from the destruction of forests. Since 1855, humans have destroyed up to 20 percent of the world's rain forests in places like Brazil. Burning forests to clear land for farming, roads, and settlement injects large amounts of carbon dioxide into the atmosphere. Also, trees convert carbon dioxide into oxygen through photosynthesis. With the destruction of trees, however, less carbon dioxide is converted.

The Persistent Minority

About 97-98 percent of climate scientists – a scientific consensus – agree with the IPCC that today's global climate change is happening and is primarily human-caused. A small but persistent minority of the world's scientists, however, disagree with the consensus around the IPCC's findings.

These dissenting scientists deny the IPCC's findings in a variety of ways. Most of them doubt that global warming is primarily human-caused. Others believe the cause of global warming cannot be known. Still others simply doubt that the effects of global warming will be catastrophic.

Physicist S. Fred Singer is skeptical of anthropogenic (human-caused) climate change. In 2013, he said, "The Sun . . . and other natural forces are much more important than any human influence on climate." He has also pointed out that scientists are not sure how much carbon dioxide is absorbed by the world's oceans.

Singer has also identified global warming's potential benefits, if temperatures rise. He foresees more food from longer growing seasons, an increase in timber, more water in some dry regions, and a decrease in the use of fossil fuels for heating as winters become more moderate.

rainfall along with floods, landslides, and soil erosion. Violent storms will threaten human life, health, and property, driving up insurance rates.

- Anthropogenic influence has contributed to the melting of the Greenland ice sheet since 1993. Global sea level rise will very likely increase at a faster rate than what scientists observed between 1971 and 2010. Rising seas will cause major flooding and loss of land in the coastal regions in the world, affecting tens of millions of people.
- Ecosystems unable to cope with the climate changes will be at risk. While some animal, bird, and fish species will successfully expand their ranges, those unable to adapt will become extinct.
- Climate-change impacts will slow economic growth. This will, in turn, increase poverty, especially in developing countries in Africa. But when the Earth's surface temperature increases more than a few degrees, even industrialized countries like the United States will experience economic hardships.
- Climate change's impacts can lead indirectly to increased inequality and even violent conflict, such as civil war.

Scientists have also provided evidence that glacier and icecap melting will accelerate in the Northern Hemisphere in the 21st century. For example, the Arctic Bay's summer "melt season" is now up to 11 days longer than it was 40 years ago. It is possible that the entire Greenland

ice sheet could melt away entirely, adding to the projected three-foot rise in sea level by 2100.

The National Oceanic and Atmospheric Administration reported that hurricanes, floods, wildfires, and tornadoes have increased alongside record-setting warm temperatures in the United States. The damages cost over \$300 billion in the U.S. in 2017 alone.

As noted by Singer, there could be potential positive benefits from global warming, such as longer crop growing periods. But these benefits will probably not be enough to overcome significant damage to the environment.

What Should the U.S. Do About Global Warming?

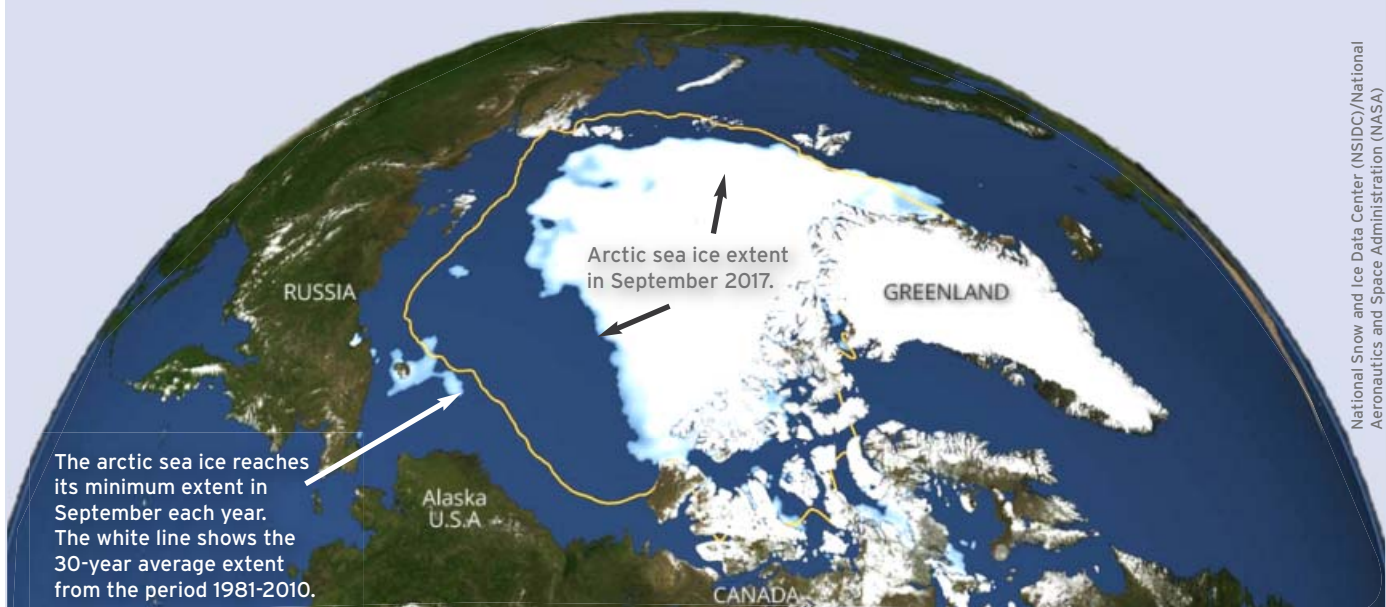
In 1997, more than 160 nations met at Kyoto, Japan, to work out a treaty requiring reductions of greenhouse gas emissions. The Kyoto Treaty included no specific methods that nations had to use to reduce their emissions. Nations would probably have to consider options such as limiting deforestation, requiring more fuel-efficient automobiles, or imposing a "carbon tax" on gasoline and other fossil fuels to discourage usage. Relying more on renewable energy sources, namely solar, wind, and nuclear power, would also reduce greenhouse gas emissions.

President Bill Clinton signed the Kyoto Treaty, but the U.S. Senate refused to ratify it because of an exemption for developing countries and potential harms to the American economy. In 2001, President George W. Bush withdrew the United States' signature from the Kyoto

The Albedo Effect

The scientific consensus is concerned about the albedo effect. Albedo is a measure of the ability of a surface to reflect sunlight and its heat. White surfaces have a high albedo and reflect more light and heat. Dark surfaces have a low albedo and absorb more light and heat.

As ice melts in the Arctic Bay, more of its icy white surface disappears. As heat from the sun is absorbed into the remaining ocean due to its low albedo, the water warms. The chance of the water freezing again greatly lowers, which will, in turn, make a low-albedo surface permanent and cause the water to continually warm. At the same time, the melted ice will cause sea-levels to rise.



Treaty. He argued that its percentage requirements for greenhouse gas reductions would cost Americans millions of jobs.

In an attempt to buttress the Kyoto Treaty, President Barack Obama signed the Paris Agreement in 2016. It was a part of a United Nations framework on climate change and was initiated through multi-national collaboration. Over 170 nations have signed the agreement, each obligated to mitigate global warming by reducing greenhouse gases and aiding developing nations. The aim is to keep global temperatures below a 2°C (Celsius) increase by the year 2100.

In June 2017, President Donald Trump announced that the United States would withdraw from the Paris Agreement. He said the Paris agreement would “undermine our economy” by costing the U.S. 6.5 million jobs and \$3 trillion in gross domestic product (GDP). He wanted to renegotiate the agreement. Under the terms of the agreement, however, the earliest the U.S. could withdraw is November 4, 2020, the day after the U.S. presidential election in that year.

Supporters of President Trump’s decision argue that Congress should have decided whether or not to enter the agreement, not the president. U.S. Energy Secretary Rick Perry, a former Texas state legislator and governor, said the agreement “was neither submitted to nor ratified by the U.S. Senate, and is not in the best long term economic interest of the United States.”

Rep. Lamar Smith (R-TN) who was the chair of the House of Representatives science committee agreed with Secretary Perry, saying that President Obama put the nation “at an economic disadvantage” in joining the Paris Agreement.

Opponents of President Trump’s decision argue that the decision would not harm the U.S. economy but would

instead harm the environment. House Democratic leader Nancy Pelosi said, “President Trump’s decision . . . is a stunning abdication of American leadership and a grave threat to our planet’s future.” Bob Ward, a trained geologist at the London School of Economics, called President Trump’s decision “confused nonsense” in a statement. Ward also cited flaws in a report Trump relied on from an economic consulting firm.

Technological entrepreneur Elon Musk, the CEO of Tesla, Inc., resigned from President Trump’s economic advisory and manufacturing advisory councils in protest, tweeting, “Climate change is real.” Robert Iger, the CEO of The Walt Disney Company, also resigned from the president’s policy advisory council.

* * * * *

Global warming is real. The debate centers on its ultimate long-term impacts and what to do about them. The dilemma is how to reduce greenhouse gas emissions without damaging the world economy.

WRITING & DISCUSSION

1. Define anthropogenic climate change. What evidence is there for anthropogenic climate change?
2. Make a list of five impacts on the world’s environment that are likely to occur in the 21st century if we do nothing about global warming. Rank these changes from most to least important from your point of view. Give reasons for the single most important change on your list.
3. Describe the similarities and differences between the U.S. treatment of the Kyoto Treaty and the U.S. treatment of the Paris Agreement for reducing greenhouse gas emissions.

ACTIVITY: Campaign 2020: Where Do You Stand on the Paris Agreement?

President Trump’s decision to withdraw from the Paris Agreement will not take effect until the day after the next presidential election in 2020. So his decision will be a controversial issue in that election.

- A. You are part of a team of environmental-policy advisors to a presidential candidate in the year 2020. Meet with your team of three to four other advisors and do the following:
1. Re-read the section “What Should the U.S. Do About Global Warming?.” Underline main points you agree with. Double-underline main points you disagree with. Circle any words that are unfamiliar to you. Share this information with your team.
 2. Deliberate with your fellow advisors about what advice your team will give to your candidate on the Paris Agreement. Decide whether or not your candidate should promise that the United States will re-enter the Paris Agreement.
 3. Provide at least three reasons for your team’s decision, using information from the article.
 4. Choose a spokesperson who will present your team’s decision and reasons to the class. Be prepared to answer questions from other teams.
- B. After all the teams have presented, each advisor will write a 100-word briefing on your team’s advice to the candidate. Imagine that this briefing will be presented to the candidate.

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Civics on Call

Discussion of current events and controversial issues is one of the six proven practices of highly effective civic education identified by the Civic Mission of Schools (CMS). "When students have an opportunity to discuss current issues in a classroom setting," reports CMS, "they tend to have a greater interest in civic life and politics as well as improved critical thinking and communication skills."

Civics on Call, is a one-stop web page for classroom-ready lessons on issues of the day. All lessons are free, downloadable, and reproducible for classroom use. We will continue to add lessons here for your easy access, and you will find the following current events lessons at Civics on Call today:

- Guns and School Safety: What is the Best Way Forward?
- What Should the U.S. Do About North Korea's Nuclear Weapons?
- How Should We Judge Our Nation's Founders?
- and more. . .
- The Iran Nuclear Deal and Its Critics
- Understanding 'Fake News'
- Youth and Police



www.crf-usa.org/civics-on-call

Standards Addressed

Hypatia of Alexandria

California History Social Science Standard 6.7. Students analyze the geographic, political, economic, religious, and social structures during the development of Rome. (7) Describe the circumstances that led to the spread of Christianity in Europe and other Roman territories.

California History Social Science Standard 10.1. Students relate the moral and ethical principles in ancient Greek and Roman philosophy, in Judaism, and in Christianity to the development of Western political thought. (1) Analyze the similarities and differences in Judeo-Christian and Greco-Roman views of law, reason and faith, and duties of the individual.

National World History Standard 9. Understand how major religious and large-scale empires arose in the Mediterranean Basin, China, and India from 500 BCE to 300 CE. Middle School: (5) Understands the status and role of women in Roman society. (6) Understands the influence of Christian beliefs on political, social, and cultural aspects of society.

National World History Standard 11. Understands major global trends from 1000 BCE to 300 CE. Middle School: (2) Understands the development of large regional empires (e.g., . . . state bureaucracy . . . belief systems . . .). Knowledge/skill statement 4: Understands the significance of belief systems in the development of large regional empires.

Common Core State Standards: SL.6-8/9-10-12.1, SL.6-8/9-10.3, RH.6-8/9-10.1, RH.6-8/9-10.2, RH.6-8/9-10.3, RH.6-8/9-10.4, RH.6-8/9-10.10, WHST.6-8/9-10.1, WHST.6-8/9-10.2, WHST.6-8/9-10.9, WHST.6-8/9-10.10.

Cotton Mather

California History Social Science Standard 7.10. Students analyze the historical developments of the Scientific Revolution and its lasting effect on religious, political, and cultural institutions. (2) Understand the significance of the new scientific theories. . . . (3) Understand the scientific method advanced by Bacon and Descartes, the influence of new scientific rationalism on the growth of democratic ideas, and the coexistence of science with traditional religious beliefs.

California History Social Science Standard 11.3. Students analyze the role religion played in the founding of America, its lasting moral, social, and political impacts, and issues regarding religious liberty.

National U.S. History Standard 4. Understands how political, religious, and social institutions emerged in the English colonies. High School: (3) Understands characteristics of religious development in colonial America (e.g., . . . the major tenets of Puritanism and its legacy in American society. . . .). (4) Understands characteristics of the social structure of colonial America (e.g., . . . different ideals among diverse religious groups, social classes, and cultures. . . .).

National World History Standard 27. Understands how European society experienced political, economic, and cultural transformation in an age of global intercommunication between 1450 and 1750. High School: (4) Understands influences on the spread of scientific ideas and Enlightenment thought (e.g., the importance of royal societies and other international networks in disseminating scientific ideas and methods; how academies, salons, and popular publishing spread Enlightenment thought. . . .) (5) Understands features of the conflict between religious beliefs and scientific thought during the Scientific Revolution (e.g., the coexistence of the new scientific rationalism in 17th and 18th-century Europe with traditional learning and rituals. . . .)

Common Core State Standards: SL.6-8/11-12.1, SL.6-8/11-12.3, RH.6-8/11-12.1, RH.6-8/11-12.2, RH.6-8/11-12.3, RH.6-8/11-12.4, RH.6-8/11-12.10, WHST.6-8/11-12.1, WHST.6-8/11-12.2, WHST.6-8/11-12.9, WHST.6-8/11-12.10.

Global Warming

California History Social Science Standard 12.4. Students analyze the unique roles and responsibilities of the three branches of government as established by the U.S. Constitution. (4) Discuss Article II of the Constitution as it relates to the executive branch, including eligibility for office and length of term, election to and removal from office, the oath of office, and the enumerated executive powers.

National Civics Standard 23. Understands the impact of significant political and nonpolitical developments on the United States and other nations. Middle School: (6) Knows examples of environmental conditions that affect the United States' domestic and foreign policies (e.g., destruction of rain forests and animal habitats, depletion of fishing grounds, air and water pollution). High School: (5) Understands historical and contemporary responses of the American government to demographic and environmental changes that affect the United States.

Common Core State Standards: SL.6-8/11-12.1, SL.6-8/11-12.3, RH.6-8/11-12.1, RH.6-8/11-12.2, RH.6-8/11-12.3, RH.6-8/11-12.4, RH.6-8/11-12.10, WHST.6-8/11-12.1, WHST.6-8/11-12.2, WHST.6-8/11-12.9, WHST.6-8/11-12.10.

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Erratum

In the printed issue of *Bill of Rights in Action* (33:4), we inadvertently labeled the U.S. Supreme Court case *D.C. v. Heller* as *D.C. v. Helfer* on page 3, though we did correctly identify the respondent's name as Heller on that page.

Landmarks: Historic U.S. Supreme Court Decisions

Linked to U.S. history and civics standards

Grades 9-12

U.S. Supreme Court cases have greatly affected U.S. history. Let your students discover some of the most important cases. Each reading in the student text focuses on one case, giving historical background, outlining the decision, and explaining its significance.

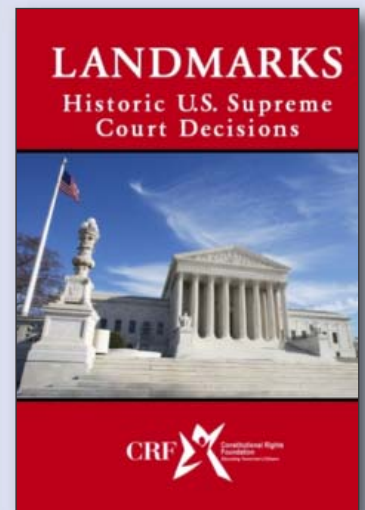
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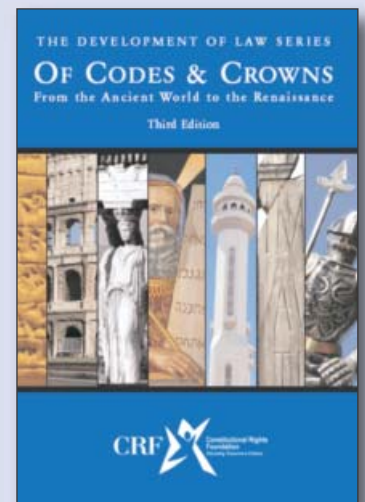
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A Murder Trial

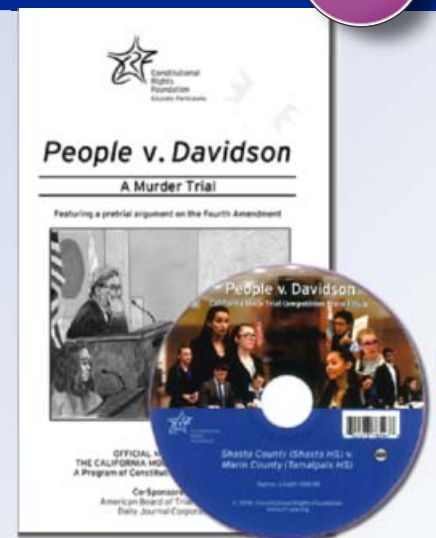
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The defense argues that Davidson did not murder Thompson and has an alibi for the time of death. According to the defense, Davidson was an activist in a nonviolent group, and had a history of mediating conflicts. The defense also argues that forensic blood evidence found on Davidson's clothing was the result of Davidson's close proximity to Thompson when Thompson was punched at the rally. The messages on the social network, the defense argues, were in one case the result of someone other than Davidson, and in another case the result of Davidson responding to an incident in which Thompson physically injured Davidson.

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