A GREAT DESOLATION:
YELLOW FEVER, SMALLPOX AND INFLUENZA IN AMERICAN HISTORY

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ABSTRACT

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By Stephanie Steffano-Davis

This historiography addresses the impact of smallpox, influenza and yellow fever on selected events in American history. The consequences of the interactions between people and the microscopic world are very great, and there is a growing body of interdisciplinary literature examining connections between history and the spread of deadly infectious diseases. In order to understand the correlations between disease and history, a basic explanation of some aspects of virology, immunology, and epidemiology as they relate to selected disease epidemics is included. Events of particular attention include Philadelphia’s yellow fever epidemic in 1793, smallpox epidemics as they affected the American Revolution and Native American peoples, and the influenza pandemic of 1918. The study of the impact of epidemics on politics, war and social life is appropriate in American history and world history courses. A lesson plan on the topic of smallpox and Manifest Destiny, using Lakota winter counts as primary source documents, is appended. Deadly epidemics are raging now and worse may be yet to come; therefore, the study of their effects in the past may better prepare students to face the future.
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INTRODUCTION

Human history is intertwined with the microscopic world. Viruses, such as influenza, smallpox, and yellow fever have affected daily lives of common people as well as the lives of the upper classes. Disease affects the course of wars and the direction of migrations. Whether a certain individual lives or dies can change the future. When masses of people die in epidemics, entire cultures can be irrevocably changed or even completely lost. Since publication of Alfred Crosby’s *The Columbian Exchange: Biological and Cultural Consequences of 1492* published in 1972 and William H. McNeill’s *Plagues and Peoples* in 1976, the literature has exploded with excellent histories of disease by anthropologists, historians and microbiologists.

These were not the first books to address the effects of disease in American history. An example of earlier research is J. M. Powell’s *Bring out Your Dead: the Great Plague of Yellow Fever in Philadelphia in 1793* which was published in 1949. Powell’s historical perspective on the epidemic is reflective of the period in which he wrote, just as newer authors reflect changing perspectives on history, and an increased body of knowledge. It is interesting to note that histories of disease have built on each other’s scholarship and on new information in medical science. Epidemics overlap in time, occur simultaneously, and recur; for these reasons, there is no clear-cut chronological order to these diseases. This paper will follow the chronological flow of historiographers
on each plague, rather than following the timeline of the appearance of each of these epidemic diseases in American history.

Among the three diseases this paper addresses, yellow fever is the newest arrival in the Americas. Since transmission of yellow fever is by mosquito, it is a very different type of epidemic disease than smallpox and influenza. The mosquito’s geographic range checks its spread. Evidence shows that yellow fever entered the New World from Africa. It is now endemic in many tropical regions of the world. Although most of the United States are outside the tropics, yellow fever affected the D.C. area as well as Philadelphia in 1793 when ten percent of the population of Philadelphia died; it struck Memphis in 1887, and later had a major effect on the Spanish-American War, killing thousands of soldiers. “Forty-niners” contracted yellow fever when they hiked fifty miles overland through the jungles of the Isthmus of Panama during the California gold rush. Yellow fever impeded progress on the Panama Canal. No one understood the mosquito-yellow fever connection until 1900; and even after a program of mosquito eradication in Havana in the wake of the Spanish-American War reduced yellow fever cases to zero, many still did not believe in the mosquito connection.¹

¹ In J.H. Powell, Bring Out Your Dead: The Great Plague of Yellow Fever in Philadelphia in 1793, Pennsylvania: University of Pennsylvania Press, 1949, p. 22, he reproduces a paragraph written by someone known only as “A.B.”. The writer did not know the connection between yellow fever and disease, but if all of Philadelphia had followed these suggestions, the epidemic might have ended. “Whoever will take the trouble to examine their rain-water tubs, will find millions of the mosquitoes...in a state not quite prepared to emerge and fly off...any common oil...by excluding the air, will destroy the whole brood. A gill of oil poured into a common rain-water cask will be sufficient.” The writer recognized that mosquitoes are “distressing to the sick, and troublesome to those who are well.” They were troublesome, indeed.
Smallpox burst upon the New World far earlier than yellow fever, and though its impact on the settlement of the American continents by imperial Europe can scarcely be overstated, still it was only a sidebar in the study of American history until publication of *The Columbian Exchange* in 1972. The influence of smallpox on American history ranges from pre-Colonial times until its eradication in Africa in 1978. In colonial times, Americans were great innovators in inoculating against smallpox using attenuated virus. Even before settlement by English colonists, however, Spanish conquistadores as well as French and Spanish missionaries had already brought smallpox to the American continents. Recent estimates of the native populations before European contact are much higher than most of our contemporary textbooks claim. So many American Indians died as these introduced diseases spread through their lands from tribe to tribe that when Hernando De Soto first arrived in the southeastern United States in 1540, he saw an already greatly reduced population. Devastation of Indian communities by imported diseases doubtlessly made the exploration and colonization of North America much easier than it would otherwise have been. Smallpox did great damage to American soldiers during the Revolution. More soldiers have died of disease than in battles throughout most of history, and the fortunes of the American Revolution nearly turned on smallpox. In addition, smallpox accompanied Manifest Destiny all the way into California; many people at the time proclaiming that the massive mortality among Indians proved that God favored westward expansion of the United States over Indian claims to the land. Vaccination against smallpox and the subsequent successful
eradication of the disease, as well as the fate of virus still kept in containment in the United States and the former USSR, are fascinating aspects of smallpox’s history.

Influenza has also had a profound effect on American history. Influenza is a virus with a cyclical nature. Though most otherwise healthy people tolerate most variants of the virus, deadly variants arise in what to some researchers appear to be regular intervals. The worst influenza pandemic known is in 1918, but there have been severe epidemics many times in American history. Alfred Crosby’s *Epidemics and Peace, 1918*, republished as *America’s Forgotten Pandemic: The Influenza of 1918* in 1989, awakened a number of researchers to the mysteries still unsolved about this pandemic. Many scientists and historians have since discovered more about the nature of the deadly flu of 1918. With the spread of the deadly H5N1 “bird flu” since its emergence in 1997, fear of another devastating influenza pandemic is causing renewed public interest in the influenza of 1918.

Epidemic diseases in history are an important area of study. As our human population approaches or exceeds the Earth’s carrying capacity, the probability increases that our students will experience a devastating epidemic within their lifetimes. The worst epidemic killers are “crowd diseases”. If there is no crowd, such diseases cannot continue and just sputter to a stop. However, in the presence of large numbers of susceptible individuals, an epidemic can continue to the point of complete devastation of cultures. When these diseases rampage, fear of death and fear of the unknown can lead people to jump to conclusions, sometimes leading to scapegoats and “retaliation” as in the murders of Jews for poisoning the wells during the Black Plague of Medieval Europe.
John M. Barry, in *The Great Influenza*, implies that as recently as the 1918 flu pandemic, Americans murdered German-Americans for “poisoning” the U.S. with flu. Education about epidemics of the past, focusing on the nature of the immune system, on the microbiology of disease, and on the methods of epidemiology tracking the geographic spread of epidemics in the past, can hopefully eliminate some of the fear of the unknown. Understanding the course of epidemics in the past may give our students the tools to recognize a genuine epidemic and possibly even avoid becoming ill when epidemic diseases arise. Students should learn about historical atrocities caused by the fallacy of creating scapegoats when crises occur. Examination of such mistakes in the past will make it possible for students to recognize the fallacy more quickly, and not succumb to it.

Since these epidemics have occurred throughout American history, the study of these diseases fits many places in the California History Standards for American History. Following the arrival of the early explorers, during American colonial times, and in the Revolutionary period, smallpox was devastating communities. When students learn about the challenges to Manifest Destiny, the Indian removals and U.S. territorial expansion, smallpox was there also, devastating Indian populations. During the Constitutional Convention and the Ratification period, yellow fever struck Philadelphia and Washington, D.C. In New Orleans and Memphis, yellow fever epidemics repeatedly occurred throughout the nineteenth century, and having no scientific basis in the epidemiological and immunological facts regarding the disease, some “experts” offered

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peculiar notions of racial and socio-economic susceptibility. When studying the Spanish-American War, students should know that yellow fever was killing American soldiers in massive numbers. Near the end of World War I, the Spanish flu ground domestic life and military operations to a standstill around the world. Presently, an often-fatal H5N1 “bird flu” is threatening to cross the human-to-human contagious threshold.

Studying these diseases will also fit into World History standards, since all of them have been worldwide plagues. In addition, these historical studies are perfect for integrating into and adapting for use in the California Science Standards for Life Sciences in the fifth, seventh and ninth through twelfth grades. The lesson plan offered here is an example of one place in the American history timeline where the study of smallpox, influenza and yellow fever belong.

Humanity has had a long history with infectious disease, and the consequences of these interactions between people and the microscopic world are very great. It is surprising that, despite decades of historiography on the subject, elementary and secondary school history textbooks put very little emphasis on this. As James Loewen puts it in *Lies My Teacher Told Me*: If teachers have “…a lot of time, light domestic responsibilities, sufficient resources, and a flexible principal…” they can create lessons that include this important information.
YELLOW FEVER

Yellow fever has been a major influence on American history since the sugar boom in Atlantic America in the 1640s. A struggle began in the 1680s between England and France to control the islands; French defenders had a great advantage over English expeditionary forces. The local French troops were immune to yellow fever. After slaves and ex-slaves revolted, imperialist expeditionary forces, hailing from France, tried to reclaim Haiti in 1802, but they lacked immunity to yellow fever. As Toussaint Louverture’s successor Jean-Jacques Dessalines told his followers, “The French will not be able to remain long in San Domingo. They will do well at first, but soon they will fall ill and die like flies.”

He was right, and Haiti declared independence in 1804. The same dynamics helped the American Revolution succeed at Yorktown. As Cornwallis reported, “Our numbers had been diminished by the Enemy’s fire, but particularly by sickness . . .” In the Spanish-American War, for every soldier who died in battle, twenty-five died from disease. From 1904 to 1914, construction on the Panama Canal was

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4 Ibid. [Cornwallis’s troops suffered from malarial fevers, especially, but yellow fever as well.]
5 Nancy Stepan, “The Interplay between Socio-Economic Factors and Medical Science: Yellow Fever Research, Cuba and the United States,” Social Studies of Science, Vol. 8, no. 4 (Nov., 1978), 408. The government called for Immune regiments to fight the war, four regiments of blacks and six of whites from areas in the United States where yellow fever was known; some members of the House of Representatives intelligently questioned how the army could determine immunity. [according to Marvin Fletcher,
under American control, but tropical diseases including yellow fever took a high toll. With a force of 39,000 men, the sick rate was twenty-three per 1,000 per day, and the death rate was seventeen per 1,000 per day, or 663 deaths per year. Until vaccines controlled yellow fever in 1935, outbreaks plagued humid, warm areas of the United States such as Philadelphia, New Orleans and Memphis, giving rise to strange medical beliefs and practices.

One of the first historians to address the effects of plagues on American history was J.M. Powell with *Bring Out Your Dead: The Great Plague of Yellow Fever in Philadelphia in 1793* published in 1949. Although “there is no substantial evidence that the cry [“Bring out your dead!”] was used in Philadelphia in 1793” it could have been, because, as in the bubonic plague in medieval Europe, so many died in so short a time, and people feared the dead so greatly, that bodies often lay for a long time before they were hauled away. In three months, some 5,000 residents died and an estimated 20,000 escaped the city. This was not the only time yellow fever struck Philadelphia; there

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were previous outbreaks in 1699, 1747, and 1762. The 1793 epidemic proved the most devastating.

Yellow fever is a particularly horrible way to die. There is a wealth of primary documents describing the fever, the yellow pallor, the burning in the stomach, the black vomit, and the dreadful stench of the sick. Written accounts abound of husbands abandoning sick wives, wives their husbands, parents abandoning children, and children abandoning parents. Orphans were found sitting with their dead parents. People would not come close to a person suffering in the gutter. No amount of money would induce a property owner to take in a person sick with yellow fever.

In the manner of historians writing in the first half of the 20th century, Powell’s story had a hero. He wrote the story of the yellow fever epidemic with Benjamin Rush, a Revolutionary War hero, also a heroic figure in Philadelphia’s yellow fever epidemic of 1793. Dr. Rush may seem an unlikely hero since not only did he not understand the causes of the disease, as no-one at the time did, but his blood-letting and mercury-ingesting “cure” was dangerous, ill-advised and likely hastened the demise of many of his patients. But this was in a time when medicine was an art based on the ancient principles of the four humors, and when people believed that miasmata (poisonous atmospheres formerly thought to rise from swamps and putrid matter) caused disease. The scientific method was unknown in medicine at the time. Dr. Rush had used the “French cure” on his first four patients, and three of them died; it looked like murder to him. His absolute inability to recognize the superiority of the “French cure” of cold baths, mild stimulants and quinine bark when he was presented with statistically significant numbers later in the
epidemic was a great failing. At the fever hospital at Bush Hill, Stephen Girard and Jean Deveze, who was familiar with yellow fever from his time in the West Indies, practiced the kinder “French cure.” Dr. Powell made Benjamin Rush a hero of this story because of Rush’s unfailing devotion to his patients, and because of his absolute certainty that he could cure this disease. The doctor’s firm resolve to “stay the course” brought comfort and calm to a panicking populace. His confident leadership makes him a hero, although his tender mercies must have brought more suffering to the sick, and in spite of his absolute intolerance for, and fierce denunciation of, any doctor who did not agree with his copious bleedings and mercury purges as a cure for the yellow fever.

At the time of the yellow fever epidemic, Philadelphia was the capital of the United States, as well as being the “foremost in commerce, science, and political life.” The previous winter had been warmer than usual, and the spring rains were late. The *Aedes aegypti* mosquito, which is the usual carrier of yellow fever, does not need very much water, and it does particularly well in man-made water containers, such as rain-water casks. There were uncommonly numerous mosquitoes, which authorities saw as a

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10 It seems clear from Dr. Rush’s writings that he sincerely believed that his cure was highly effective. He wrote, “I now save 29 out of 30 of all to whom I am called…” according to J. H. Powell in *Bring Out Your Dead: The Great Plague of Yellow Fever in Philadelphia in 1793*, Pennsylvania: University of Pennsylvania Press, 1949, p.80. It seems likely that most of these people he “saved” could not have been on their deathbeds, but in his enthusiasm and overwhelming desire to cure this disease Dr. Rush, as people are wont to do in the absence of strict scientific protocol, saw what he expected to see.

sign of “unwholesome atmosphere.” The female mosquito, who generally stays within three hundred meters of her birthplace, must bite an infected person in the first three days of illness and then, after extrinsic incubation for twelve days, bite a healthy one in order for the disease to spread. As with malaria mosquitoes, she remains a carrier of the disease for her entire life. Spread of yellow fever requires a sufficient number of people with infected blood, a large population of *Aedes aegypti*, as well as a pool of non-immune people. The revolution in the West Indies brought exiled Haitians to Philadelphia, many of them with acquired immunity from childhood bouts with the disease. Refugees sick with yellow fever must have arrived as well. The mosquitoes were undoubtedly local. Not knowing these facts, Philadelphia erupted in a great political dispute over the source of the disease, with Hamiltonians on one side and Jeffersonians on the other.

Hamiltonians argued that the disorder was imported, and Jeffersonians (including Dr. Rush) insisted that “miasmata” from the swamps and “effluvia” from rotting coffee at the docks were the source of the fever. For some doctors, politics may have been the main influence for their medical opinion. The Philadelphia port physician, Dr. Hutchinson, was a Republican. He also was an importationist before the 1793 epidemic, but seemingly changed to localism to avoid closing the port to French refugees.

Throughout all of this, rumors spread that the true cause of the disease stemmed from

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“the wells [which] had been contaminated preparatory to a French invasion.” Mobs threatened the refugees who were blamed for the poisoning. As Rush stated, “Loathsome and dangerous diseases have been considered by all nations as of foreign extraction.”

In a time of mass suffering and death, political arguments swirled around causes and solutions to the problem of yellow fever. People worried about Philadelphia’s reputation as a clean city. The College of Physicians answered, “No possible improvement with respect to water or ventilation can make our situation more eligible.”

Yet, at the time, there was no system for sewage or garbage disposal and no fresh water supply in Philadelphia. People who already preferred agrarian life to city life suggested that yellow fever would convince people that big cities are inherently unhealthy. This supports the hypothesis that in an emotional time, individuals who have firmly set opinions will seldom change their ideas based on a logical examination of the facts. With very few facts to go on, the polarized political groups in 1793 Philadelphia firmly entrenched themselves.

Even the treatments for victims of yellow fever became a political issue. Because refugee doctors, such as Jean Deveze, brought the “French” method long used both by the British and French in the West Indies, it was the “Federalist cure.” This traditional “bark method” consisted of quinine bark, wine and cold baths; to modern eyes, the cold baths, at least, might be helpful to bring down the fever and the other two aspects should do no

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15 Ibid. p. 568.
16 Ibid. p. 570.
harm. Alexander Hamilton attributed the bark and wine cure with his own recovery from yellow fever, and “could not resist a sneer at his old critic, Dr. Rush.” This may have been the beginning of the political polarization of the medical treatments. Rush “discovered” his new treatment after losing patients when using the traditional “French cure” methods. Rush’s “experimental” approach involved attempting to draw an amount of blood we now know to be in excess of the quantity in the average person’s body, as well as taking by mouth a powder containing so much mercury that teeth and skin were disfigured. When he used this method on the next five patients, four of them recovered, so perforce the treatment worked. Since this was Rush’s discovery, it became the “Republican cure.”

It was a turbulent time in the young nation. With France at war with Great Britain, Holland, Spain and Austria, the new minister of the French Republic, Citizen Genet, arrived in the United States to a very positive public reception. He came to the new nation’s capitol seeking help from President Washington in the prosecution of this war. Washington declared the country neutral, and pro-French demonstrations had escalated by summer to such a pitch that John Adams wrote, “ten thousand people in the streets of Philadelphia…threatened to drag Washington out of his house and effect a revolution in the Government or compel it to declare war in favor of the French

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18Ibid., 574.
Revolution. Then yellow fever broke out and many of the rioting people fled Philadelphia. According to John Adams, the deaths of two important Democratic Society members, Dr. James Hutchinson and Jonathan Dickinson Sergeant, saved the nation from an imminent revolution.

There was a mistaken notion at the time that blacks were not susceptible to yellow fever. This may stem from situations such as in Barbados, where the black slaves lacked confidence in white healers to cure them. For yellow fever, “African healers used hot baths and herbs which soothed the system.” In contrast, standard practice among white doctors was “bloodletting from the arm. Saline cathartics…leaches to the abdomen, 2 dozen. Warm poultices, gentle evacuations.” More leeches and a large blister followed this less than soothing treatment. No wonder, then, if slaves might not report yellow fever to the master. Another source for the erroneous idea that blacks have innate immunity to yellow fever goes back to the West Indies. Since West Africa is the origin of yellow fever, children there often endure a mild case of yellow fever. If they survive, they have lifelong immunity. For this reason, immunity to yellow fever was common

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23 Ibid.
among adult slaves brought from West Africa to the islands for sugar cane work.\textsuperscript{24} Because of this peculiar idea that they could not become ill from yellow fever, Rush pleaded with his friends Richard Allen and William Gray of the Free African Society to “come and attend the sick since God had granted them special exemption from the disease.”\textsuperscript{25} Many members of Philadelphia’s black community answered the call.\textsuperscript{26} Even when it became clear to black leaders that they were not immune, and some of these leaders expressed a belief that their supposed immunity was a plot developed by whites to take unfair advantage of them, many blacks including these two friends of Rush’s, continued to serve. Nevertheless, “many blamed them for carrying contagion, or preying upon the diseased.”\textsuperscript{27}

Unsubstantiated, moralistic conclusions regarding the spread of yellow fever abounded in many other outbreaks in the United States, and ignorance allowed accusations to fly, until Walter Reed and his crew discovered the true cause of the disease

\textsuperscript{26} The concept of black immunity continued long after this Philadelphia epidemic. In 1878 Memphis where thousands of people died, and tens of thousands escaped the city, belief in black immunity led to the integration of the police force, which remained integrated until 1895. [ from Dennis C. Rousey, “Yellow Fever and Black Policemen in Memphis: A Post-Reconstruction Anomaly,” \textit{The Journal of Southern History}, Vol. 51, (Aug., 1985), pp. 357-374.]  
in 1900. A typical theme in the nineteenth century outbreaks in New Orleans blamed “strangers” and their “dissipated” and “filthy” habits. As Dr. J. S. McFarlane wrote, “Every evil with which we have to contend is introduced by strangers,” and “[they indulge] in every evil propensity and passion, until they are overtaken by those retributive diseases which have been ordained as the punishment of vice and immorality.”

It is more likely that slums near the waterfront and docks where the laboring classes worked experienced yellow fever first because the ships from Latin America brought it there. Upper class immunity did not exist, if bitten and non-immune, the upper class would suffer yellow fever also, but infected mosquitoes bit them less often. Despite daily evidence of Creole children dying of yellow fever, many doctors instead called it pernicious fever because of their firm belief in Creole immunity. 

Irish immigrants to New Orleans in 1853, working in jobs traditionally done by blacks, contracted yellow fever. Why were these white men were sick? One doctor wrote, “Nature scorns to see the aristocracy of the white skin... reduced to drudgery work under a Southern sun ... and has issued her fiat.”

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28 Yellow fever was the first virus isolated. Reed’s team went on to prove that it was mosquito-borne, and that eliminating breeding grounds for mosquitoes eliminates the disease.
30 Ibid. [Emotions were so hot that in 1858, two chief spokespersons for opposing views on the controversy surrounding Creole immunity nearly fought a duel over the subject.]
“less likely to succumb to yellow fever” than whites, clearly relying on skewed statistics that did not take into account immunity acquired in childhood.  

There are many ways to create a tale out of the facts of history. Heroism, of Benjamin Rush, Stephen Girard and two former slaves, Absalom Jones and Richard Allen, as well as that of the committee of citizen volunteers who took over government when the usual leaders died or fled, forms the sustaining thread of Powell’s narrative. He never claimed to construct a record of events; Powell wrote that a historian can only “construct a record of records.” He constructed more than that; in addition to weaving together the primary sources, Powell’s Bring Out Your Dead creates a morality tale, a kind of character education, using the theme of heroism to inspire his readers.

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Columbus was no hero in Alfred Crosby’s *The Columbian Exchange: Biological and Cultural Consequences of 1492*. Neither did he serve as a villain. Columbus’s character is less a factor in this history than the physical health of Columbus and his crew. Published in 1972, this thin, orange book spawned a new level of discussion about the biological consequences of human interactions. This book was indeed polemical, full of bold simplifications; as a contemporary review states, “on every aspect of his theme one would like more precise, detailed treatment.”\(^{33}\) *The Columbian Exchange* is a very important step in the historiography of disease in American history, because it stimulated others to pursue with more depth the intriguing questions that it raised. As a result of these studies, some of the claims which in 1972 were controversial, in 2006 appear canonical.

Crosby made use of numerous primary sources to support his perspective that the most fundamental changes caused by the contact between the New and Old Worlds were not brought on by human culture, politics, or systems of economics, but by biology. The second chapter focuses on microbiology and the Spanish conquest of the native peoples

in the New World. In *The Book of Chilam Balam of Chumayel*, an Indian of the Yucatan recalls the days before the Spaniards:

There was then no sickness; they had no aching bones; they had then no high fever; they had then no smallpox; they had then no burning chest; they had then no abdominal pain; they had then no consumption; they had then no headache. At that time the course of humanity was orderly. The foreigners made it otherwise when they arrived here.\(^3^4\)

These pre-contact people were remarkably healthy and numerous. There is much debate regarding the pre-European contact population in the Americas, but there is no doubt that after European contact epidemics swept through and caused an unprecedented and drastic decline in the native populations.

The best-documented early epidemic was apparently smallpox, *viruelas* in Spanish. It began in 1519 in the Greater Antilles, eventually wiping out vast numbers of natives in Mexico, Central America and, very likely, in Peru; this population crash paved the way for the Spanish conquest. Horses, guns, armor, ferocity: these have all been postulated as the reasons that 600 Spaniards could conquer many millions of fierce Aztec warriors. Not primarily, for this was the work of a virus. Estimates made by witnesses at the time were that only ten percent, thirty percent, in some places maybe up to fifty percent of the Indians survived, numbers that recent archaeological excavations support. Although death was horrible, it was not swift enough to prevent the spread of this imported disease. People infected with smallpox feel fine for the first seven to seventeen days, and then the first symptoms appear. As soon as those symptoms begin, until the

last scab falls off, the person is contagious. If a victim of smallpox can stay alive this long, the contagious phase lasts approximately three weeks. When the scabs have all dropped, the person is no longer contagious, but the scabs themselves can carry the disease for some time, as can contaminated clothing and bedding.\textsuperscript{35} There is some question as to the vigor of the virus when it is not \textit{in vivo}, but it is possible to transmit at least an attenuated form with material taken from a pustule. The early forms of inoculation in Africa and the Middle East successfully used such material to produce a weak case of smallpox in order to induce immunity.

Long before Pizarro invaded the Incan Empire, the Inca Huayna Capac knew about Spaniards ("monstrous marine animals, bearded men who moved upon the sea in large houses"). How did this information reach him? Perhaps it came in the same way that his death arrived. He and his captains died with "their faces …covered with scabs."\textsuperscript{36}

The disease traveled ahead of the Spaniards, laying waste to the indigenous people.

An epidemic broke out, a sickness of pustules. It began in Tepeihuitl. Large bumps spread on people; some were entirely covered . . . could no longer walk about, but lay in their dwellings and sleeping places . . . And when they made a motion, they called out loudly. The pustules that covered people caused great desolation; very many people died of them, and many just starved to death; starvation reigned, and no one took care of others any longer.—Sahagun, Historia general de las cosas de Nueva Espana c. 1575-1580\textsuperscript{37}


\textsuperscript{37} NOW with Bill Moyers, "Bracing for Bioterror," Feb. 7, 2003,
How physically, psychologically and spiritually devastating this must have been to the peoples afflicted! Amongst all this Indian suffering and death, the Spanish marched in unharmed by this relentless disease. Perhaps it is true, as charged by the Spanish historian, Antonio de Herrera y Tordesillas, that enraged Indians kneaded infected blood into their masters’ bread and secreted corpses in their wells. Whether or not the native people tried this reverse biological warfare, smallpox destroyed Indians, leaving the Spaniards in control.

Smallpox was a continuing scourge to populations in the New World, and epidemics hit native groups even before they had any direct contact with Europeans. How can this happen? An Indian runner could travel an estimated 300-400 kilometers during the approximately two weeks when an infected person “feels fine.” For example, there is evidence that in the 1520s, smallpox found its way as far north as west Texas. Once Indians had made contact with Europeans, disease outbreaks were a near certainty. When Hernando De Soto came through what is now the southeastern United States in 1540, he saw many Indian town sites abandoned two years earlier because the inhabitants had died in epidemics transmitted from coastal Indians who had had contact with


Alfred W. Crosby, The Columbian Exchange: Biological and Cultural Consequences of 1492, Westport, Connecticut : Greenwood Press, 1972, p. 38. Crosby treats this charge as a fact. Antonio de Herrera y Tordesillas was a Spanish historian who never left Europe, though the excellent material which he had at his disposal enabled him to write with exactness the history of the discovery of America, and of all that followed that event.[According to Appleton’s Encyclopedia, 2001, http://www.famousamericans.net/antoniodeherreraytordesillas/ (accessed Feb. 23, 2006).]

Spaniards. In other places, he found the cities, towns and temple complexes of the lower Mississippi Valley still flourishing. By the early 1700s when white settlers arrived, these Indians were gone. Smallpox wiped out the Patuxet people of Massachusetts before the Pilgrims arrived in 1620. One Pilgrim’s view: “The good hand of God favoured our beginnings . . . in sweeping away the great multitudes of the Natives by the Small Pox.”

There are several related smallpox viruses, with somewhat different outcomes for the patient. In 1996, there were 450 strains under extremely tight security in the cold vaults at the Center for Disease Control (CDC) in Atlanta, Georgia. They included eight or ten types of Variola major; the rest were strains of Variola intermedia, and Variola minor. As the names suggest, each of these has a different mortality rate, ranging from the least (Variola minor) to the greatest (Variola major). All of these are smallpox viruses but they are each genetically distinct.

Physicians used to talk about how likely a smallpox patient was to die based on the way the skin eruptions appeared; they were either discrete or they ran together (confluent). If the pustules run together, the skin is likely to turn black and peel off in great strips. In addition to the unbearable torment of this, the resultant hemorrhage or

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infection was deadly. A mortality rate of seventy-five percent could be expected for patients who grew this kind of pustule, but it could take two weeks of suffering to die. Fulminating smallpox, when the rash turned inward and hemorrhaged, had even worse odds; the death rate is one hundred percent. In this form, massive vomiting of blood, intestinal or uterine hemorrhage, or blood poisoning caused death. \textit{Variola major} caused both. A child who survived a bout with \textit{Variola minor}, which was a much milder strain common in the urban areas of Europe, grew up with partial or complete immunity to \textit{Variola major}.$^{44}$ Thus, in 1634 William Bradford of the Plymouth Plantation could say, “This spring, also those Indeans that lived aboute their trading house there fell sick of the small poxe, and dyed most miserably. . . . [Yet] not one of the English was so much as sicke, or in the least measure tainted with this disease.”$^{45}$

There are many accounts of English using smallpox as a biological weapon. Just before the epidemic of 1757 hit the Ottawa people, according to a chieftain:

\begin{quote}
    The smallpox which they brought from Montreal during the French war with Great Britain . . . was sold to them shut up in a tin box . . . after they reached home they opened the box; but behold there was another tin box inside . . . when they opened the last one they found nothing but mouldy particles . . . a great many closely inspected to find out what it meant . . . pretty soon [there] burst out a terrible sickness among them.$^{46}$
\end{quote}

$^{44}$ Many European children did not survive smallpox. In Chester England in 1774, out of 202 deaths from smallpox, 180 were children under five. Smallpox deaths in Europe took mostly children, whose loss is less disruptive to a community than the loss of adults (some say they are “easy to replace”). Overall in Europe, mortality under five was about fifty percent. [S.R. Duncan; Susan Scott; C. J. Duncan, “Smallpox Epidemics in Cities in Britain,” \textit{Journal of Interdisciplinary History}, Vol. 25, (Autumn, 1994), p. 260.]


There is a lively debate in the literature as to the veracity of such claims, but there is much evidence that the British military tried to spread smallpox during the French and Indian War. General Sir Jeffrey Amherst in July of 1763 wrote, “Could it not be contrived to send smallpox among these disaffected tribes of Indians? We must on this occasion use every stratagem in our power to reduce them.” The local commander replied, “I will try to inoculate the [Indians] with some blankets that may fall in their hands, and take care not to get the disease myself.” There is no record showing whether Amherst’s plan was carried out, but the month before, in June of 1763, a very similar deed had already been done, and General Thomas Gage, signed payments for “the ‘Sundries’ used ‘to Convey the Smallpox to the Indians’.” There are later quotes from American colonials accusing various British of biological warfare. In 1775, an American officer who had served under Gage during the French and Indian War wrote, “If it is In General Gage’s power I Expect he will Send ye Small pox Into ye Army—but I hope In ye Infinight Mercy of God he will prevent It, as he hath don In Every attempt that he has made yet.” The facts regarding how a certain group was infected are very difficult to ascertain at this far remove, and may be a moot point. As Elizabeth Fenn, author of *Pox Americana* states, “By the second half of the [eighteenth] century, many of the combatants in America's wars of empire had the knowledge and technology to attempt

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49 Ibid.
biological warfare with the smallpox virus. Many also adhered to a code of ethics that did not constrain them from doing so.\textsuperscript{50} There were rules of war at the time that should have prevented ethical people from using smallpox as a weapon, but these rules only apply in the case of “just” wars against “civilized” nations. Regarding Native Americans, Amherst wrote, “Indeed their Total Extirpation is scarce sufficient Attonement [sic] for the Bloody and Inhuman deeds they have Committed.” To men like Amherst, wars against “savage” or “heathen” people warranted total war. Rebels deserved no better. During the American Revolution, a footnote in a little book by a British officer proposed that soldiers dip arrows in smallpox matter and “twang” them at American rebels to inoculate them.\textsuperscript{51}

Elizabeth Fenn has done extensive research into the spread of smallpox in North America. In her 2001 book, \textit{Pox Americana: The Great Smallpox Epidemic of 1775-82}, she follows the spread of smallpox in the years 1775-82 “into Mexico, back through Texas to New Orleans, up into the Hudson Bay region and beyond into western Canada, out onto the Great Plains and the Far West . . .even including Alaska.”\textsuperscript{52} The emphasis on primary sources, including winter counts and oral histories, and the extension of American history to include the entire continent, even though this epidemic occurs during

the Revolutionary War era, make this book uniquely useful. Though it has been criticized for lacking contextual analysis, what *Pox Americana* does particularly well is to articulate with impressive documentation the human connections across vast geographical areas that caused the spread of the contagion from distant peoples through intermediaries. Fenn’s book tells many human stories along the way; the connecting factor is the chain of contagion across the continent.

Even in cases where no one intentionally spread the disease, smallpox traveled the continent making Manifest Destiny manifest. When Lewis and Clark mapped the Missouri in 1805, they plotted many Mandan villages that had been empty for “about 25 years.” An interpreter told them, “Maney [sic] years ago. . . the Smallpox destroyed the greater part of the nation and reduced them to one large Village and some Small ones.”

In May 1837, traders headed upriver to a Mandan village with a man aboard who showed symptoms of smallpox. A devastating epidemic raged through the Upper Missouri, killing ninety percent of the Mandan tribe. The head trader at Fort Clark, Francis Chardon, remarked, “What a bande of RASCALS has been used up.” This heartless attitude towards native people’s suffering was common in many places. When the Lipan Apache of Texas suffered devastation in a smallpox epidemic in October of 1780, Texas

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Governor Cabello wrote to San Antonio that, “. . . without offending decency, one might hope that not a single Lipan-Apache lives through it.”

Why were these introduced diseases so devastating to the natives of the Americas? The most important reason is that this was a virgin soil population; no Indian had ever been exposed to smallpox, or any disease resembling it, before Europeans arrived. When a person is first exposed to a new viral infection, the immune system may recognize the invading virus as “not self” and begin the process of creating an immune response specific to that microbe. This process of acquired immunity is a race against the virus. Will the virus make the person sick? Or will the immune response overwhelm the virus before the person becomes ill? The answer may depend on the virulence of the virus. If the person survives the first bout with the virus, and later encounters the same virus, the immune system is “primed” to respond quickly and the disease never manifests. Babies of disease-experienced mothers attain some degree of immunity from mother’s milk and across the placenta. Acquired immunity is the reason immunization is an effective strategy. If no one in a population has ever encountered a specific deadly virus before, through natural causes or by medical practice, the chances of a general epidemic are great. A classic example of this is the first outbreak of bubonic plague in 1347-51 Europe where the mortality in that virgin soil population was a staggering thirty to fifty percent. Epidemics like this tend to come in “waves” that end when all the susceptible individuals have either died or become immune.

Why didn’t the presence of a sick Spaniard among the conquistadors cause an epidemic among the soldiers? Epidemiologically opposite to a virgin soil epidemic is banishment of a disease from a community by the process of herd immunity. Although some individuals may be susceptible to the disease, if many who are immune surround each of those persons, the epidemic sputters to a stop or cannot even begin. Once the contagious period of about three weeks is past (unless infectious matter is retained, for example, in a blanket or clothing) the danger to others is over. Even if one individual becomes ill, if there is no other host close enough for the virus to infect, then the “herd” is preserved. This is one important way that the immunity of the majority of members in a group protects the health of non-immune members of that group.55

The study of immunology has advanced since Alfred Crosby’s *The Columbian Exchange* opened up the topic of how European diseases affected the people of the New World, and since William H. McNeill picked up the story in *Plagues and Peoples*. For example, McNeill cites books published in 1934 and 1956 and refers to the outmoded term “white corpuscles.” Although the ideas in these two books sparked a proliferation of literature because of the intriguing ideas raised, the immunological details do not bear up to modern science.56 An example is McNeill’s speculation that natural selection in a population of plague survivors leaves a group with “heightened resistances,” and that

55 In addition to protection by herd immunity, the Spaniards understood the concept of quarantine.

56 McNeill’s very original theme, which he carried through *Plagues and Peoples*, was to refer to disease as “microparasitism” and rulers (and their taxation) as “macroparasitism.” Guido Majno, in a 1977 book review in *Nature* made the clever connection that, “. . . infectious diseases (microparasitism) make you immune. And the Latin word *immunis* meant ‘exempt from taxes’ (macroparasitism)!"
therefore Europeans, afflicted with plague diseases for thousands of years, would have stronger immune systems than Native Americans, who lived in a relatively disease-free world.\textsuperscript{57} Although there may be some basis in fact, evidence shows that when exposed to pathogens, Native American immune response is as robust as any other group.\textsuperscript{58} Nevertheless, the idea of the vulnerability of a virgin soil population still holds true.

Another reason that contagious viruses could spread rapidly among American Indian tribes is the profound genetic similarity of the people. Viruses tend to mutate rapidly in a race for survival against the victim’s immune system. A virus that can evade the host’s immune system may survive to reproduce. Immune system antigens found in randomly chosen Native American people are as similar to each other as are those in close family members in Europe. When a group has similar genetics, as Native tribes did from thousands of years of isolation, the virus’s success in one individual is very likely to lead to success evading the immune system of the next individual.\textsuperscript{59} There is no slowing of the rate of virus replication caused by the trial-and-error of various mutational schemes; a successful mutation has already occurred, and so the speed of replication and the success rate of transmission increases.

\textsuperscript{59} Elizabeth A. Fenn, \textit{Pox Americana: The Great Smallpox Epidemic of 1775-82}. New York: Hill and Wang a division of Farrar, Straus and Giroux, 2001, p. 27. Fenn gives the example of measles: compared to mortality rates when unrelated individuals pass measles to one another, mortality nearly doubles when passed to a cousin, and nearly quadruples when passed to a sibling. It is probable that smallpox is similar.
A third reason for the tremendous mortality rates of Indians stricken with European diseases is cultural. Europeans had learned over thousands of years of experience with epidemics to quarantine the sick to avoid spreading disease. Contagious epidemics were not a feature of life in the Americas before Columbus. Customs and traditions dealing with sickness, healing, and death developed among these people that were not to their advantage when faced with these new kinds of diseases. In the case of a smallpox outbreak in an Algonquin settlement in the 1630s, adults crowded into victims’ lodges, inhaling the virus-laden air. This custom was not limited to Algonquin people; it is a common practice in many native communities to sit up with the ill, chanting and praying. Some tribes’ customs include sitting with the dead through the first night.  

In addition, the ratio of sick people to healthy ones led to higher mortality rates from lack of care for two reasons: either no one was left healthy, or the healthy left. Often, so many members of a community would be ill at once that there was no one strong enough to help in even the simplest way. An Algonquin witness from 1634 stated that “. . . they were in the end not able to help one another, no not to make a fire nor fetch a little water to drink, nor any to bury the dead. . . some would crawl out on all fours to get a little water, and sometimes died by the way and not be able to get in again.”  

Sometimes, healthy people abandoned the sick in terror. In 1781, Fray Luis Sales, a missionary in Baja California, wrote,

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The heathen Indians crowded in the caves, when they noticed any infected with the disease, fled to another cave and abandoned those unfortunates and the former, who were sometimes already infected, spread it to others, and all showed the same reactions.\textsuperscript{62}

Indians were not the only victims of smallpox epidemics in America, though they are the only peoples who lost their country because of smallpox.

Smallpox was not evenly distributed, however. Among the people of the Great Plains, smallpox may have had the effect of promoting one tribe above others. In the Brule Sioux winter counts, smallpox epidemics appear in 1779-80, 1780-81, and 1801-02, but because of their nomadic way of life “their losses were slight” compared to agricultural peoples like the Arikaras, Hidatsas, and Mandans.\textsuperscript{63} At the same time that smallpox nearly wiped out these three tribes, the Omahas also lost 400 of their 700 people. Smallpox losses weakened these peoples who had controlled the Missouri, leaving the Sioux as the most powerful tribe in the region. Every other tribe on the Great Plains during the nineteenth century decreased in population largely due to smallpox and other diseases. Increased territory, along with a high birth rate, in-migration from related tribes to the east, abundant hunting (since there was less competition for game), and good health expanded the western Sioux from about 5000 people in 1804 to 25,000 in the


1850s. Since European contact Native American depopulation of the land has been the general rule, however, and Sioux expansion was exceptional among the native people.

Smallpox had a profound effect on both the rebels and loyalists during Revolutionary War as well. Most of the men in the British army were immune to smallpox because of their childhoods in England where it was endemic at the time. Most rural colonists had not had the disease, though many urban residents had. Smallpox, like other so-called “crowd diseases,” needs an endless supply of susceptible hosts before it becomes endemic. In a city of thousands, an endless supply of people without immunity can exist because of susceptible immigrants and new births. If outbreaks of disease take place in a sparsely populated area, eventually everyone is either immune or dead. In a small, rural community then, the virus will die out until two criteria are met: enough susceptible children must be born, and a new source of infection must enter. Then it can strike again. Even if there are new children, however, the virus might not make an appearance in the region. These dynamics led to patchy immunity among colonials.

Inoculation had been practiced in the American colonies at least since the 1720s when Cotton Mather asked his slave Onesimus if he had had smallpox, and got the answer, “Yes, and no.” In Onesimus’s native West Africa, the process of introducing infective matter into a susceptible person in order to induce immunity was time-honored, and so without really “having” smallpox, he was immune. Inoculation (also known as

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variolation) was known in Europe at the time, and the wealthy had begun taking advantage of it. It was expensive and dangerous, however. An American doctor might charge two or three pounds to inoculate a patient, much too expensive for a workingman to afford. Once inoculated, wealthy people ran a two percent chance of dying from the weak case of smallpox induced.65

A weak case of smallpox is still smallpox, however. Danger for the working classes lurked in the figures of wealthy inoculees going about to church and town while carrying live Variola virus particles in their bodies. Quarantine of persons undergoing inoculation was poorly enforced, although necessary. Others could contract smallpox from them, and so the protests of the common people against inoculation had a sound basis in their own best interests, and were not from ignorance and superstition. Residents in Salem and Marblehead rioted when inoculation hospitals were opened; one hospital was razed and both closed. City officials restricted inoculation, especially in the New England colonies, to such an extent that the physician Benjamin Waterhouse later commented that New England “. . . voluntarily submitted to more restrictions and abridgements of liberty, to secure themselves from that terrible scourge, than any absolute monarch could have enforced.”66

The Revolution led to a lot of movement in the population, so that many susceptible country people were exposed to more people (and more germs) than they had ever encountered in their lives. When Lord Dunmore’s 1775 proclamation freed

66 Ibid., p. 39.
Virginia’s slaves (under the condition that they join “his Majesty’s Troops”), they became his new Ethiopian Regiment. Smallpox hit them hard. Lord Dunmore wrote, “Had it not been for this horrid disorder, I should have had two thousand blacks; with whom I should have no doubt of penetrating into the heart of this Colony.”\footnote{Elizabeth Fenn, 	extit{Pox Americana: The Great Smallpox Epidemic of 1775-82}, New York: Hill and Wang a division of Farrar, Straus and Giroux, 2001, pp. 53-59.} If smallpox had not invaded his army, the fortunes of the war might have been very different.

The British controlled Boston in 1775, but the Continental Army surrounded the city. Smallpox raged within, and George Washington, knowing the havoc the disease would wreak on his non-immune army, feared the smallpox terribly. At the same time, he understood that to inoculate his troops meant putting them all at risk. If he inoculated them all at once, they would be vulnerable to attack by the British. If he attempted to inoculate in small groups, he ran the risk of the virus escaping quarantine and becoming epidemic in his crowded camps. Washington opted for prevention by quarantine instead of inoculation. The British general Sir William Howe, having fewer soldiers lacking immunity, took the option of inoculating those men. He also granted permission for Boston citizens to be inoculated, and then began ordering certain individuals to leave. This presented Washington with a “flood tide of castaways who might well infect the American lines.”\footnote{Ibid., p. 50.} Through stringent quarantine, and intense vigilance, smallpox stayed out of the American camps throughout the standoff. Washington’s troops, however, were still susceptible.
Quebec could have been a decisive rebel victory, but smallpox was victorious instead. One thousand one hundred Continental soldiers camped on the Plains of Abraham outside the walled city of Quebec in the late fall of 1775. Benedict Arnold’s 600 men arrived nearly starving, some without shoes. Richard Montgomery brought 500 men. Exhausted, weak and hungry, they settled in to crowded and unsanitary camps as winter arrived. On December 6, 1775, one man’s journal reports, “The small pox is all around us and there is great danger of its spreading in the army.”69 The houses all around hosted the sick, even though there was a smallpox hospital designated by Christmas.

Many of the soldiers’ terms of enlistment ended on December 30, and so General Montgomery ordered an attack on Quebec at midnight on New Year’s Eve in a blizzard. Montgomery died in the assault, and his men retreated. About thirty Americans died, and the British captured more than four hundred. Smallpox was in the camp, and now it moved into the British prison.

Their captors removed enlisted men who became ill to the prison hospital in the first wave of the illness, but they returned them to the general population while the prisoners were still infectious. “Of course, all who had not had it took the disease,” wrote a nineteen year old soldier.70 Extremely cramped quarters, high fevers and no available water created unnecessary misery for the general soldiery. Officers, however, could send for money with which they purchased the services of an inoculator.

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70 Ibid., p 65.
Smallpox was rampant out on the Plains of Abraham as well, and yet there were standing orders that no one was to inoculate themselves to prevent it. General Arnold called for reinforcements, but as soon as they arrived smallpox met them. By March there were 2,505 Continental soldiers, but 786 were ill. Desertion, expired enlistments and smallpox deaths reduced the force by another five to six hundred by April. In May, only one thousand fit men remained, but nine hundred were sick. British reinforcements landed at Quebec, and immediately rushed onto the Plains of Abraham.

The Continental Army retreated, leaving equipment, clothing, ammunition and most of their sick troops. As the army escaped along the St. Lawrence River, they abandoned many more of the smallpox victims. The British rescued hundreds of smallpox victims, perhaps out of true compassion for their suffering. The loyalist troops, as long as they were not native to the Americas, were by and large immune to smallpox.

Through the spring and summer of 1776, smallpox raged in the Continental army causing thousands of deaths to disease. Nearly two thousand sick with the smallpox, camped near the Canada-New York border. Fifteen to twenty each day were laid in the two mass graves there. General John Sullivan ordered an evacuation on June 20 to Ticonderoga. They could not leave smallpox behind. “Every thing about this Army is infected with the Pestilence,” wrote Major General Horatio Gates. As reports circulated of the conditions in the army, fear of contracting the disease hampered recruiting efforts.

Smallpox had become endemic in Philadelphia, causing politicians and potential recruits to fear the city.

Glorious soldiers and bravery in battle, and death on the field of honor are often the historical images of war. The inglorious and unromantic reality is that incapacitation and death from disease has always played a profound role in war. Smallpox could easily have decided the Revolutionary War in the favor of Great Britain, if George Washington had not finally decided to require inoculations. On February 5, 1777 he ordered that all recruits be inoculated as soon as they arrive in Philadelphia. The following winter at Valley Forge, Washington noted that “Notwithstanding the orders I had given last year. . . between three and four thousand Men had not had the Small Pox; that disorder began to make its appearance in Camp, and to avoid its spreading in the natural way, the whole were immediately inoculated.” It was not the end of smallpox in the Revolutionary War, but it was a turning point for the susceptible American army.

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More people are aware of the Great Influenza epidemic of 1918 today than were aware of it in 1976 when Alfred Crosby wrote *Epidemic and Peace, 1918*. As it follows the flu through the world, this book tells detailed stories of that year. A theme throughout this book is heroism, not individual heroes like Benjamin Rush in the yellow fever plague of Philadelphia in 1793, but the heroism of the common people. Was it because of the wartime status of the country or because of the relatively short duration of the crisis, or was it a combination of many factors? For whatever reason, people pulled together in heroic ways during this pandemic.⁷³ As Crosby says, “Americans by the hundreds of thousands did lend each other a helping hand, despite the lack of institutional structures to enable them to do so and despite the deep schisms in their society.”⁷⁴ Influenza was terrifying, deadly, ubiquitous, and mysterious. Yet, *Epidemic and Peace* shows examples from myriad city and military installation of selfless service on the part of doctors, nurses, nuns, policemen and other “regular folks” who looked death in the face daily and kept on helping. Though his emphasis is on the heroism of the common people, Crosby does not shy away from recounting less than heroic situations.

⁷³“Pandemic” generally means an epidemic over a wide geographical area affecting a large proportion of the population; in the case of influenza, we use “pandemic” to mean worldwide.
In 1976 the book was, “a piece of medical antiquarianism, informative and interesting. . . but with little immediate relevancy” as Crosby wrote in his preface to its new release in 2003 as America’s Forgotten Pandemic: The Influenza of 1918. History and literature have given “short shrift” to the influenza epidemics of the past; even Plagues and Peoples in 1976 barely considered influenza. Now with the growing threat of H5N1 avian influenza it could hardly be more relevant. There is only one place where Epidemic and Peace, 1918 needs updating, and that is in regards to the genetics of the virus and the location of the first outbreak. Researchers only recently have begun to understand these aspects of the flu to any high degree. Mortality from this last great plague was phenomenal, though the numbers are in dispute because of unreliable estimates in many countries, the breakdown of bureaucracy at the height of the epidemic, and partly because pneumonia often followed the flu and became the recorded cause of death. In 1976, Plagues and Peoples estimated twenty million worldwide; as recently as 1997 Jared Diamond in Guns, Germs and Steel also quoted twenty-one million, but India alone lost an estimated twenty million people. In 2000, William McNeill revised his estimate upward to a more reasonable forty to one hundred million dead in the pandemic.75

Influenza is not as dramatic as smallpox, but it too is terrible. The term “influenza” was first coined by the Italians in 1504 when the disease was attributed to the influence of the stars, though some later writers referred to it as ‘influenza di freddo’ (the influence of the cold). These names sound almost romantic, but epidemic influenza is an ugly disease. Although many people think of “the flu” as just a bad cold, it has destroyed more lives throughout history than most people realize. Like smallpox, influenza has an ancient history in the Americas. It fits the description of the disease that came to the Maya in 1520-1521, prompting this poignant lament:

Great was the stench of the dead. After our fathers and grandfathers succumbed, half of the people fled to the fields. The dogs and vultures devoured the bodies. The mortality was terrible. Your grandfathers died, and with them died the son of the king and his brothers and kinsmen. So it was that we became orphans, oh my sons!76

An unambiguous example of an influenza pandemic in the sixteenth century decimated Europe and Japan in 1556, and traveled the seas causing disaster among the American Indians from 1558-59.77 In 1580, a worldwide pandemic of flu started in Asia, and then traveled to Africa, Europe and America. Nine thousand died of this flu in Rome and some cities in Spain were “nearly entirely depopulated by the disease.”78 Annual outbreaks of influenza can be fairly mild, but a new flu pandemic rampages approximately every ten

to fifty years. The flu of 1889-90 was a worldwide disaster, but worse by far was the Great Influenza pandemic of 1918-1919.

Generally, the old and the young die at the highest rates during a flu pandemic, while the strong immune systems of people in the twenty to forty year old age group fight off the disease. A graph of death rate versus age, with mortality rate on the vertical axis and age on the horizontal axis, takes the shape of a “U” in that case. The influenza of 1918 was very strange; it killed a vast number of people in the prime of their lives. The old and the young still succumbed, but a similar graph of the 1918 flu looks like a “W,” having a third peak in mortality. It seems in this case that a robust immune system may not have been helpful, as source after source at the time laments that the dead were the strongest and healthiest members of society. Whether this relates in some way to the 1889-90 pandemic is a mystery.

The first recorded cases of a strangely virulent influenza, or grippe, were in rural Haskell County, Kansas in February 1918. World War I was raging in Europe, and young men were crowding into army camps preparing to ship out to France. Several young men traveled from Haskell County to Camp Funston, Kansas. Beginning on March 4, 1918, swarms of men began entering the camp hospital with flu symptoms: fevers, headache, backache; most of them recovered, although a pneumonia epidemic followed. As men traveled between camps, the spring wave of the influenza epidemic spread with them. Influenza was nearly everywhere by March and April. Where American soldiers disembarked at a camp near Bordeaux, suddenly great numbers were prostrated; most recovered, as in the United States, but patients died at a higher rate than
usual for influenza. There was something different about this flu that was noted in postmortems: the victim’s lungs had swollen and hemorrhaged. The cause of the fluid and swelling was a massive immune response in the lung tissue.

The spring wave engulfed the Continent, though complications were few and most troops recovered. The Germans launched an offensive in April, and they made some advances as the Allies retreated. Then the Allies waited. The expected German offensive was postponed, according to an Allied officer, “...the epidemic of grippe which hit us rather hard in Flanders also hit the Boche worse, and this may have caused the delay.” The German commander, Erich von Ludendorff, also blamed influenza: “It was a grievous business having to listen every morning to the chiefs of staff’s recital of the number of influenza cases, and their complaints about the weakness of their troops.”

It was “astonishingly contagious;” in Dunkirk, ninety percent of the 168th Infantry Regiment, and of the U.S. Navy Seaplane Station caught the flu.

Influenza, like smallpox, is mostly an airborne infection. A sneeze or a cough creates thousands of droplets that may be inhaled by another person or animal. Most of these droplets dry out, however, and float in the air for hours. These tiny “droplet nuclei” are dried mucus and saliva containing any viruses or bacteria the ill person may be shedding at the time. Influenza virus retains the ability to infect for many hours in droplet nuclei. When inhaled, the virus can “set up shop” in the nose and lungs. Influenza

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can spread rapidly because it incubates for only one to three days, and multiplies on the surface membranes of the respiratory tract from whence new virus particles can become airborne. An infected individual begins shedding virus about 24 hours after exposure.\(^8^1\) It is also possible to contract influenza by touching a surface contaminated with the virus, and then touching the mouth or nose. The virus can remain viable on a hard surface for up to two days.\(^8^2\) The closer people are to one another, the more chance for the virus to pass from one to the next. Influenza is a crowd disease.

The war created huge crowds of soldiers, and the 1918 pandemic virus traveled with them all over the world. Although the influenza most likely came from Kansas, no one knew at the time. The Americans called it “three day fever;” the Germans called it “Flanders fever;” but an estimated eight million Spaniards caught it, and even King Alphonse XIII became seriously ill. Unlike the censored press in the warring countries, reports of the disease filled Spanish papers. Within a month or two, the entire world (except Spain) was calling it Spanish influenza.\(^8^3\)

British forces brought the flu with them to Russia, while other ships brought it to North Africa, Bombay, Chungking, New Zealand and the Phillipines, where three-quarters of Manila’s longshoremen were unable to work that July.\(^8^4\) That summer it was strangely absent from the United States. It appears that the influenza virus was increasing

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\(^8^4\) Ibid., p. 28.
in virulence as it passed through millions of people around the world, and this deadly strain inevitably would return to the United States.

Viruses all have some things in common. Smallpox, yellow fever and influenza are obligate parasites. They all have to get inside a cell in order to reproduce, since they are only genetic material in a shell of some kind. Once inside a person’s body cells, a disease virus “hijacks” the cells’ functions in order to make more copies of itself, and then it has to get out again to go infect other people. The immune system fights against this invasion. Head colds and influenza are different from smallpox and yellow fever; immunity to smallpox and yellow fever lasts a lifetime. The immune system has a “memory;” in other words, if the immune system has been previously exposed to an infectious agent, it is “primed” to respond quickly when the same pathogen enters the body, and the disease never manifests again. A person can get a cold many times in a year though, and “the flu” every year (and sometimes more than once in a year). This is because they are very unstable genetically. Influenza is an RNA virus, and so is prone to frequent mutation, simply because copying RNA is much less accurate than copying DNA. Sometimes these mutations make the virus not quite recognizable to the immune system, and so a person who had last year’s flu can still get sick from this year’s flu, or a new variant may even circulate in the same year. These small “antigenic drifts” in the annual flu do not change it enough to take every immune system by complete surprise.85

85 Ann H. Reid et al., “1918 influenza Pandemic Caused by Highly Conserved Viruses with Two Receptor-Binding Variants,” Emerging Infectious Diseases, Vol. 9, (October 2003), p. 1249. According to Reid, this process of progressive change in the antigens of
The change is enough, however, that medical authorities recommend that the elderly, for example, get an annual “flu shot.”

People who had had influenza in the spring of 1918 did have some immunity when the more deadly strain came back across the Atlantic. The first wave of the flu hit soldiers stationed in Hawaii in June 1918. They transferred to Camp Dodge that August; when the lethal second wave came through Camp Dodge in September and October, one-third of the camp’s total population became ill and nearly seven percent died. The soldiers from Hawaii stayed healthy. In the 1919 *Annual Report of the Surgeon General of the U.S. Navy*: “many men of the Navy who had influenza in the spring or summer of 1918, while in European waters, escaped during the later epidemics, both in Europe and the United States.”

Pandemic influenza differs from the annual influenza from which most people recover as easily as from a head cold. To understand why the former is so much more dangerous, it is necessary to understand how the immune system recognizes a microbe as being “not self.” Proteins on the surface of a microbe alert the immune system that something foreign has invaded the body. Immediately the immune system begins creating specific defenses: proteins (antibodies) and white blood cells (killer-T cells) that recognize those proteins on the surface of the microbe. Antibodies tend to bind to a protein on the viral surface, making the virus unable to perform its life functions (for

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the virus results in a distinct variant strain every 2-3 years which can cause new flu epidemics.

example, to attach to the surface of a body cell). The killer-T cells destroy any body cell that they recognize as infected with the virus, so that the virus cannot replicate.

In the case of influenza, two surface proteins are particular targets, hemaglutinin (HA), and neuraminidase (NA). These spiky proteins stud the surface of the virus particle. The virus uses the HA protein to latch onto lung cells, and the NA protein helps release the newly made viruses from the cell. Researchers can isolate different strains of influenza based on their HA and NA proteins. There are fourteen subtypes of hemaglutinin, and nine subtypes of neuraminidase; every influenza virus has one kind of each, thus can be given a number, for example H1N1 or H3N8. One of the first influenza strains identified this way was a swine flu in 1930, so it was designated H1N1. The influenza of 1918 was also subtype H1N1.

One of the strangest things about influenza is the arrangement of its RNA. It has eight distinct gene segments, which it releases into the cell of its host. Like genetic material in any organism, this RNA has all the instructions to make the influenza’s proteins, including its hemaglutinin and neuraminidase. If a person’s lung cell contains the gene segments from two different strains of flu at the same time, they can mix and match into a new influenza that is different from either “parent.” Picture two kids playing with cards: one has eight cards from a red deck and the other has eight cards from a blue deck, they scatter the cards around the room, and quickly pick up any eight. The result is likely to include cards from both decks. When this happens with influenza gene segments, the results can be alarming.
Flu is not just for people; it is also an animal disease. There are specifically human strains, as well as avian and swine strains. These are the most commonly known non-human hosts for influenza; however, influenza has been isolated from horses, baboons and dogs as well. In the eighteenth and nineteenth centuries, influenza-like symptoms in horses have been associated with human epidemics in twelve epidemic years. Many reports exist of horse influenza epidemics striking one or two months before human cases began. There are ancient reports that influenza struck Charlemagne’s army in 876, and that the same disease attacked the dogs and birds.87

Strains of influenza grow best in their own hosts; human flu grows best in humans and duck flu in ducks. Dr. Arnold J. Levine, in Viruses, illustrates how the 1918 influenza might have arisen in nature. Imagine that one duck has picked up a human influenza to which most humans in the world have some immunity (H3N8), and a duck influenza (H1N1) at the same time.88 Both sets of eight gene segments are in the duck’s lung, and when it is time to repackage new virus particles, suddenly there is a new combination. It could have for example, the human gene segments for the first three, a duck gene segment for the fourth and sixth, and the human segments for five, seven and eight. Most of the RNA in this virus is human, so it will replicate well in a person. It is in the fourth and sixth gene segments that instructions for the HA and NA proteins reside, so the new virus will have the duck’s (H1N1). The term for this is “antigenic shift.” [See Appendix

88 It is unknown what animal reservoir held the H1 subtype before 1918, but most evidence points to birds; swine definitely had H1N1 after 1918. Most experts believe that the pigs acquired the H1N1 from humans during the pandemic.
A for a diagram of this process.] This new virus will be H1N1 in a world where most humans have some immunity to H3N8 and none at all to H1N1. If this should spread, it would cause a virgin soil epidemic. Every pandemic known has been associated with a change in the HA protein on the surface of the virus particle. Before the 1918 epidemic, the strain circulating among people, to which most people had immunity, was H3N8.89

Pandemics of flu tend to “smolder” before they explode. Statistics from influenza pandemics show a clear seasonal fluctuation in influenza cases. A slow initial progress takes place in the warm season of the year, and the rapid spread of the disease occurs in the cooler months.90 Moving inside because of the weather may put healthy people in closer contact with others who are shedding virus, and there is evidence that the virus inside droplet nuclei will die when exposed to sunlight. In addition to the seasonal effect, another reason for pandemics’ slow beginnings may have to do with the transmissibility of the virus. In laboratories, the degree of infectivity of a new flu virus increases as it passes through a series of individuals in the new species. A new pandemic subtype may not spread easily from person to person during the “smoldering” period, but then may suddenly acquire that capability and explode, as did the Great Influenza of 1918.

When sailors docked in Boston in August 1918, the flu returned to the United States from Europe. By September 8 the lethal strain appeared in Fort Devens, Massachusetts. On September 29, a doctor at the camp wrote that the soldiers,

rapidly develop the most viscous type of Pneumonia that has ever been seen. Two hours after admission they have the Mahogany spots over the cheek bones and a few hours later you can begin to see the Cyanosis extending from the ears and spreading all over the face, until it is hard to distinguish the colored man from the white. It is only a matter of a few hours then until death comes and it is simply a struggle for air until they suffocate. It is horrible. One can stand to see one, two or twenty men die, but to see these poor devils dropping like flies gets on your nerves. We have been averaging about 100 deaths a day, and still keeping it up.\(^{91}\)

Upon autopsy, it was obvious that the men had drowned; their blue lungs were wet with foamy, bloody fluids. After stepping through a disorderly array of dead bodies in the autopsy room, and opening the chest of one of the dead, William Henry Welch, the foremost pathologist of the time, reportedly said, “This must be some new kind of infection or plague.”\(^{92}\)

In Europe, the flu patients clogged hospitals during the Meuse-Argonne offensive of October 1918. Americans died in Europe from the pandemic itself, and also because wounded soldiers may not have reached help quickly enough due to the enormous numbers of influenza victims. A surgeon wrote in his diary,

Everything is overflowing with patients. Our divisions are being shot up; the wards are full of machine-gun wounds. There is rain, mud, “flu” and pneumonia. Some hospitals are overcrowded, some are not even working. Evacuation 14 had no medical officer but hundreds of pneumonias and no one to look after them. . . . Every sort of infectious case was there, packed in as close as sardines with no protection. An ophthalmologist was in charge of these hundreds of cases of desperate pneumonia that are dying by the score. . . In one night I had 60 deaths.”\(^{93}\)

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92 Ibid., p. 17.
No one understood why people were falling like wheat before the reaper. Sudden death was not a stranger to Americans in 1918, but the scale of the epidemic was terrifying. With a war going on, rumors spread that the Germans at Bayer aspirin had put germs in the medicine. That rumor went so far that the government tested the aspirin in order to reassure the public that it was safe. Other rumors circulated that Germans were landing in Boston harbor with vials of germs that they spread in crowded places. Some say that fanatics targeted individual German-Americans for spreading the flu. As in the yellow fever epidemics of nineteenth century New Orleans, “dissipated” and “filthy” habits took the blame for causing illness. When people do not know the cause, they sometimes put the blame squarely where it does not belong.

Public interest in the flu pandemic of 1918 has made best sellers out of historical storytelling like Gina Kolata’s 1999 *Flu*, and John Barry’s *The Great Influenza: the Epic Story of the Deadliest Plague in History* published in 2004. Both of these authors chose to focus on heroic main characters. Kolata’s main hero is Jeffery K. Taubenberger, a twenty-first century molecular pathologist, and Barry’s is William Welch, a distinguished pathologist of the late nineteenth and early twentieth century. Both books are faithful to the biological details, and so improve understanding of “America’s forgotten pandemic.” Since they are more recent, these two works both supplement *Epidemic and Peace, 1918* with recent research on genetics and immunology.

Writers tell the story of the 1918 influenza pandemic from many perspectives. Gina Kolata’s *Flu* focuses chiefly on recent genetics researchers and the search for the elusive virus itself, reflecting her background as a science reporter. John M. Barry, who
has spent many years as a journalist, emphasizes the political miscalculations and social disorder during the pandemic in *The Great Influenza*. A video from PBS, *The American Experience: Influenza 1918*, also emphasizes social disorder to some extent. At one point there is a segment of an interview with Alfred W. Crosby Jr. so that he is heard to say, “. . . if an epidemic goes on long enough, if enough bodies pile up, morality starts to break down. . .” implying that he believes this happened in 1918. Nothing could be further from the truth; he still stands by his conclusions in *Epidemic and Peace, 1918*. After extensively researching reactions to the flu in America, Dr. Crosby concludes that this epidemic contributed to social cohesion, not to disruption. He found that people pulled together in remarkable ways to make it through this mysterious and terrifying plague.

In the Black Death of the fourteenth century, society did fall apart in many ways. The flu pandemic’s mortality rates were similar to those in the Black Death; why did people maintain order in the twentieth century? Medical science was making great advances against contagious disease at that time; perhaps the recent successes against yellow fever, cholera, typhoid, diphtheria, and tetanus inspired the public to have faith that science would soon stop the epidemic. It may be because the influenza’s tremendous death rate occurred over a relatively short period; perhaps it is because the country was already working together to win the Great War; for whatever reasons, Crosby says, “. . . Americans did by and large act as if they were all, if not brothers and sisters, at least

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94 Alfred W. Crosby, Jr., e-mail to the author, March 6, 2006.
cousins." There may indeed have been isolated instances of abandonment, violence and panic, but Eleanor Roosevelt, who had five children, her husband and three servants all sick with the flu, took enough time from her duties with them to bring food to the Red Cross, and speak encouraging words to the rows of patients in the overcrowded hospital wards. She was undoubtedly an exceptionally kind person, yet nurses, doctors, policemen, teachers and all sorts of Americans were doing the same.

The horrors of this flu pandemic should not be understated, and the unbelievable mortality rates caught everyone unprepared. Coffins were in short supply, and gravediggers could not keep up with the work. Families sometimes could not remove the dead from their homes for days because of the overloaded system. People remember wagons picking up corpses one after another. At the morgues on army bases, nurses tell of seeing young men’s bodies “stacked up like cordwood.” During the second week of October in Philadelphia 2,600 people died due to the pandemic; the next week, it was 4,500. There was only one morgue in town and its capacity was thirty-six; unembalmed bodies without ice were stacked “three and four deep in the corridors and in almost every room, covered only with dirty and often bloodstained sheets.”

San Francisco, at least, had the benefit of some preparation. In early October before the pandemic arrived in San Francisco, government officials on the East Coast sent advice to the rest of the country:

Hunt up your wood-workers and cabinet-makers and set them to making coffins. Then take your street laborers and set them to digging

96 Ibid., p. 77.
graves. If you do this you will not have your dead accumulating faster than you can dispose of them.\textsuperscript{97}

Accumulated unburied dead never manifested in San Francisco as they did in Philadelphia. San Francisco quickly made rules making influenza a reportable disease, and established quarantine when the disease first appeared at Camp Fremont on September 28, 1918. By October, the Board of Health closed all public gathering places, schools, and amusement parks, even churches, in San Francisco. People were advised to smother coughs and sneezes. Influenza nearly shut down the city’s operations just as it did in Philadelphia, the personnel-strapped telephone company asking that citizens make only essential calls. Just as they did in Philadelphia, officials pleaded for volunteers to take in children orphaned by the pandemic.

Viruses cannot be seen with a light microscope, but bacteria can be seen. A bacterium was isolated from many victims of the flu, but it was not the true culprit. Near Boston, Doctor Timothy Leary developed a “flu vaccine” against that bacterium; vaccine arrived in San Francisco on October 22. Since the causative agent had not been identified correctly, the vaccine was ineffective. Coincidentally, new cases and deaths from flu declined just as the vaccine became widely used. Most credited the use of gauze masks, however, to the decline.

The spaces between the weave of gauze are so large compared to a virus that wearing a mask to prevent flu has been compared with trying to stop a dust storm with

\textsuperscript{97} Ibid., p.92, cites the \textit{American Journal of Public Health}, Vol.8 (October, 1918), p. 787, for this often-repeated quotation.
chicken wire, but gauze can catch droplets containing virus. For a mask to be even slightly effective however, would require that the gauze be quite a number of layers, worn very firmly, and washed and dried at least daily. Coughs and sneezes spread the influenza virus most often indoors, and so the most important time to use the mask would not be on the streets, but in the home and office. These criteria would be very difficult to enforce, nevertheless, a mask ordinance in San Francisco was in place by the first of November. Many photographs exist of citizens doing their civic duty by wearing masks during the pandemic. Masks were uncomfortable, however, and resistance to the statute was rife.

World War I, “The War to End All Wars,” ended on November 11, 1918. On November 29, Maude Fisher, an American Red Cross nurse, wrote a letter to the mother of a young soldier. Two days after the armistice, influenza landed the young man in the hospital. She wrote, “He was brave and cheerful though, and made a good fight with the disease. . .The country will always honor your boy, because he gave his life for it, and it will also love and honor you for the gift of your boy, but be assured, that the sacrifice is not in vain, and the world is better for it.”98 Like millions of other young men, the war took his life. At the memorial service at Camp Meade, Maryland for the soldiers who died in the pandemic, an officer read each name to a massed battalion. With a salute, the Sergeant of the man’s company then responded, “Died on the field of honor, Sir.”99 In all

the centuries of war, young men from diverse communities, their immune systems naïve to each other’s infections, have been suddenly thrust into the crowded conditions of army camps and overcome by epidemics. Some may still believe in the glory of war, but inglorious diseases have always been the cause of great numbers of soldier deaths.

Pandemic morbidity and mortality affected the fighting during World War I, and influenza at the Paris Peace Conference may have set the world on a course leading to World War II. Woodrow Wilson’s Fourteen Points gave notice to the world: the United States government stood for a peace of reconciliation. The other Allies had their own agendas. Opposition in the U.S. and in Paris grew, and according to the British Prime Minister Lloyd George, “Wilson, in his zeal, worked incessantly. Only those who were there and witnessed it can realize the effort he expended.”\(^{100}\) When his doctor pleaded with him to relent, Wilson told him, “Give me time. We are running a race with Bolshevism and the world is on fire.”\(^{101}\)

On April 3, 1919 President Wilson began to cough convulsively. With a temperature of 103 degrees, he soon could barely walk. His doctor diagnosed influenza. The deadlock with the Allies was so immovable that the President wired to arrange a return to the United States. When the press secretary to the American Peace Commission went to visit Wilson in his sickroom, he reported:

This has been a great day and we are now upon the very crisis of events. . . He is going to fight, and fight to the end. . . When I talk with this man—this tremendous, grim, rock-like man, I think he can die for faith, that he

\(^{100}\) Alfred W. Crosby *Epidemic and Peace 1918*, Westport, Connecticut: Greenwood Press, 1976, p.188.
\(^{101}\) Ibid.
can bring down the world around him before giving over his convictions.\textsuperscript{102}

Wilson did not die from his attack of influenza, though an aide who took sick the same day died four days later. The aide was in the dangerous years; he was twenty-five.

Wilson seems to have suffered long-term damage, however. He was weak and thin physically, but something changed in his thinking. Pathology reports noted neurovascular damage in autopsies of flu victims in 1918, and recent reports link influenza and stroke.\textsuperscript{103} Wilson showed signs of neurological illness. He was certain that French spies were in his house. He became obsessed with details, such as who was using the automobiles and for what purposes. Worst for the Germans, he was no longer determined to have “a peace without victory.” This previously “rock-like man” conceded to his opposition on every principle he had previously stood for, except the League of Nations. Harsh treaty terms crippled the German economy, and paved the way for the nationalistic backlash and political upheaval that put Adolf Hitler in power.

In New Jersey in 1976, soldiers at Fort Dix contracted influenza. One of them, a healthy, strong man felt sick in the morning, but went out with his unit. He collapsed as he marched, and died that evening. When the influenza strains from all of these sick men were identified, most were the normal flu that was making the rounds that year; his was mysterious. Eventually, it was identified as swine flu. After 1918, the H1N1 flu was found in swine; by 1976 it had been circulating among pigs at least since then, and was

\begin{footnotesize}
\textsuperscript{102} Ibid., p.191.
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not easily transmissible to people. When people who worked with swine did become ill, it was usually quite mild. None of these young men had been working with swine. The sudden death of this young man, and the large number of men in the hospital alarmed the medical community. Was this a recurrence of the 1918 virus? The United States government initiated a swine flu vaccination program; influenza would not catch the nation unprepared this time.

The flu pandemic never manifested, but millions of people were immunized. Dr. Hans H. Neumann, director of preventive medicine at the New Haven Department of Health wrote a letter to the *New York Times* explaining the statistical probabilities that 2,300 strokes and 7,000 heart attacks will happen in the country within two days of immunization. “Why? Because that is the number statistically expected, flu shots or no flu shots. Yet can one expect a person who received a flu shot at noon and who that same night had a stroke not to associate somehow the two in his mind?”

Guillain-Barre Syndrome is a rare neurological disorder, also called Acute Inflammatory Polyneuropathy, which causes ascending paralysis beginning in the lower extremities, then progressing to the arms, neck and breathing muscles. There is usually less than one case per one hundred thousand people, and of those only three percent die. Within several weeks of the start of the immunization campaign, doctors reported a larger than expected number of cases and immunization stopped. After administration of

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influenza vaccines in 1992-1993 and 1993-1994, about one extra person per one million persons vaccinated developed Guillain-Barre Syndrome.\textsuperscript{105}  

There is a great deal of speculation about whether vaccines are actually associated with increased incidence of this neurological disorder. According to Gina Kolata, a Minnesota doctor, Denton R. Peterson, misheard a training tape and thought it was warning that the flu vaccine might cause Gillain-Barre.\textsuperscript{106} In fact, the tape was warning against making false causal relationships. The training tape used the example of a patient presenting Guillain-Barre Syndrome after a flu shot as an example of an ex post facto fallacy. Just because one thing follows another does not prove a causal relationship.

Unfortunately, there are an expected number of Gillain-Barre cases, and though rare, one could have happened immediately after a vaccination. When Dr. Peterson reported to the Center for Disease Control, officials initiated investigations to see if there was an increase in cases. More doctors began looking for the disorder. Consequently, they may have diagnosed more cases than they otherwise might have done. Some suspect that there was a high level of misdiagnosis. A torrent of lawsuits against the United States government followed. Whatever the actual facts in the 1976 cases, the Guillain-Barre Foundation recommends that patients who fulfill the standard criteria for a flu shot continue to get them, as the risks of complications for influenza are greater than the risk of Guillain-Barre Syndrome.

\textsuperscript{105} Joel S. Steinberg, M.D.,Ph.D., \textit{Gillain-Barre Syndrome and Chronic Inflammatory Demyelinating Polyneuropathy: An Overview for the Layperson}, GBS/CIDP Foundation International, 9\textsuperscript{th} edition, 2000.  
It seems like every newspaper and magazine for the past several years has had an article on “bird flu,” the media’s name for the H5N1 avian influenza that has been spreading among domestic and wild fowl and has crossed into humans at least since 1997. As of February 27, 2006, World Health Organization (WHO) reports the cumulative number of laboratory confirmed human cases of H5N1 flu to be 173 with 93 deaths. Most infections have occurred directly from a bird to a human. In no instance has anyone caught this flu from a person who is not a close member of the family, so it is hard to tell if the disease passed from one person to another or if it came directly from the family’s poultry. If this flu undergoes genetic change that makes it easily transmissible between humans, it could lead to a pandemic because it is very deadly when contracted, and it is a very different strain than people’s immune systems have previously encountered.

Most of these newspaper and magazine articles raise the possibility of a massive mortality similar to that of 1918. This may happen with H5N1, or it may not. Some other influenza may be the next pandemic. It is impossible to predict what will happen, although our knowledge of the spread of the 1918 flu, and the deadliness of it, can inform our efforts to prevent a similar occurrence in the future. The over-reaction to the potential threat from the non-existent 1976 swine flu epidemic is also good information for public policymakers.

Diseases can circle the planet faster in the twenty-first century, with air travel commonplace for millions of people. Although transportation is faster today, so is communication in many places. If people report it wherever H5N1 influenza appears, sanitation measures may prevent the realization of the virus’s pandemic potential. If that fails and the flu does pick up the genetics that allow human-to-human contagion, communication with the World Health Organization is essential. As long as the influenza is recognized, contained and analyzed quickly, we now have the capability to make effective vaccines. Ann H. Reid and her colleagues have studied tissues containing virus from victims of the 1918 flu, and have determined that the flu did not mutate significantly during the pandemic.\textsuperscript{108} While it was raging, the infectious agent was identical in people extremely geographically distant to one another. Since each influenza vaccine only works against one specific strain, this antigenic stability during the pandemic of 1918 supports the idea that a vaccine could be effective in stopping the next pandemic. Antibiotics which prevent bacterial pneumonia complications are available now. The world is in an entirely new position today compared to 1918.

Influenza is not the only possibility for a future pandemic. Throughout history, people have endured many kinds of epidemic diseases, and through ignorance have often made matters worse, sometimes panicking, sometimes blaming the innocent for the illness, and often using ineffective or downright dangerous medical practices. People have been guilty of trying to spread disease in order to destroy their enemies, and

diseases, however acquired, have taken more lives in wartime than bullets have taken. Some of the deadly epidemic diseases in history were localized, with their range restricted by external factors such as the absence or presence of a vector. Other diseases became pandemic.

Population density, ease of communicability, the level of immunity in the population to the microbe, and the deadliness of the infection are important factors in the spread of disease. If crowds of people without immunity to a deadly microbe spread it efficiently, this creates the conditions for a deadly pandemic. If any one of these criteria is absent, there is no crisis. Authorities in public health throughout the world have been saying that it is not a matter of “if” the world will experience another deadly pandemic, but it is a matter of “when.” Through studying the history and biology of epidemic disease and recognizing how the decisions people made affected the outcomes, perhaps the people who experience the next pandemic can make better choices than our ancestors could have made with the knowledge they possessed.
BIBLIOGRAPHY


Appendix A:

Diagram of Antigenic Shift in Influenza

By permission of the author.
APPENDIX B-N:

LESSON PLAN MATERIALS
**Topic.** Smallpox and Manifest Destiny

**Theme.** History is “His Story.” Point of view dramatically affects how each person understands events.

**California State History Standards.**

8.4 Students analyze the aspirations and ideals of the people of the new nation.

8.4.1 Describe the country’s physical landscapes, political divisions, and territorial expansion during the terms of the first four presidents.

8.4.4 Discuss daily life, including traditions in art, music, and literature, of early national America.

8.6 Students analyze the divergent paths of the American people from 1800 to the mid-1800s and the challenges they faced, with emphasis on the Northeast.

8.6.1 Discuss how physical geography shaped human actions.

8.8 Students analyze the divergent paths of the American people in the West from 1800 to the mid-1800s and the challenges they faced.

8.8.2 Describe the purpose, challenges, and economic incentives associated with westward expansion, including the concept of Manifest Destiny—removal of Indians, and the territorial acquisitions that spanned numerous decades.

**California English-Language Arts Standards**

2.0 Writing Applications
Using the writing strategies of grade eight, students:

2.1 Write biographies, autobiographies, short stories, or narratives.

1.0 Listening and Speaking Strategies:

Students deliver focused, coherent presentations that convey ideas clearly and relate to the background and interests of the audience.

1.9 Interpret and evaluate the various ways in which visual image makers (e.g. graphic artists, illustrators, news photographers) communicate information and affect impressions and opinions.

2.0 Speaking Applications

Using the speaking strategies of grade eight, students:

2.0 Deliver narrative presentations (e.g. biographical, autobiographical)

Timeline. 8 days

Prior Content Knowledge and Skills.

- Students should be aware that before European exploration, many culturally distinct groups already had their homes in the Americas. They should know that there were great cities in the Inca, Aztec and Mound Builder (Mississippian) regions. It would be helpful if students know the routes of the Spanish, Portuguese, English, Dutch and French explorers. Although not necessarily prerequisite to these lessons, other prior content knowledge may include the French and Indian War, Washington’s Native American campaigns against the people between the Appalachians and the Mississippi River, the Louisiana Purchase, the
Lewis and Clark expedition, Indian Removals under Jackson, Oregon Trail, California Gold Rush and Westward Expansion.

- Students will use maps, and will read primary sources.
- In addition to the materials attached, the teacher will need:
  
  Large Brown Paper Bags
  
  Markers
  
  Computer Lab with internet capability
  
  Projector for computer on the internet
  
  Butcher Paper to create chart (see attached format)

Day One Introductory “Hook.”: Prior to using this Smithsonian Institute internet site with students, print out and read the excellent teacher materials provided if you are not already familiar with Plains Indian winter counts. Using a computer and a projector show [http://wintercounts.si.edu/index.html](http://wintercounts.si.edu/index.html) This website shows a short video clip utilizing Lakota language, and flute music, with a voice-over of an old man, Eugene “Pepper” Young. He is the grandson of Theresa Yellow Lodge, a woman who kept a winter count. It is very appealing and riveting, as well as being accurate. The video clip is less than one minute long. After this, navigate the site to show students introductory information on winter counts, which are a pictographic mnemonic device used by some preliterate American Indian people to aid oral history. Show the interview with Eugene Young and other interviews if desired. The interview with Wilbur Flying By is also particularly well-done.
Day One Activity: While the Lone Dog winter count is displayed on the screen, begin with the following Mini-Lecture: *The Lakota, like people all over the world, kept track of their history.* *Oral history can be phenomenally accurate; one technique that many Plains Indians, including the Lakota, used to keep their historians’ memories in order were these winter counts. These pictographs are a “memory jogger,” or mnemonic device, to remind the winter count keeper of the sequence of events. Each extended family of about 150-300 people, a tiospaye, had a winter count keeper who was the group’s historian. At ceremonies or other gatherings, the keeper would bring out the count and use it to name the years. As he got old, he would pass on the count to a son or nephew. The new keeper would copy the winter count. Although there are individual differences in the drawings made by different keepers, there are conventions to the pictographs so that they can be easily understood. As people learned to read and write, written captions would be added to the pictographs. In some winter counts, words began to replace pictographs completely. Originally, the keeper painted the winter count on a buffalo, elk or deer hide; as time passed and hides grew scarce, muslin replaced them. Some counts are on paper. As times changed, sometimes women became winter count keepers. During the summer months, Lakota people were very busy hunting and preparing food and hides; most ceremonies, and large gatherings are in the summer too. In the winter, smaller related groups would go to their winter camp where sewing, storytelling, and reflecting on the past were important. That was when the event for that year was decided and drawn on the winter count.*

Discussion: Ask students, “*What was the most memorable event for you of this year (from last winter to this winter)?* Possible questions to stir memories: Did anyone win a great honor or
award? Did someone move? Did anyone die? Was someone born? Did anyone get very sick? Were there any major trips? Did you get a new horse? Car? Allow plenty of time for students to discuss, and if possible continue back in time a year or two, and as a class discuss memorable events for each year. If they bring up an annual event, point out that since that happens every year it would not signify any particular year unless some very unusual thing happened. Each student will begin a winter count of his/her life, using the graphic organizer attached (Handout #1 Winter Count Project Flow Chart). Ask students to begin thinking of the most memorable event of the present year, and the previous year, and the years before them. The event chosen for a year can be one that your family remembers best, or one that anyone in the town, state, or nation might remember best for that year. How far back can you go? Take the flow chart home for homework and ask friends and relatives to help.

Day Two: Finish the winter count project by drawing pictorial representations of each of the significant events for as many years back as you can go. Use a brown paper bag, cut open so it lays flat. If desired, make a template that resembles a buffalo hide to cut the grocery bag into a symbolic shape. Crumple the bag and soften it until it resembles hide. The drawing and coloring may take some time; a teacher may choose to send it home for homework or to devote another class period to the artistic part of this project. Burning the edges of the paper lends an “authentic” look to the finished pieces.

Day Three: Oral Presentations--When the winter counts are finished, each student shares his or her winter count by telling an anecdote to the class which relates to each pictograph. Note how different people sometimes choose the same events (for example in 2001, many students will draw a symbolic representation of the World Trade Center attack), and sometimes different
events for the same year; also note if students remember the same events differently, if the opportunity naturally presents itself. Toward the end of the period, display a transparency showing the theme of the lesson: *History is “His Story.”* Point of view dramatically affects how each person understands events.

Day Four: Primary Source Analysis (Winter Counts)--Give small groups color copies of winter counts, or winter counts can be assigned using the computer lab and the website [http://wintercounts.si.edu/index.html](http://wintercounts.si.edu/index.html) Every one of the winter counts on this web exhibit has at least one depiction of smallpox. Initially, do not draw attention to any particular image, but be sure that the representations of smallpox victims are noticed if the students don’t see them very well. (If you cannot use the internet, many images of winter counts that can be found beyond these on the website include references to smallpox epidemics.) Ask students to come up with ideas as to what each pictograph might represent. Come back to a full class discussion and allow each group to show the class some of their interpretations for the pictographs on their group’s assigned winter count. After every group has had a turn to present, tell the students that you will give them some information to help them identify more meaning for their pictographs. Pass out the handout attached, Handout #2 “Some Meanings of Symbols in Lakota Winter Counts,” to allow groups to identify some pictographs on their assigned winter count. There is a very useful section in the website’s own teacher materials explaining pictographic conventions which could also be used at this point. Give the students some time to analyze the pictographs now that they have some more information to help them. They may notice the frequency of spotted people on their own. If students do not notice the frequency of smallpox references, the teacher may need to lead them to search the winter counts on the website. Go
to “View Winter Counts.” At the lower left corner is a search engine, have students type in “smallpox” to make sure everyone notices the smallpox pictographs. Ask: “Why do you think we see these smallpox pictographs so frequently? Why are they on so many different winter counts?” (Possible responses may include that smallpox happened many times, that it was very memorable, that it affected people intensely, that it happened in many different groups of people). Agree with students’ responses, and state any that they missed.

Day Four: Primary Source Quotation Analysis-- Display Overhead #1: Theme. Tell the students that history is the interpretation of events. Tell the students that they will be the historians today. They will read and interpret short quotations from individuals who were present during smallpox outbreaks at different times in American history. Small groups of two or three will work together to read primary source quotations and define vocabulary words on handouts (there are twelve handouts for this exercise). Each group must come up with an interpretation of the quotation in their own words: What does this quote mean? Why did this person say this? What does this quote show about the speaker?

As groups finish, they will come up to the butcher paper chart and fill in the information for the quote they worked on. When all groups are finished writing on the chart, teacher concludes lesson by reading the chart aloud and leading a discussion after each quote. Questions such as, Can anyone add something to the interpretations given by your classmates? and What do you think this quote shows about the speaker? may give students from other groups an opportunity to comment. Display the butcher paper chart for several days, so that students have many opportunities to read each other’s interpretations.
Day Five: Content Lecture on Smallpox, followed by Animation Video on Vaccination--

Display overhead #3 of ancient images of the Aztec epidemic.

Mini-lecture: In 1519, the Aztec city, Tenochtitlan, had a population of about a quarter of a million people. A complex system of local and long distance trade provided food for the city, which farmers grew using irrigation. According to Sheldon Watts in Epidemics and History:

Its many two-story stone houses, stone towers and temples, its great public squares and markets, its myriad crowds, its canals and bridges, its high aqueduct bringing in fresh water for drinking and for baths, all combined to create an urban place which in Europe could only be challenged by the city of Rome 1,500 years earlier after it had been newly rebuilt by Augustus. Of course, by 1519 old imperial Rome lay in ruins and was inhabited largely by pigs and sheep, swine-herders and shepherds.

In the spring of 1519, the Aztec emperor, Montezuma, graciously welcomed Hernan Cortes to Tenochtitlan. But soon the Aztecs threw them out by force when they began murdering unarmed dancers. Aztec warriors slaughtered the Spanish, killing 900 of the 1,200 conquistadors, and sending the rest of them scurrying for the sea. Spanish warriors were no match for the fierce Aztecs, but with the Spanish came smallpox.

Smallpox hit the Aztecs in 1520 so hard that half of the people died. When Cortes returned in 1521, smallpox still raged among the Aztec. Yet the surviving warriors resisted this Spanish invasion. This time the Spanish were overwhelmingly victorious; conquistadors killed 40,000 men, women and children. Cortes later boasted, “...in those streets where they were, we came across such piles of the dead that we were forced to walk upon them.”

Display Overhead #1 on the screen. Say, Imagine being the Aztecs after smallpox arrived. What happens when vast numbers of your people, including military and
political leaders, all die of a strange disease while the conquering army walks unharmed through the city?” (Possible answers include: you lose the war, you think that the conquering army has supernatural protection, your society falls apart, the conquerors take everything) Now say, Imagine being Spanish. What do you think about the Aztecs falling before you? (Possible answers may include that you win because you are better warriors, have supernatural protection, or because you are culturally superior. Accept all reasonable answers.)

Now ask, Why did the Indians die and the Europeans survive? (Accept any reasonable ideas) A simple explanation follows: Smallpox was like chickenpox in one way: if you had it once, you were immune to it in the future. Chickenpox is not very often dangerous, however, but smallpox was often fatal. If you got smallpox, you either died or became immune. In Spain, so many people got smallpox when they were little, that most of the adult conquistadors were immune survivors of the disease.

Pass out the second page of Handout #5, (“Smallpox Disease”) from a CDC handout “Smallpox Overview.” Read aloud and explain as necessary.

Ask, Why don’t we hear about people dying of smallpox any more? (Accept reasonable ideas, some students may offer the idea of vaccination.)

To explain how vaccination primes the immune system, show Disney’s WWII era cartoon Defense Against Invasion (1943). Tell students: “After we watch this video, maybe we’ll have some more ideas. This video is from 1943; let’s answer #1 on this handout together.”

Pass out Handout #3 Defense Against Invasion (1943)

Say,
1. What was happening in the world in 1943 that inspired the artists at Walt Disney studios to make the images and metaphors for this film all war related? (Be sure students are aware that World War II was on everyone’s mind at the time. Since this is 8th grade, many students will not know that yet.)

After the video, tell the students that the World Health Organization eradicated smallpox in 1978 by worldwide vaccination efforts. Tell the students that a worldwide cooperative effort to find every last case and vaccinate anyone near succeeded against one of the world’s deadliest diseases. With no susceptible people, and no animal reservoir, smallpox was eliminated from the wild. There is no smallpox virus any more, except contained in laboratories for research purposes.

Day Six: Map Study--Display Overhead #1 Ask students to look at the dates on the butcher paper. Ask them if smallpox stopped devastating Native Americans after Cortez’s defeat of the Aztec. (The dates make it clear that smallpox was still rampant among the Lakota through 1837.) Agree with them that smallpox was still very destructive among Indian tribes. It is interesting to note that the highly mobile Lakota did not lose as many people as other tribes (such as the Mandan and Ponca) who were agricultural and sedentary. No matter where or when people of European descent encountered Native Americans, smallpox ravaged the native people. Smallpox epidemics continued even into the twentieth century.

Color maps to emphasize the concept that North America was fully occupied by Native American peoples before explorers, trappers and white settlers arrived, and that as the white people moved through the continent, so did smallpox. Most eighth grade social studies
programs include maps of the explorers’ routes, Indian campaigns and territorial growth from 1800-1820, and so these are not included here.

Map #1: Precontact Indian Territories: Have students trace or draw freehand the cultural/linguistic regions from William Sturtevant’s map [Sturtevant, William C. “Early Indian Tribes, Culture Areas, and Linguistic Stocks.” Washington, D. C.: U.S. Government Printing Office, 1967.] onto a blank map of the contiguous United States. They should color and label each linguistic region. Students will title the map “Precontact Indian Territories.” This map is available at the following website:


Map #2: Explorers’ routes: Students should label explorers’ routes and by comparing with the Precontact Indian Territories map, identify the cultural/linguistic groups of the native peoples they encountered. Each explorer’s route should be marked with the date.

Map #3: Fenn’s smallpox routes (1775-82): Use the map on page 7 of Elizabeth A. Fenn, *Pox Americana: The Great Smallpox Epidemic of 1775-82*. New York: Hill and Wang, a division of Farrar, Straus and Giroux, 2001. Students should draw freehand or trace and then label these transmission routes on a blank map (with state outlines) of the contiguous United States. Students will label the finished map “Smallpox Transmission 1775-82.”

Map #5: Present day Indian Reservations: Students should freehand or trace present-day reservations on a blank map of the U.S. with state boundaries and compare to the precontact Indian Territories map. An Indian Reservation map may be found at this website: http://www.cr.nps.gov/nagpra/DOMUMENTS/RESERV.PDF

After map work, ask students, “What effect do you think smallpox and other diseases might have had on the westward expansion of the United States?” (Possible answers might include: if smallpox paved the way for the Spanish conquest of the Aztec empire, maybe smallpox epidemics among the American Indians made Westward Expansion of the United States easier by reducing the native population. Students might also hypothesize about the sociological and psychological effects of losing so many members of a tribe, and the consequent disruption of the ability to defend territory effectively.)

Conclusion.

Day seven: “Two Points of View” Timeline--Display Overhead #1: Theme: History is “His Story.” Point of view dramatically affects how each person understands events.

Use the computer lab and the website http://wintercounts.si.edu/index.html to conclude the lesson. Using the searchable database of pictographs from a number of Lakota winter counts, have students identify the dates that smallpox epidemics are recorded as the most memorable event of the year. Students should take those dates, and make a timeline with smallpox events identified under the line. Above the line, they should correlate with dates normally required on timelines in history books (examples might be: Cortes conquers Aztecs, the French and Indian War, events in the Revolutionary War, Louisiana Purchase, Lewis and Clark expedition, War of 1812, Trail of Tears, Indian Removals, Custer’s Last Stand, Spanish-American War begins,
the Wright Brothers fly at Kitty Hawk, etc.). If students want to put other events from the winter counts on the timeline, they should put them under the line (with the smallpox events). Close the lesson by drawing their attention to the differences and correlations between events depending on whose point of view is used as history.

Ask a rhetorical question: *Whose Story is His Story?*

Day Eight: Creative Evaluation. “Whose Story is His-Story?” Assignment: Students will be asked to write a historical fiction account based on one or more events from the winter counts examined earlier in the week, or based on one of the primary source quotations, or on the narrative they heard about the conquest of the Aztec. Writers tell the story in the first person, from the point of view of one character that was present at the time, and maintain a consistent point of view. Characters should be consistent with individuals who could have been present at the historical events (for example, the character’s nationality, religious beliefs, clothing, and ideas about the world should make sense in the context of the historical place and time).

Details, such as the correct date and reasonable geographical/ecological particulars, should be included. See rubric attached.
History is “His Story.”

Point of view dramatically affects how each person understands events.
## Primary Document Analysis: Quotations

<table>
<thead>
<tr>
<th>Date it was said?</th>
<th>Who said it?</th>
<th>Quotation:</th>
<th>Vocabulary Words:</th>
<th>Group’s Interpretation:</th>
</tr>
</thead>
<tbody>
<tr>
<td>15--?</td>
<td></td>
<td></td>
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<td></td>
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<tr>
<td>1575-1580</td>
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<tr>
<td>1620</td>
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<td>1634</td>
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<td>1634</td>
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<tr>
<td>French and Indian War</td>
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<tr>
<td>1757</td>
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<tr>
<td>1837</td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>
Some Meanings of Symbols in Lakota Winter Counts

<table>
<thead>
<tr>
<th>Names</th>
<th>A name indicator directly on the figure, for example, the single horn attached to the head of Lone Horn, or more commonly a small picture is above the subject of the pictograph</th>
</tr>
</thead>
<tbody>
<tr>
<td>Attitude</td>
<td>War-like attitude indicated by hair hanging loose, not braided.</td>
</tr>
<tr>
<td>Captivity or death in battle</td>
<td>No hands</td>
</tr>
<tr>
<td>Injury</td>
<td>A red mark on the injured part of the body</td>
</tr>
<tr>
<td>Death</td>
<td>A red mark on the chest; death in battle has a red mark at the scalp line.</td>
</tr>
<tr>
<td>Relatedness</td>
<td>A line connecting two figures at the bases</td>
</tr>
<tr>
<td>Social Status</td>
<td>Warrior status is shown by a single eagle feather in the hair.</td>
</tr>
</tbody>
</table>
Rubric for Evaluating Historical Fiction

“Whose Story is His-Story?”

<table>
<thead>
<tr>
<th></th>
<th>4</th>
<th>3</th>
<th>2</th>
<th>1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Point of view</td>
<td>Point of view is consistent. Stays first person with a single character</td>
<td>Point of view is mostly consistent (occasional use of omniscient narrator, etc.)</td>
<td>Point of view changes between characters</td>
<td>Does not use a first person narrative style</td>
</tr>
<tr>
<td>Details (dates, events, geography) are accurate.</td>
<td>Details are in the “ballpark”</td>
<td>Details don’t make good sense or are incorrect.</td>
<td>Lacks details.</td>
<td></td>
</tr>
<tr>
<td>Characters are fully consistent with historical facts.</td>
<td>Characters may have some anachronistic details, but are otherwise consistent with historical events (i.e. nationality, religious beliefs, etc.)</td>
<td>Characters may be from a different, but close, time period, or their religious beliefs or nationality seem out of place, but otherwise fit the story</td>
<td>Characters do not show that the writer understands the events depicted</td>
<td></td>
</tr>
<tr>
<td>Conventions of writing (spelling, capitalization, grammar, and punctuation) are impeccable</td>
<td>Conventions of writing (spelling, capitalization, grammar, and punctuation) are mostly observed</td>
<td>Errors in conventions of writing (spelling, capitalization, grammar, and punctuation) may interfere with meaning</td>
<td>Serious errors in conventions of writing (spelling, capitalization, grammar, and punctuation) interfere with meaning</td>
<td></td>
</tr>
</tbody>
</table>
Governor John Winthrop stated in 1634, “For the natives, they are neere[sic] all dead of small Poxe[sic], so as the Lord hathe[sic] cleared our title to what we possess.”

Vocabulary:

Cleared___________________________________________________________

Title______________________________________________________________

Interpret this quotation in your own words:

What does this quote mean?

Why did this person say this?

What does this quote show about the speaker?

General Sir Jeffrey Amherst in July of 1763 wrote, “Could it not be contrived to send smallpox among these disaffected tribes of Indians? We must on this occasion use every stratagem in our power to reduce them.”

Vocabulary:
Contrived
Disaffected
Stratagem

Interpret this quotation in your own words:

What does this quote mean?

Why did this person say this?

What does this quote show about the speaker?

When the Lipan Apache of Texas suffered devastation in a smallpox epidemic in October of 1780, Texas Governor Cabello wrote to San Antonio that, “. . . without offending decency, one might hope that not a single Lipan-Apache lives through it.”

Vocabulary:
Devastation
Offending
Decency

*Interpret this quotation in your own words:*

What does this quote mean?

Why did this person say this?

What does this quote show about the speaker?

An epidemic broke out, a sickness of pustules. It began in [the month of] Tepeilhuitl. Large bumps spread on people; some were entirely covered . . . could no longer walk about, but lay in their dwellings and sleeping places . . . And when they made a motion, they called out loudly. The pustules that covered people caused great desolation; very many people died of them, and many just starved to death; starvation reigned, and no one took care of others any longer.—Fray Bernardino de Sahagun, Historia General de las Cosas de Nueva Espana translated this from the native Nahuatl language, c. 1575-1580

Vocabulary:

Pustules____________________________________________________________

Desolation__________________________________________________________

Reigned ____________________________________________________________

*Interpret this quotation in your own words:*

*What does this quote mean?*

*Why did this person say this?*

*What does this quote show about the speaker*

From NOW with Bill Moyers, “Bracing for Bioterror,” Feb. 7, 2003, 
In 1757, an Ottawa Chieftain said, “The smallpox which they brought from Montreal during the French war with Great Britain . . . was sold to them shut up in a tin box . . . after they reached home they opened the box; but behold there was another tin box inside . . . when they opened the last one they found nothing but mouldy particles . . . a great many closely inspected to find out what it meant . . . pretty soon [there] burst out a terrible sickness among them.”

Vocabulary:

Behold____________________________________________________

Mouldy____________________________________________________

Interpret this quotation in your own words:

What does this quote mean?

Why did this person say this?

What does this quote show about the speaker?

During the French and Indian War, regarding Native Americans, Amherst wrote, “Indeed their Total Extirpation is scarce sufficient Atonement [sic] for the Bloody and Inhuman deeds they have Committed.

Vocabulary:

Extirpation

Sufficient

Atonement

*Interpret this quotation in your own words:*

*What does this quote mean?*

*Why did this person say this?*

*What does this quote show about the speaker?*

A devastating epidemic raged through the Upper Missouri in 1837, killing ninety percent of the Mandan tribe. The head trader at Fort Clark, Francis Chardon, remarked, “What a bande [sic] of RASCALS has been used up.”

Vocabulary:

Devastating_______________________________________________________________
Band___________________________________________________________________
Rascals_________________________________________________________________

*Interpret this quotation in your own words:*

*What does this quote mean?*

*Why did this person say this?*

*What does this quote show about the speaker?*

In 1634 William Bradford of the Plymouth Plantation said, “This spring, also those
Indeans [sic] that lived aboute[sic] their trading house there fell sick of the small poxe
[sic], and dyed most miserably. . . . [Yet] not one of the English was so much as sicke
[sic], or in the least measure tainted with this disease.”

Vocabulary:
Tainted__________________________________________________________

*Interpret this quotation in your own words:*

*What does this quote mean?*

*Why did this person say this?*

*What does this quote show about the speaker?*

From Sheldon Watts, *Epidemics and History: Disease, Power and Imperialism*, New
An Algonquin witness from 1634 stated that “. . . they were in the end not able to help one another, no not to make a fire nor fetch a little water to drink, nor any to bury the dead. . . some would crawl out on all fours to get a little water, and sometimes died by the way and not be able to get in again.”

Vocabulary:

Algonquin

Interpret this quotation in your own words:

What does this quote mean?

Why did this person say this?

What does this quote show about the speaker?

In 1781, Fray Luis Sales, a missionary in Baja California, wrote,

The heathen Indians crowded in the caves, when they noticed any infected with the disease, fled to another cave and abandoned those unfortunates and the former, who were sometimes already infected, spread it to others, and all showed the same reactions.

Vocabulary:

Heathen_____________________________________________________
Abandoned__________________________________________________
Unfortunates______________________________________________

Interpret this quotation in your own words:

What does this quote mean?

Why did this person say this?

What does this quote show about the speaker?

When Lewis and Clark mapped the Missouri in 1805, they plotted many Mandan villages that had been empty for “about 25 years.” An interpreter told them, “Maney [sic] years ago. . . the Smallpox destroyed the greater part of the nation and reduced them to one large Village and some Small ones.”

Vocabulary:

Many

Interpret this quotation in your own words:

What does this quote mean?

Why did this person say this?

What does this quote show about the speaker?

In 1620 New England, one Pilgrim wrote: “The good hand of God favoured our beginnings . . . in sweeping away the great multitudes of the Natives by the Small Pox.”

Vocabulary:
Favored___________________________________________________________
Multitudes________________________________________________________

Interpret this quotation in your own words:

What does this quote mean?

Why did this person say this?

What does this quote show about the speaker?

Pierre Chouteau, a French fur trader, wrote after the 1837 smallpox epidemic, “. . . this morning (Sunday) we have been all occupied in perusing the melancholy details of plague pestilence and devistation[sic], ruined hopes and blasted expectations . . . cattle [i.e. bison] were never known so abundant but there are no Indians to kill them & dress the robes.”

Vocabulary:

Perusing
Melancholy
Pestilence
Devastation
Abundant

Interpret this quotation in your own words:

What does this quote mean?

Why did this person say this?

What does this quote show about the speaker

Speaking of the time before the Spaniards arrived, an old man said, “There was then no sickness; they had no aching bones; they had then no high fever; they had then no smallpox; they had then no burning chest; they had then no abdominal pain; they had then no consumption; they had then no headache. At that time the course of humanity was orderly. The foreigners made it otherwise when they arrived here.”

Vocabulary:

Abdominal ________________________________________________

Consumption____________________________________________

*Interpret this quotation in your own words:*

*What does this quote mean?*

*Why did this person say this?*

*What does this quote show about the speaker?*

Aztec Images of Smallpox Disease

From NOW with Bill Moyers, “Bracing for Bioterror,” Feb. 7, 2003,

Defense Against Invasion (1943)

1. What was happening in the world in 1943 that inspired the artists at Walt Disney studios to make the images and metaphors for this film all war related?

2. What scares “Tubby”?  

3. Why?  

4. What does the city represent?  

5. What do the little red workers represent?  

6. What does the creepy crawly invader represent?  

7. What do the guns represent?  

8. What do the little green guys represent?  

9. What do the little red guys do when the little green guys show up?  

10. What do the airplanes represent?  

11. What do the little red guys do this time (now that they have dealt with the little green guys) when the creepy crawlie invaders show up?  

12. What does the “V” at the end stand for? (Be careful; there are two answers!)  

13. Explain vaccination in your own words, including all the main ideas in this little Disney clip.
Lakota tipi painted with a winter count. Courtesy of Nebraska State Historical Society, John Anderson Collection, Lincoln. Item No. RG2969.PH:2-96.
Sam Kills Two, Sicangu Lakota, c. 1926, painting a copy of the Big Missouri winter count on a hide. Courtesy of the Nebraska State Historical Society, John Anderson Collection, Lincoln. Item No. RG2969.PH:2-1.
SMALLPOX FACT SHEET
Smallpox Overview
The Disease
Smallpox is a serious, contagious, and sometimes fatal infectious disease. There is no specific treatment for smallpox disease, and the only prevention is vaccination. The name smallpox is derived from the Latin word for “spotted” and refers to the raised bumps that appear on the face and body of an infected person.
There are two clinical forms of smallpox. Variola major is the severe and most common form of smallpox, with a more extensive rash and higher fever. There are four types of variola major smallpox: ordinary (the most frequent type, accounting for 90% or more of cases); modified (mild and occurring in previously vaccinated persons); flat; and hemorrhagic (both rare and very severe). Historically, variola major has an overall fatality rate of about 30%; however, flat and hemorrhagic smallpox usually are fatal. Variola minor is a less common presentation of smallpox, and a much less severe disease, with death rates historically of 1% or less.
Smallpox outbreaks have occurred from time to time for thousands of years, but the disease is now eradicated after a successful worldwide vaccination program. The last case of smallpox in the United States was in 1949. The last naturally occurring case in the world was in Somalia in 1977. After the disease was eliminated from the world, routine vaccination against smallpox among the general public was stopped because it was no longer necessary for prevention.
Where Smallpox Comes From
Smallpox is caused by the variola virus that emerged in human populations thousands of years ago. Except for laboratory stockpiles, the variola virus has been eliminated. However, in the aftermath of the events of September and October, 2001, there is heightened concern that the variola virus might be used as an agent of bioterrorism. For this reason, the U.S. government is taking precautions for dealing with a smallpox outbreak.
Transmission
Generally, direct and fairly prolonged face-to-face contact is required to spread smallpox from one person to another. Smallpox also can be spread through direct contact with infected bodily fluids or contaminated objects such as bedding or clothing. Rarely, smallpox has been spread by virus carried in the air in enclosed settings such as buildings, buses, and trains. Humans are the only natural hosts of variola. Smallpox is not known to be transmitted by insects or animals.
A person with smallpox is sometimes contagious with onset of fever (prodrome phase), but the person becomes most contagious with the onset of rash. At this stage the infected person is usually very sick and not able to move around in the community. The infected person is contagious until the last smallpox scab falls off.

*Smallpox may be contagious during the prodrome phase, but is most infectious during the first 7 to 10 days following rash onset.
<table>
<thead>
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<th>Smallpox Disease</th>
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| **Incubation Period**  
(Duration: 7 to 17 days)  
*Not contagious* | Exposure to the virus is followed by an incubation period during which people do not have any symptoms and may feel fine. This incubation period averages about 12 to 14 days but can range from 7 to 17 days. During this time, people are not contagious. |
| **Initial Symptoms**  
(*Prodrome*)  
(Duration: 2 to 4 days)  
*Sometimes contagious* | The first symptoms of smallpox include fever, malaise, head and body aches, and sometimes vomiting. The fever is usually high, in the range of 101 to 104 degrees Fahrenheit. At this time, people are usually too sick to carry on their normal activities. This is called the prodrome phase and may last for 2 to 4 days. |
| **Early Rash**  
(Duration: about 4 days)  
*Most contagious* | A rash emerges first as small red spots on the tongue and in the mouth. These spots develop into sores that break open and spread large amounts of the virus into the mouth and throat. At this time, the person becomes most contagious. Around the time the sores in the mouth break down, a rash appears on the skin, starting on the face and spreading to the arms and legs and then to the hands and feet. Usually the rash spreads to all parts of the body within 24 hours. As the rash appears, the fever usually falls and the person may start to feel better. By the third day of the rash, the rash becomes raised bumps. By the fourth day, the bumps fill with a thick, opaque fluid and often have a depression in the center that looks like a bellybutton. (This is a major distinguishing characteristic of smallpox.) Fever often will rise again at this time and remain high until scabs form over the bumps. |
| **Pustular Rash**  
(Duration: about 5 days)  
*Contagious* | The bumps become pustules—sharply raised, usually round and firm to the touch as if there’s a small round object under the skin. People often say the bumps feel like BB pellets embedded in the skin. |
| **Pustules and Scabs**  
(Duration: about 5 days)  
*Contagious* | The pustules begin to form a crust and then scab. By the end of the second week after the rash appears, most of the sores have scabbed over. |
| **Resolving Scabs**  
(Duration: about 6 days)  
*Contagious* | The scabs begin to fall off, leaving marks on the skin that eventually become pitted scars. Most scabs will have fallen off three weeks after the rash appears. The person is contagious to others until all of the scabs have fallen off. |
| **Scabs resolved**  
*Not contagious* | Scabs have fallen off. Person is no longer contagious. |
What is the most memorable event of each year of your life?

Winter Count Project Flowchart    Name: __________________________
BIBLIOGRAPHY FOR LESSON PLAN


