

8

INVESTIGATION

How and why have our reaction and our response to disease changed ?

Plague! The term evokes horror in most people and for good reason. Outbreaks of bubonic plague have killed well over 100 million people throughout human history. And plague is what you're going to study in this investigation.

Actually, you're going to compare two outbreaks of bubonic plague to try to explain if they show anything about how and why our responses to disease have changed.

What do you think? How has our collective response to major diseases changed over time?

To help you think about this we are going to look at how humans responded to the same disease — bubonic plague — at two different time periods. We have gathered some sources that show how those living in the 14th century reacted to the spread of plague that killed at least one of every three people in Europe and the Middle East.

And we have found some sources to how those in the 19th century responded to the same disease, an outbreak of plague that killed about 15 million people.

We provide a chart to help you make your comparisons as you try to figure out how our reaction to disease has changed.

Then, write a four- to five- paragraph explanation of how our collective reaction to disease has changed over time. You will be able to use your chart, your notes, and the investigation documents to write your essay.

THE STEPS IN THIS INVESTIGATION

How and why have our reaction and our response to disease changed?

EXPLORE	As you have done before, please begin with your <i>conjectures</i> — your best guesses — before digging into the evidence. Do you think there have been changes in our reactions and responses to major diseases over the past 500 years? What have they been? What explains these changes?
RESEARCH	Read the materials in the Investigation Library. We provide a chart for you to use to help you capture information and organize your thinking. Use this chart, your initial conjectures, notes, and any other information you have to try to figure how our reactions to disease have changed.
SHOW YOUR THINKING	After you've done some research, show your thinking. Use what you learned about plague to explain in a four- to five-paragraph essay and why how our reactions to disease have changed over the last 500 years. Please make sure to explain your thinking. In your essay, you should use: <ul style="list-style-type: none">• Use big history ideas and content• Acknowledge opposing viewpoints and why you reject them• Support your thinking with logic and evidence• Write a concluding paragraph to close your explanation Investigations do not end with your answer. Read or discuss your classmates' essays to compare their thinking with yours. Do others students' explanations support, extend, or challenge your explanation?

Plague and our response to it: comparing the 14th and 19th centuries

Use this table to organize your thinking. As you take notes on each of the “points of comparison,” record which texts provide information for your argument. If you need to, make a copy of this table so you have more space to keep notes.

Points of comparison	Plague in the 14th century	Plague in the 19th century
Causes of the plague		
Treatment of patients		
Measures taken by governments and institutions to counter plague outbreaks		

8

INVESTIGATION LIBRARY

TEXT 01	PLAGUE IN THE 14TH AND 19TH CENTURIES	5
TEXT 02	PLAGUE IN THE 14TH CENTURY: OUTBREAK IN CITIES	6
TEXT 03	PLAGUE IN THE 14TH CENTURY: PLAGUE DOCTORS	7
TEXT 04	PLAGUE IN THE 14TH CENTURY: DOCTORS EXPLAIN THE CAUSES OF PLAGUE	8
TEXT 05	PLAGUE IN THE 14TH CENTURY: PUBLIC HEALTH MEASURES	10
TEXT 06	PLAGUE IN THE 19TH CENTURY: OUTBREAK IN CITIES	11
TEXT 07	PLAGUE IN THE 19TH CENTURY: SCIENTISTS DISCOVER THE PLAGUE BACILLUS	12
TEXT 08	PLAGUE IN THE 19TH CENTURY: DISCOVERING THE ROLE OF FLEAS	13
TEXT 09	PLAGUE IN THE 19TH CENTURY: PUBLIC HEALTH MEASURES	15

TEXT 01

PLAGUE IN THE 14TH AND 19TH CENTURIES

There have been a number of outbreaks of bubonic plague in human history. This investigation focuses on two of the most horrific, the first of which began in the 1320s in China before spreading to other parts of the world. Historians estimate that it killed at least 20 million people; some think it might have wiped out half of the population in Europe and the Middle East. This outbreak of plague is the most famous and is often called the Black Death, because one of the symptoms of the disease is the blackening of the skin around swellings called buboes. The second outbreak that we will focus on began in 1884 in Hong Kong.

In the text below, Myron Echenberg discusses these two pandemics. Dr. Echenberg was professor of African history at McGill University who has written several books on how people in the past have responded to disease.

The Black Death has received the most attention from historians. It reached Europe from Central Asia in 1347. Within four years, no fewer than 20 million Europeans died, and estimates of deaths from plague during the rest of the 14th century range from a low of one-quarter to a high of one-half the total population of both Europe and the Middle East.

The most recent plague pandemic lasted from 1894 to roughly 1950. Bubonic plague infected the densely populated provinces of south China before attacking the port of Hong Kong in 1894. There it rekindled international fears, especially when it reached Macao and Fuzhou a year later, and struck Singapore and Bombay in 1896. Bubonic plague took only a few years to reach every continent. This time around, the plague pandemic produced a highly variable death toll. Most of the roughly 15 million lives it ended prematurely were inhabitants of India, China, and Indonesia. For India alone, recent estimates exceed 12 million. Europe's death toll was 7,000 people between 1899 and 1950. Central and South America lost roughly 30,000 people to plague over this long time span. In the United States, approximately 500 deaths were attributed to plague during mild outbreaks in San Francisco, Los Angeles, and New Orleans and in isolated rural settings in Arizona and New Mexico during this same period.

Source

Modified from Myron Echenberg, *Plague Ports: The Global Urban Impact of Bubonic Plague Between 1894 and 1901* (New York: New York University Press, 2007) 4–5.

TEXT 02

PLAGUE IN THE 14TH CENTURY: OUTBREAK IN CITIES

The map below lists cities that had major outbreaks of plague in the 14th century.



THINGS TO THINK ABOUT

Can you see a pattern in the spread of the disease? What explains this pattern? Did you notice that plague did not strike cities in the Americas, southern Africa, or Australia? Why not?

TEXT 03

PLAGUE IN THE 14TH CENTURY: PLAGUE DOCTORS

Plague doctors were special physicians who treated plague during the 14th century and later. The picture below shows the type of protective clothing they wore when treating someone with plague — long coats, heavy gloves, and thick boots. Plague doctors also wore beaklike masks in which they put spices, herbs, and vinegar, and they carried long wands.



Doctor Schnabel von Rom, an engraving of a plague doctor by Paulus Fürst, 1656

THINGS TO THINK ABOUT

Why do you think they wore such clothes and such a mask? What does it suggest to you about what these doctors thought caused plague?

TEXT 04

PLAGUE IN THE 14TH CENTURY: DOCTORS EXPLAIN THE CAUSES OF PLAGUE

Physicians of the 14th century had many different explanations for what caused plague. Here are three. As you read, ask yourself four questions: (1) What claims were these doctors making about the disease? (2) What claim testers were they using? (3) If someone believed this claim, then how might they prevent catching the plague? (4) Finally, what do you think of the claim?

A Muslim doctor living in Spain, Lisan al-Din Ibn al-Khatib, wrote this explanation of how plague spread between 1349 and 1352. His claim is that plague is contagious, that is, healthy people get it from sick people.

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Contagion has been proved by experience, deduction, the senses, and observation, and unanimous reports to cause plague. It is not a secret: those who come into contact with [plague] patients mostly die, while those who do not come into contact survive. Moreover, disease occurs in a household or neighborhood because of the mere presence of a contagious dress or utensil. Even [a contaminated] earring has been known to kill whoever wears it and his whole household. And when it happens in a city, it starts in one house and then affects the visitors of the house, then the neighbors, the relatives, and other visitors until it spreads throughout the city. Reports were unanimous that isolated places that have no roads to them and are not frequented by people have escaped unscathed from the plague.

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The king of France asked the doctors at the Paris medical school to explain what was causing plague. They claimed that constellations had created vapors that polluted the air.

We, the Members of the College of Physicians of Paris, intend to make known the causes of this pestilence. We, therefore, declare as follows: It is known that in India the constellations exerted their power against the sea and the waters of the ocean arose in the form of vapor. Thereby the waters were so corrupted that the fish which they contained died. This vapor spread itself through the air in many places on Earth. On all the islands and adjoining countries to which the corrupted sea-wind extends, if the inhabitants of those parts do not take the following advice, we announce to them inevitable death.

Every one of you should protect himself [and herself] from the air. Wormwood and chamomile should be burnt in great quantity in the market places and in the houses. Going out at night is dangerous on account of the dew. Rainwater must not be employed in cooking, and everyone should guard against exposure to wet weather, fasting and anxiety of mind, anger, and immoderate drinking. Bathing is injurious.

Some people thought that evil people had caused the plague. In fact, many minorities, including Jews, were persecuted unjustly because people blamed them for the plague. Here a physician, Alphonso of Cordoba, explains how someone could spread plague to an entire city and not catch it himself.

Air can be infected artificially and placed in a glass bottle. When this preparation is well fermented, whoever wishes to produce this evil will wait for a strong and steady wind. Then he will walk against the wind opposite the city or town he wishes to infect. Going back against the wind, so as not to be infected by the vapor, he will throw the glass bottle [with the disease in it] with against the stones. As soon as the bottle is broken the [disease] vapor will spread out and disperse in the air. Whoever is touched by this vapor will die very soon.

Sources

Modified from John Aberth, *The First Horseman: Disease in Human History* (Upper Saddle River, NJ: Pearson Prentice Hall, 2007) 44–45.

Modified from George Deaux, *The Black Death: 1347* (New York: Weybright and Talley, 1969), 52–53.

Modified from Jon Arrizabalaga, “Facing the Black Death: Perceptions and Reactions of University Medical Practitioners,” in Luis García-Ballester, Roger French, Jon Arrizabalaga, and Andrew Cunningham (ed.) *Practical Medicine from Salerno to the Black Death* (New York: Cambridge University Press, 1993), 257.

TEXT 05

PLAGUE IN THE 14TH CENTURY: PUBLIC HEALTH MEASURES

Cities infected by plague and those not yet infected took action to contain or prevent the disease from spreading. Here are some laws that the city of Pistoia, Italy, passed after neighboring cities of Pisa and Lucca became infected in 1348.

Ordinances against the Spread of the Plague, Pistoia, Italy

1. So that the sickness which is now threatening the region around Pistoia shall be prevented from taking hold of the citizens of Pistoia, no citizen or resident of Pistoia shall dare go to Pisa or Lucca. No one shall come to Pistoia from those places. And no one from Pistoia shall receive or give hospitality to people who have come from those places. And the guards who keep the gates of the city of Pistoia shall not permit anyone travelling to the city from Pisa or Lucca to enter.
 2. No one, whether from Pistoia or elsewhere, shall dare to bring to Pistoia any old linen or woolen clothes.
 3. The bodies of the dead shall not be removed from the place of death until they have been enclosed in a wooden box, and the lid of planks nailed down.
 5. No one, of whatever condition, status or standing, shall dare or presume to bring a corpse into the city whether coffined or not.
 13. So that the living are not made ill by rotten and corrupt food, no butcher or retailer of meat shall dare to hang up meat, or keep and sell meat hung up in their storehouse or over the counter.
 14. Butchers and retailers of meat shall not stable horses or allow any mud or dung where they sell meat
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Source

Modified from Rosemary Horrox, *The Black Death* (Manchester: Manchester University Press, 1994) 194–196.

TEXT 06
PLAGUE IN THE 19TH CENTURY:
OUTBREAK IN CITIES

The map below lists cities that had major outbreaks of plague in the 19th century.



THINGS TO
THINK ABOUT

Can you see a pattern in the spread of the disease? What explains this pattern? Why do you think this outbreak included cities in the Americas, southern Africa and Australia?

Source
Map created from information in Myron Echenberg, *Plague Ports: The Global Urban Impact of Bubonic Plague Between 1894 and 1901* (New York: New York University Press, 2007), 30.

TEXT 07

PLAGUE IN THE 19TH CENTURY: SCIENTISTS DISCOVER THE PLAGUE BACILLUS

Medical science made a dramatic leap forward in the modern era with the discovery of bacteria and the link between some of the microorganisms and disease. Using microscopes and working in labs, 19th-century researchers such as Louis Pasteur and Robert Koch connected bacteria to such diseases as tuberculosis, diphtheria, tetanus, and plague. People worldwide read about such discoveries in new scientific journals or learned about them at scientific conferences. Sometimes scientists or nations competed with each other to make an important contribution to our collective learning. Such is the story of the discovery of the bacteria that causes plague.

When the news spread of plague's outbreak in Hong Kong in 1884, there was immediate interest from scientists' eager to find a cause, a cure, and possibly fame for themselves and their countries. In June 1884, two researchers — Shibasaburo Kitasato from Japan and Alexandre Yersin from Switzerland — using microscopes to study the blood from infected rats and people almost simultaneously identified the bacteria that caused plague. For years there was a great rivalry over whether Kitasato or Yersin was first and more accurate in identifying the plague bacillus, or the bacteria that caused plague. Eventually, scientists found that Yersin was more accurate and today that bacteria is called *Yersina pestis*.

Not only did Yersin identify the bacteria, he made the connection — a mistaken connection, by the way — between rats and plague. He wrote in a journal shortly after his discovery:

I have placed healthy mice and inoculated [diseased] mice in the same cage. The inoculated ones died first, but within a few days all of the others die from the invasive plague bacillus. Plague is therefore a contagious and transmissible disease. It is probable that rats are the major vector [carrier of the disease].

Yersin was wrong about rats spreading the infection. The next text will explain how another scientist corrected Yersin's mistake.

Sources

Myron Echenberg, *Plague Ports: The Global Urban Impact of Bubonic Plague Between 1894 and 1901* (New York: New York University Press, 2007) 6.

Roy Porter, *The Greatest Benefit to Mankind: A Medical History of Humanity* (New York: Norton, 1997) 443–44.

TEXT 08

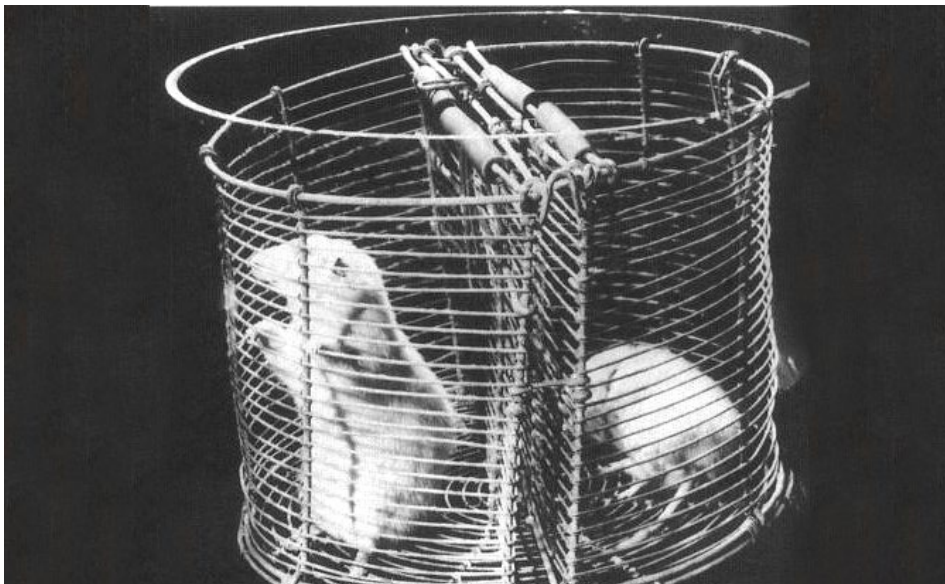
PLAGUE IN THE 19TH CENTURY: DISCOVERING THE ROLE OF FLEAS

It was French physician and biologist Paul-Louis Simond who discovered the link between the flea and plague. In 1898, he proved it using a very clever experiment that he describes below. As you read, ask yourself three things: (1) What claim is Simond making? (2) How did he test his claims? (3) With this new information, how might people protect themselves from plague?

Without delay I proceeded to the experiment I had in mind since the time I had discovered Yersin's bacillus in the digestive tract of fleas taken from plague-ridden rats. I prepared a device consisting of a large glass bottle. The lid consisted of wire mesh covered with fabric held tightly to the neck of the bottle with a drawstring. I was fortunate enough to catch a plague-infected rat in the home of a plague victim. In the rat's fur there were several fleas running around.

After 24 hours the animal I was experimenting on rolled up into a little ball, with its hair standing on end. I then introduced into the bottle a small metal cage containing a perfectly healthy young Alexandria rat caught several weeks before and kept sequestered from any danger of infection. The cage was suspended inside of the bottle. The cage had three solid sides, but the other covered by wire screen with a mesh size of about six millimeters. The rat inside the cage could not have any contact with the sick rat.

The next morning the sick rat had died. I left its body in the bottle for one more day. Then I carefully removed it.



During the next four days the other Alexandria rat remained imprisoned in its cage and continued to eat normally. About the fifth day, it seemed to have difficulty moving. By the evening of the sixth day it was dead. An autopsy of this one (previously uninfected rat) revealed there were abundant plague bacilli in the organs and blood.

That day, 2 June 1898, I felt an emotion that was inexpressible in the face of the thought that I had uncovered a secret that had tortured man since the appearance of plague in the world.

I subsequently repeated the same experiment with similar results.

Source

Marc Simond, Margaret L. Godley, and Pierre D.E. Mouriquand, "Paul-Louis Simond and His Discovery of Plague Transmission by Rat Fleas: A Centenary," *Journal of the Royal Society of Medicine* 91, no. 2 (1998): 102.

TEXT 09

PLAGUE IN THE 19TH CENTURY: PUBLIC HEALTH MEASURES

The outbreak of plague in one city made other cities fear they might be next. Some ended trade with infected cities. As knowledge spread of the role that infected fleas and rats played in the plague epidemic, many cities launched a full-scale assault on rats that lasted for many years. The poster below, from about 1915, shows Philadelphia's continuing efforts to stay plague free. Many cities did as Philadelphia did and paid people for turning in rats. Philadelphia and other cities also created special "rat patrol" inspectors who kept watch on waterfront rat traps and incoming ships. For example, Sydney, Australia, declared "rat Wednesdays" and gave free rat poison to residents.

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DEPARTMENT OF PUBLIC HEALTH AND CHARITIES

KILL THE RATS AND PREVENT THE PLAGUE

TRAP THEM **POISON THEM**
RAT-PROOF YOUR BUILDINGS

TRAPS—The best Trap for Houses and Stores is the large Cage Trap. Snap Traps are best in Butcher Shops, Bakeries and Restaurants.

BAIT—Should be changed daily between Cheese, Fresh Liver, Nuts, Fish-Heads and Chicken Heads and should be securely fastened to the trap. Always Smoke the Traps after handling and see that they are placed close to the wall at the usual feeding place.

POISON—All druggists can furnish Good Rat Poisons. Follow Directions and **DO NOT PLACE WHERE ACCESSIBLE TO CHILDREN or DOMESTIC ANIMALS.**

DISPOSITION OF RATS { THE CITY WILL PAY A BOUNTY OF
5c FOR LIVE RATS
2c FOR DEAD RATS

**AT THE RECEIVING STATION
RACE ST. PIER, DELAWARE AVE.**

IF NOT CONVENIENT TO TAKE RATS TO STATION, PHONE TO
ELECTRICAL BUREAU 55
AND THE RAT PATROL WILL CALL FOR THEM

The RAT is the known carrier of the Bubonic Plague, Rat Leprosy and other diseases. Aside from being a health menace the RAT destroys property and merchandise to the extent of \$10,000 EACH DAY IN PHILADELPHIA.

RAT-PROOFING BUILDINGS { Building the Rat out of house and home takes more time but in the long run is the most effective measure for destroying Rats

FOR FURTHER INFORMATION CALL AT OR PHONE TO
ROOM 615 CITY HALL
PHONE ELECTRICAL BUREAU 247

11662

Source

Timothy Horning, "Kill the Rats!" The Philly History Blog, May 23, 2011. <http://www.phillyhistory.org/blog/index.php/2011/05/kill-the-rats/>