

The Effects Of The Plague & Its Role In History

Jackie Lutz

Anatomy & Physiology

Mr. Syvret

January 7th, 2019

The echoing screams of the damned ring throughout the night. Families cower in their homes, wanting to take comfort in each other, but being forced apart by the fear of the pestilence. Flagellants marched through the streets, cursing the church for being unable to stop what they thought was the end of all times. Bodies piled the streets, those who hang onto life too afraid to dispose of them. Fathers, mothers, and children return to their families, and with one cough are immediately tossed to the streets. For in their family's eyes, just looking at the inflicted could condemn them all. The Black Death was one of the most devastating bouts of plague in history. To most people's knowledge, the plague is a thing of the past, but it is still a threat.

That time period of mass fear was caused by a small coccobacillus bacterium known as *Yersinia pestis*.¹ It is an anaerobic human pathogen which is transmitted through a bite by an infected flea.² The incubation period is from one to six days, depending on the person who contracted it. It is spread by small animals such as squirrels, for the fleas reside in their fur. A person who comes in contact with the animal or its carcass is at risk for contracting the plague. It is advised to not go near any dead animals without the proper sanitary gear, and to avoid direct contact with other people's bodily fluids.³ While the plague isn't as prevalent as it was during the 14th century, cases are still reported around the Western United States, South/Central Africa, Central Asia, and South America.⁴ It pops up in seemingly random spurts and causes mass death if the area does not have the correct medical treatment readily available.

The bacteria *Yersinia pestis* causes three strains of plague, bubonic, pneumonic, and septicemic. They all have similar symptoms, but have a few key differences that tell them apart.

¹ Perry, Robert D, and Jacqueline D Fetherston. "Yersinia Pestis - Etiologic Agent of Plague." *NCBI, Clinical Microbiology Reviews*, Jan. 1997, www.ncbi.nlm.nih.gov/pmc/articles/PMC172914/pdf/100035.pdf.

² "Plague." *World Health Organization*, World Health Organization, 31 Oct. 2017, www.who.int/news-room/fact-sheets/detail/plague.

³ Ibid.

⁴ "Travelers' Health." *Centers for Disease Control and Prevention*, Centers for Disease Control and Prevention, 31 May 2017, wwwnc.cdc.gov/travel/yellowbook/2018/infectious-diseases-related-to-travel/plague-bubonic-pneumonic-septicemic.

Victims suffer from general weakness, headaches, fever, and chills. In bubonic plague, the ever famous buboes swell in the inguinal, axillary, and cervical lymph nodes of the body. These buboes are painful and filled with infected blood and pus. If left untreated, the bacteria will spread, and cause either pneumonic plague, septicemic plague, or both. Pneumonic plague is caused by the bacteria spreading to the lungs. Along with the classic symptoms, victims will also suffer from nausea, acute pneumonia, and will cough up blood filled sputum.⁵ Pneumonic plague is the most contagious of the three strains, for it can be spread through the air, while the others are spread through fluids. There was recently a month-long outbreak in Madagascar of pneumonic plague, where 2,300 cases and 200+ deaths were recorded.⁶ Septicemic plague, the last and most uncommon form, is also the most dangerous. It is caused by the bacteria moving to the blood, and causes internal hemorrhaging, blackened skin of the digits, and vomiting. All forms of the plague are extremely dangerous, and require immediate medical care in order for the patient to survive.

While studying *Yersinia pestis*, scientists must use biosafety level 2 protocols. These include wearing the right safety equipment, and adding other protective devices to the lab environment. This includes gloves, face masks, goggles, and a lab coat. The lab must have self shutting doors with locks, sinks with eyewash stations, and biohazard warnings posted about the area.⁷ A disease such as the plague may seem to deserve more protection, but in modern times it is quite rare and much easier to treat, if caught in time.

⁵ "Travelers' Health." *Centers for Disease Control and Prevention*, Centers for Disease Control and Prevention, 31 May 2017, wwwnc.cdc.gov/travel/yellowbook/2018/infectious-diseases-related-to-travel/plague-bubonic-pneumonic-septicemic.

⁶ Newman, Tim. "Rare Case of Bubonic Plague Reported in Idaho." *Medical News Today*, 20 June 2018, www.medicalnewstoday.com/articles/322198.php.

⁷ "Biosafety Levels 1, 2, 3 & 4 | What's The Difference?" *Consolidated Sterilizer Systems*, 19 Mar. 2018, consteril.com/biosafety-levels-difference/.

The most well known outburst of the plague is known as the Black Death. It began in 1348 and gradually faded in the 1350's. It killed around 50 million people in a very brief period of time.⁸ It spread at an alarming pace due to the unsanitary conditions of medieval Europe. Some blamed the plague on sailors recently arriving from the Black Sea, and others thought it was the wrath of God. It seemed as if the end of time was near. Although some may argue that the plague wasn't the cause of the Black Death, the similarities of the symptoms are uncanny. Doctors at the time recorded that people would suffer from pus filled buboes in the neck, armpits, and groin, as well as blackening of the fingers, toes, and nose. They would also have symptoms similar to pneumonia, where their lungs would be flooded with fluid. It is believed that the Black Death was likely a combination of one or more of the strains; it was basically a lethal hybrid of the bacteria.⁹ Without the proper treatment the bacteria was able to spread around the body as it pleased and affect the bloodstream and the lungs. Doctors had no way of curing their patients, so they would just focus on alleviating the symptoms the best they could. They recommended alternating which side they slept on, eating healthy foods such as lettuce, and even smelling pleasant scents, for the plague was thought by some to be caused by bad air.¹⁰ Ironically, the doctors caught the plague as well due to how highly contagious it was.

Life fell apart at the hands of the Black Death. The Church promised that if they just prayed to God, the plague would be vanquished. But that thought was soon disregarded, for the death toll just kept rising. People began to live on the edge, partying and gambling and drinking as they pleased, for government officials were too afraid to come out of their lavish houses.

⁸ "Your 60-Second Guide to the Black Death." *History Extra*, 14 Aug. 2018, www.historyextra.com/period/medieval/your-60-second-guide-to-the-black-death/.

⁹ Documentaries, Timeline - World History. *YouTube*, YouTube, 25 Nov. 2017, www.youtube.com/watch?v=1xkpDeD9clk.

¹⁰ *Ibid*.

Families would abandon each other if one became sick, for the likelihood of another member contracting the disease was so high. Buildings were left unfinished, livestock was not taken care of, and crops were not harvested. This led to a famine, for no food was being made. Priests were dying faster than they could remove the bodies, and soon they were strewn about the streets, or thrown into mass graves. Flagellants, protestors who beat themselves in order to get their points across, began roaming the cities, for they believed the Church was lying to them.¹¹ Their protest did nothing to help, in fact, they could have spread the disease even faster through their strange rituals. The plague led to widespread ethnic hatred and violent actions. Some people used it as an excuse to get back at people that owed money to them, or those that they hated. A main target of this was the Jewish population of Europe. They would be beaten and forced to falsely confess to poisoning their neighbors, despite how ridiculous it was.¹²

Eventually the plague began to die out on its own in the 1350's. A few smaller epidemics popped up in the following years, but they weren't as devastating. The plague did have its positives in a way. There was an overflow of workers who were paid very little before the outbreak, and afterwards there weren't enough people willing to do the same jobs. That led to higher wages and more independent workers. The social hierarchy from the past was disappearing, creating room for a new era to begin. Medicinal practices were more closely recorded and studied, since doctors knew that they needed more knowledge in order to cure future epidemics. It is proven that the rare person who survives after contracting the plague lives

¹¹ Documentaries, Timeline - World History. *YouTube*, YouTube, 25 Nov. 2017, www.youtube.com/watch?v=1xkpDeD9clk.

¹² Ibid.

a longer and healthier life, some living even until 70 or 80 years, which was astonishing for the time.¹³

In the 21st century, the plague is likely the last possibility on a doctor's mind when diagnosing someone, depending on where they are from or where they've been. If the patient has recently been in an area where plague has been highly reported, then the physician will take it into consideration. They will look for buboes on the skin, and if they find one, they will do a cultural or serological test on it.¹⁴ If there are no buboes present, they will take samples from the blood, sputum, or throat. They will look for signs of *Yersinia pestis*, and if found, they will start treatment immediately. They are specifically looking for the F1 antigen of *Yersinia pestis*.¹⁵ Another way to diagnose the plague is to use a Rapid Diagnostic Dipstick test (RDT). It also detects the F1 antigen. It is usually used for people who are still alive, but it can also be used to figure out how someone in the distant past died. In 2007, it was used to test 18 bodies from French burial sites who were said to have died from a strain of the plague in the 16th century.¹⁶ The test was positive for the plague.

Once a patient has been diagnosed, a doctor doesn't have too much time to start treatments. The plague progresses very fast, and can be lethal within days depending on the patient. They start with IV therapy, using the antibiotics Gentamicin and fluoroquinolones. Once the patient's condition starts improving, they give them oral therapy, which includes various antibiotics depending on their age, and other factors. Some antibiotics include Streptomycin,

¹³ Binette, Peggy. "New Study Sheds Light on Survivors of the Black Death." *University of South Carolina.edu*, 7 May 2014, www.sc.edu/uofsc/announcements/2014/05_sharondewitte_blackdeath_plosonejournal.php#.XDJzp3ZznF.

¹⁴ "Diagnosis and Treatment | Plague | CDC." *Centers for Disease Control and Prevention*, Centers for Disease Control and Prevention, 27 Nov. 2018, <https://www.cdc.gov/plague/healthcare/clinicians.html>.

¹⁵ Ibid.

¹⁶ Bianucci, R, et al. "[A Rapid Diagnostic Test for Plague Detects *Yersinia Pestis* F1 Antigen in Ancient Human Remains]." *Current Neurology and Neuroscience Reports*, U.S. National Library of Medicine, Oct. 2007, www.ncbi.nlm.nih.gov/pubmed/17905394.

Levofloxacin, and Doxycycline.¹⁷ A lot of the antibiotics that could be used are not fully FDA approved, or hard to come by in the US. A doctor must make a choice based on what they have available to them, or how severe their patient's condition may be. If the patient has been diagnosed with pneumonic plague, they are isolated from other people due to how contagious they are. Those who have also been in exposure to the person with the disease are given almost the same treatment as if they had it as well, for the doctor wants to take no chances. Doctors are required to notify their state health departments if a case of the plague has been reported so it can be further investigated if needed. The medicine available today would have made an astonishing difference to those who suffered the epidemics of the past.

The plague is said to be ineradicable, for it is too spread out among rodents and other small animal populations.¹⁸ So people should instead find ways to manage its spread and learn how to deal with potential outbreaks. Plague spreads extremely fast, and if we don't know how to handle an epidemic, it could quickly become catastrophic. The strategies used in the past are too slow currently, for the plague would spread faster than the actions would be taken. There are vaccinations for the plague, but they are generally only given to those who are regularly exposed to it while studying.¹⁹ Throughout history, Plague has been used as a devastating weapon. Just one infected body could possibly kill off whole troops. With the ever existing terrorist threat, who knows when they will decide to move onto biological warfare using *Yersinia pestis* or other bacteria. While scientists should focus on getting this vaccination to everyone, or getting

¹⁷ "Diagnosis and Treatment | Plague | CDC." *Centers for Disease Control and Prevention*, Centers for Disease Control and Prevention, 27 Nov. 2018, <https://www.cdc.gov/plague/healthcare/clinicians.html>.

¹⁸ Stenseth, Nils Chr. "Plague: Past, Present, and Future." *NCBI*, 5 Jan. 2008, www.ncbi.nlm.nih.gov/pmc/articles/PMC2194748/.

¹⁹ "Plague." *World Health Organization*, World Health Organization, 31 Oct. 2017, www.who.int/news-room/fact-sheets/detail/plague.

antibiotics more available to those who need it, they should also turn their attention onto how to deal with an outbreak when it inevitably happens.

Laughter rings through the streets, kids playing with their friends. Their parents watch by, happy yet still held up on the lingering fear from the past years. Occasionally a friend will pass from the horrible sickness that had plagued them years before, but times have changed for the better. They have more money to put food on the table, and they feel freer than they ever had felt before. Despite the massive loss of life, they couldn't help but feel relieved, since they knew that their children would grow up well fed, and with a bright future. They just hope that the sickness will not come back with the same vigor as before, for that would mean the end of time for those who managed to survive. Times have changed, and modern medicine has allowed for this disease, while still around, to not be as much of a threat as it was in the past. With the advancement of science, hopefully the Plague will join other eradicated diseases in the near future.

Bibliography

- Bianucci, R, et al. “[A Rapid Diagnostic Test for Plague Detects *Yersinia Pestis* F1 Antigen in Ancient Human Remains].” *Current Neurology and Neuroscience Reports.*, U.S. National Library of Medicine, Oct. 2007, www.ncbi.nlm.nih.gov/pubmed/17905394.
- Binette, Peggy. “New Study Sheds Light on Survivors of the Black Death.” *University of South Carolina.edu*, 7 May 2014, www.sc.edu/uofsc/announcements/2014/05_sharondewitte_blackdeath_plosonejournal.php#.XDJzp3ZzznF.
- “Biosafety Levels 1, 2, 3 & 4 | What's The Difference?” *Consolidated Sterilizer Systems*, 19 Mar. 2018, consteril.com/biosafety-levels-difference/.
- “Diagnosis and Treatment | Plague | CDC.” *Centers for Disease Control and Prevention*, Centers for Disease Control and Prevention, 27 Nov. 2018, <https://www.cdc.gov/plague/healthcare/clinicians.html>.
- Documentaries, Timeline - World History. *YouTube*, YouTube, 25 Nov. 2017, www.youtube.com/watch?v=1xkpDeD9clk.
- Newman, Tim. “Rare Case of Bubonic Plague Reported in Idaho.” *Medical News Today*, 20 June 2018, www.medicalnewstoday.com/articles/322198.php.
- Perry, Robert D, and Jacqueline D Fetherston. “*Yersinia Pestis* - Etiologic Agent of Plague.” *NCBI, Clinical Microbiology Reviews*, Jan. 1997, www.ncbi.nlm.nih.gov/pmc/articles/PMC172914/pdf/100035.pdf.

“Plague.” *World Health Organization*, World Health Organization, 31 Oct. 2017,

www.who.int/news-room/fact-sheets/detail/plague.

Stenseth, Nils Chr. “Plague: Past, Present, and Future.” *NCBI*, 5 Jan. 2008,

www.ncbi.nlm.nih.gov/pmc/articles/PMC2194748/.

“Travelers' Health.” *Centers for Disease Control and Prevention*, Centers for Disease Control

and Prevention, 31 May 2017,

wwwnc.cdc.gov/travel/yellowbook/2018/infectious-diseases-related-to-travel/plague-bubonic-pneumonic-septicemic.

“Your 60-Second Guide to the Black Death.” *History Extra*, 14 Aug. 2018,

www.historyextra.com/period/medieval/your-60-second-guide-to-the-black-death/.