Plague spread 3,000 years earlier than 1st thought: 2,800 BC

October 22, 2015

In this undated photo released by Cell journal, a Bronze Age human skull painted with red ochre, from the Yamnaya culture of Central Asia, one of the cultures that carried the early strains of plague. (Simon Rasmussen/Cell

The plague was spreading nearly 3,000 years before previously thought, scientists say after finding traces of the disease in the teeth of ancient people — a discovery that could provide clues to how dangerous diseases evolve.

To find evidence of the prehistoric infection, researchers drilled into the teeth of 101 individuals who lived in Central Asia and Europe some 2,800 to 5,000 years ago. The drilling produced a powder that the researchers examined for DNA from plague bacteria. They found it in samples from seven people.

Before the study, the earliest evidence of the plague was from A.D. 540, said Simon Rasmussen of the Technical University of Denmark. He and colleagues found it as early as 2,800 B.C.

"We were very surprised to find it 3,000 years before it was supposed to exist," said Rasmussen, one of the study authors. The research was published online Thursday in the journal, Cell.

Rasmussen said the plague they found was a different strain from the one that caused the three known pandemics, including the Black Death that swept across Medieval Europe. In contrast to later strains, including the one estimated to have wiped out about half of Europe, the Bronze Age plague revealed by the new study could not be spread by fleas because it lacked a crucial gene. So it was probably less able to infect people over wide regions.

But Rasmussen said knowing that plague existed thousands of years earlier than had been believed might explain some unsolved historical mysteries, including the "Plague of Athens," a horrifying unknown epidemic that struck the Greek capital in 430 B.C. It killed up to 100,000 people during the Peloponnesian War.

"People have been speculating about what this was, like was this measles or typhus, but it could well have been plague," Rasmussen said.

He said tracking how the plague evolved from being an intestinal infection to "one of the most deadly diseases ever encountered by humans" could help scientists predict the disease's future path.

"Typically, things get less virulent with time, but that's not always the case," said Hendrik Poinar, a molecular evolutionary geneticist at McMaster University in Canada who was not part of the study. He noted that diseases could acquire new features — including lethality — relatively quickly.

Other experts said it was unlikely that plague would ever pose as great a threat as it has in the past, especially since it is now largely treatable.

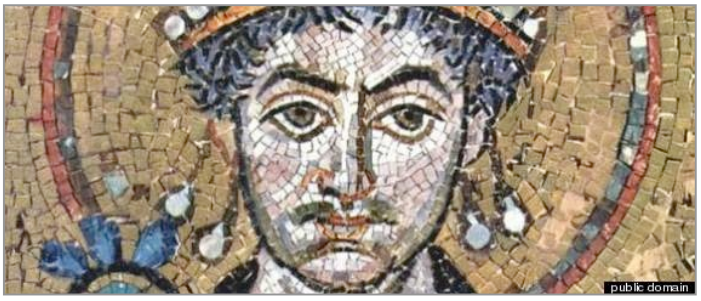
"It might be that (plague) will eventually burn itself out," said Brendan Wren, dean of the faculty of infectious and tropical diseases at the London School of Hygiene and Tropical Medicine. Wren said other diseases like leprosy have also lost genes over time and are now less able to sicken people.

"The evidence is that (plague) is not going to come back big time, but it's hard to predict what the bacteria will do," he said. "They are great survivors."

http://www.foxnews.com/science/2015/10/22/plague-spread-3000-years-earlier-than-1st-thought-2800-bc.html

Plague Helped End Roman Empire, DNA From Medieval Graveyard Suggests

By: Charles Choi, LiveScience Contributor / 05/10/2013
http://www.huffingtonpost.com/2013/05/12/plague-roman-empire-dna-medieval-graveyard_n_3261427.html



Plague may have helped finish off the Roman Empire, researchers now reveal.

Plague is a fatal disease so infamous that it has become synonymous with any dangerous, widespread contagion. It was linked to one of the first known examples of biological warfare, when Mongols catapulted plague victims into cities.

The bacterium that causes plague, *Yersinia pestis*, has been linked with at least two of the most devastating pandemics in recorded history. One, the Great Plague, which lasted from the 14th to 17th centuries, included the infamous epidemic known as the Black Death, which may have killed nearly two-thirds of Europe in the mid-1300s. Another, the Modern Plague, struck around the world in the 19th and 20th centuries, beginning in China in the mid-1800s and spreading to Africa, the Americas, Australia, Europe and other parts of Asia. [In Photos: 14th-Century 'Black Death' Graveyard]

Although past studies confirmed this germ was linked with both of these catastrophes, much controversy existed as to whether it also caused the Justinianic Plague of the sixth to eighth centuries. This pandemic, named after the Byzantine emperor Justinian I, killed more than 100 million people. Some historians have suggested it contributed to the decline of the Roman Empire.

The same plague bacterium that caused the Justinianic Plague also is responsible for the Black Death that killed nearly two-thirds of Europe in the mid-1300s. Here, skeletal remains from a Black Death gravesite from 1348 in London.

To help solve this mystery, scientists investigated ancient DNA from the teeth of 19 different sixth-century skeletons from a medieval graveyard in Bavaria, Germany, of people who apparently succumbed to the Justinianic Plague.

They unambiguously found the plague bacterium *Y. pestis* there.

"It is always very exciting when we can find out the actual cause of the pestilences of the past," said researcher Barbara Bramanti, an archaeogeneticist at Johannes Gutenberg University in Mainz, Germany.

"After such a long time — nearly 1,500 years, one is still able to detect the agent of plague by modern molecular methods," researcher Holger Scholz, a molecular microbiologist at the Bundeswehr Institute of Microbiology in Munich, Germany, told LiveScience.

The researchers said these findings confirm that the Justinianic Plague crossed the Alps, killing people in what is now Bavaria. Analysis of the DNA suggests that much like the later two pandemics of plague, this first pandemic originated in Asia, "even if historical records say that it arrived first in Africa before spreading to the Mediterranean basin and to Europe," Bramanti told LiveScience.

After the Modern Plague spread worldwide, it became entrenched in many rural areas, and the World Health Organization still reports thousands of cases of plague each year. However, doctors can now treat it with modern antibiotics.

The researchers now hope to reconstruct the whole genome sequence of the plague strain in these ancient teeth to learn more about the disease, Scholz said.

Did this sleepy village stop the Black Death?

By Eleanor Ross 29 October 2015

Today, tourists amble through the pretty village of Eyam. But 350 years ago, during the plague, the town's terrible sacrifice meant its streets were filled with the wails of the dying.

Over the course of eight days in August 1667, Elizabeth Hancock lost her six children and her husband. Covering her mouth with a handkerchief against the stench of decay, she dragged their bodies to a nearby field and buried them.

Hancock's loved ones were victims of the Black Death, the deadly plague that intermittently reared its head in Europe between the 13th and 17th Centuries, killing an estimated 150 million people. The epidemic of 1664 to 1666 was particularly notorious, and the last major outbreak of the disease in England. Some 100,000 people, one quarter of the city's population, died in London alone.

Amid the devastation, the sleepy Peak District village of Eyam, home to Hancock and her family, became the site of one of the most heroic acts of self-sacrifice in British history – and one of the main reasons the plague's march was halted.

Today, in Eyam, located 35 miles southeast of Manchester, all seems well in the world. Children pick fat purple blackberries from the hedgerows just outside the village; cyclists speed down the treacherously steep roads, their wheels slicking over fallen leaves. A pretty commuter village of 900 residents, Eyam has all the requisite English attractions: pubs, cosy cafes and an idyllic church.

Stand here 450 years ago, though, and you would have looked down onto a village ravaged by the Black Death. You would have seen empty streets, the doors daubed with white crosses, and heard the wails of the dying from behind closed doors.

The plague reached Eyam in the summer of 1665 when a London merchant sent flea- infested cloth samples to the local tailor, Alexander Hadfield. Within a week, Hadfield's assistant, George Vickers, had died a prolonged and agonising death. Before long, the rest of the household had fallen ill and died.

Until now, the plague had been mostly contained to the south of England. Terrified the disease would spread across the north, wiping out other towns and communities, the villagers realised there was only one option: quarantine. With the guidance of their rector William Mompesson, they decided to isolate themselves, creating a perimeter of boundary stones that they vowed not to cross ... even those who were not showing any symptoms.

"It meant they couldn't escape coming into contact with the disease," explained Catherine Rawson, secretary at **Eyam Museum**, which details how the village dealt with the plague.

It also meant making careful plans to ensure not only that villagers were kept in, but that others were kept out – and the residents could still receive the food and supplies they needed.

Boundary stones like this one both marked the perimeter that villagers could not cross – and became their key to survival

The villagers established a system of boundary stones around the village's periphery, boring holes into the rocks and leaving coins soaked in vinegar – they believed it acted as a disinfectant – in the holes. Merchants from surrounding villages would collect the money and leave bundles of meat, grains and trinkets in return.

You can still visit the boundary stones today. Set about half a mile back from the village, these flat, rough rocks are an attraction now, the sides of the holes smoothed down by centuries of children slotting their fingers in. Silver coins glint inside, placed there by tourists to honour plague victims.

It's one of many easy walks that visitors can hike around the village. There's another great uphill trail, a peaceful mile long walk through pine and oak forests, towards Mompesson's Well to the south. Here too, bundles of food and materials were left for villagers to collect.

How well residents took the news that they were going to be quarantined is debatable. Although some villagers tried to leave, it appears that most of Eyam's townsfolk stoically accepted their plight and made a pact with God to remain.

Even if they did leave, they certainly wouldn't have received a warm welcome elsewhere. One woman left Eyam to travel to the market at nearby village of Tideswell, five miles west. When people realised that she was from Eyam, they pelted her with food and mud, shouting, "The Plague! The Plague!".

As more people died, the village began to collapse. Roads were left to crumble; untended gardens became overgrown. Crops were left unpicked in fields, leaving villagers to rely on food packages from neighbouring towns. They were living with death literally around the corner, unsure of who would next fall prey to a disease nobody understood. The plague in 1665 must have been very much like Ebola in 2015, except with even less medical knowledge and no available vaccine.

Special measures were taken to try to stop the plague from spreading. In the first half of 1666, 200 people passed away. After the stonemason died, villagers had no choice but to engrave their own tombstones. Residents like Elizabeth Hancock buried their own dead, dragging bodies down the street by tying ropes around the victim's' feet to avoid contact with the deceased.

Church services were held in the open air to reduce the spread of disease, but by August 1666 the effects of the plague were devastating: 267 had been killed out of a population of 344. Those who didn't catch it were said to carry a special ability – today thought to have been a chromosome – which stopped them from falling ill. Others, believed that superstitious rituals (such as smoking tobacco) and fervent prayer staved off the disease.

Jenny Aldridge, visitor operation manager for Eyam Hall at the National Trust, told me how the plague victims knew they had been struck by the pox when they began to smell sweet odours. William Mompesson's wife, Katherine, noted that the air smelt sweet the night before she came down with the plague – from that, he knew that she had been infected. Gruesomely, the pleasant scent was brought on by a person's olfactory glands detecting that their internal organs were collapsing and rotting.

"This, coupled with the fact that diseases were thought to be carried through the air like miasmas, led to villagers wearing masks stuffed with herbs," Aldridge said. "Some even sat in sewers because they thought the smell was so bad, the plague couldn't get you there."

After 14 months, the disease burned itself out, leaving almost as suddenly as it had arrived. Life returned to normal and trade resumed relatively quickly too, because lead mining, Eyam's main source of wealth, was too valuable to ignore.

Today, Eyam is used mainly become a commuter town for nearby Sheffield and Manchester, although farms still surround the area, unchanged for centuries. The town's original stocks still sit on the village green and the stately 17th century Eyam Hall, a Jacobean manor house, stands proudly over the village.

The most dramatic details, though, are the green plaques that now mark the cottages where the plague struck, many listing numerous members lost by each family.

The signs are a constant reminder to the northerners here: that they, and their ancestors, might well owe these brave people their lives.

BBC - Travel - Did this sleepy village stop the Black Death? 12/26/15
http://www.bbc.com/travel/story/20151026-the-sleepy-village-that-stopped-the-black-death
*This story is a part of **BBC Britain** – a series focused on exploring this extraordinary island, one story at a time. Follow us on **Facebook**, **Twitter** and **Instagram**.*

Ecology and Transmission CDC 1/2/16, 10:39 PM http://www.cdc.gov/plague/transmission

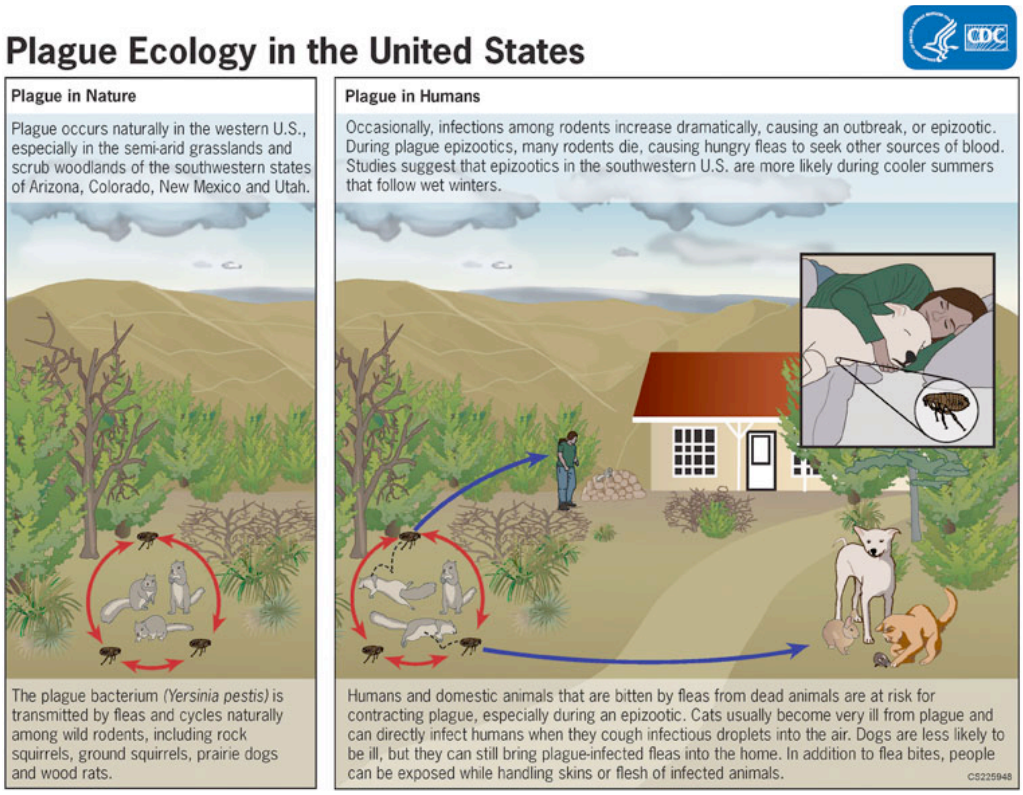
Ecology

The bacteria that cause plague, Yersinia pestis, maintain their existence in a cycle involving rodents and their fleas. In urban areas or places with dense rat infestations, the plague bacteria can cycle between rats and their fleas. The last urban outbreak of rat-associated plague in the United States occurred in Los Angeles in 1924- 1925.

Since that time,plague hasoccurred in ruraland semi-ruralareas of thewestern UnitedStates, primarily in semi-arid upland forests and grasslands where many types of rodent species can be involved. Many types of animals, such as rock squirrels, wood rats, ground squirrels, prairie dogs, chipmunks, mice, voles, and rabbits can be affected by plague. Wild carnivores can become infected by eating other infected animals.

Scientists think that plague bacteria circulate at low rates within populations of certain rodents without causing excessive rodent die-off. These infected animals and their fleas serve as long-term reservoirs for the bacteria. This is called the enzootic cycle.

Occasionally, other species become infected, causing an outbreak among animals, called an epizootic. Humans are usually more at risk during, or shortly after, a plague epizootic. Scientific studies have suggested that epizootics in the southwestern United States are more likely during cooler summers that follow wet winters. Epizootics are most likely in areas with multiple types of rodents living in high densities and in diverse habitats.



Transmission

The plague bacteria can be transmitted to humans in the following ways:

Flea bites. Plague bacteria are most often transmitted by the bite of an infected flea. During plague epizootics, many rodents die, causing hungry fleas to seek other sources of blood. People and animals that visit places where rodents have recently died from plague are at risk of being infected from flea bites. Dogs and cats may also bring plague-infected fleas into the home. Flea bite exposure may result in primary bubonic plague or septicemic plague.

Contact with contaminated fluid or tissue. Humans can become infected when handling tissue or body fluids of a plague-infected animal. For example, a hunter skinning a rabbit or other infected animal without using proper precautions could become infected with plague bacteria. This form of exposure most commonly results in bubonic plague or septicemic plague.

Infectious droplets. When a person has plague pneumonia, they may cough droplets containing the plague bacteria into air. If these bacteria-containing droplets are breathed in by another person they can cause pneumonic plague. Typically this requires direct and close contact with the person with pneumonic plague. Transmission of these droplets is the only way that plague can spread between people. This type of spread has not been documented in the United States since 1924, but still occurs with some frequency in developing countries. Cats are particularly susceptible to plague, and can be infected by eating infected rodents. Sick cats pose a risk of transmitting infectious plague droplets to their owners or to veterinarians. Several cases of human plague have occurred in the United States in recent decades as a result of contact with infected cats.

1. What time period(s) does each article focus on? (Articles may talk about more than one.)

List the four articles and give your answer for each of them.

2. Give a short statement that sums up when and how ***Yersinia pestis*** has affected people and societies.

3. What should people and societies do now, based on this history?

Some possible ways to think about this:

a. How should we deal with diseases like the plague?
b. How should we think about history?
c. (Or *YOUR* idea whatever it may be)