

Scientists solve one mystery about two plagues

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Miniature out of the Lindisfarne Gospels (Ireland) of 11th century. The disease is widely believed to be the plague. The location of bumps or blisters, however, is more consistent with smallpox (as the bubonic plague normally causes them only in the groin and in the armpits). Photo: Wikimedia Commons

About 1,500 years ago, a disease called the Justinian Plague killed up to 50 million people from Asia to Africa to Europe. Experts say the type, or strain, of bacteria that caused the disease can no longer be found.

We will likely never see it again, say the authors of a new study on the missing strain. The study was published in a medical journal called *Lancet Infectious Diseases*. Its authors say the missing strain teaches us a lesson.

Plague can jump from rodents to humans. A strain can kill millions of people, and then mysteriously disappear. New and equally deadly strains could appear just as mysteriously, they wrote.

“Fortunately, we now have antibiotics that could effectively be used to treat plague,” said study co-author Dave Wagner, a professor at Northern Arizona University. That, he says, lessens the chances of another worldwide outbreak.

The symptoms that overtook victims of the Justinian Plague were similar to those of the Black Plague, which struck 800 years later and killed up to 200 million people.

Did the same strain cause both diseases?

Doing Detective Work

That's the question an international team of researchers set out to answer. They first extracted DNA fragments from the teeth of two plague victims who were buried in Bavaria, Germany, around the time of the Justinian Plague outbreak. DNA is the material that holds information about how a person will look and how his or her body will work.

Next, they reconstructed the genetic material of the strain that killed both victims. Finally, they compared it with more than 100 strains of bacteria from the same family. Those bacteria strains are currently found worldwide in animals and humans.

What did the research team discover? The strain that caused the Justinian Plague is a member of the bacterial family *Yersinia pestis*. The Black Plague, also called the Black Death, sprang from the same family 800 years later. But the genetic fingerprint of the Black Plague is different from the Justinian Plague. Researchers concluded it is highly unlikely that they are related. It is also unlikely that the Justinian strains evolved into the strains that caused the Black Death.

Among the most significant differences between the strains: their ability to spread, replicate and kill their hosts. The Justinian Plague strains appeared to have been even deadlier than the *Y. pestis* strains that re-emerged during the Black Plague outbreak.

The authors believe the strain of *Y. pestis* that caused the Justinian Plague is gone for good. If it does still exist, scientists have yet to discover it.

What became of the strain after it killed so many? The study's authors can only guess. Humans may have built a resistance to the strain. Climate changes occurring at the time may have killed the strain.

There is evidence for the climate-change theory. Both the Justinian Plague, the Black Plague, and a plague that occurred in the late 1800s and early 1900s followed periods of exceptional rainfall and ended periods of normal climate patterns.

Plague blame game: Gerbils replaced rats as prime suspects

CNN Wed. February 25, 2015

Story highlights

Rats have long been blamed for helping spread the plague in Europe. But scientists say gerbils in Central Asia (Mongolia area) could have played a bigger role. They think the disease may have been repeatedly reintroduced through trade routes.

(CNN) For a long time, rats have taken the heat (blame) for the waves (spread) of plague that killed millions of people across Europe starting in the 14th century. But now suspicion is falling on another rodent with a much cuddlier reputation: the gerbil.

A team of scientists from Norway and Switzerland are challenging the widely held view that communities of rats in Europe played host to the fleas carrying the disease for hundreds of years.

In an article published this week in the Proceedings of the National Academy of Sciences, the researchers say they think the plague bacteria could have sprung (started) from populations of the great gerbil and other rodent species in Central Asia. (Mongolia Area)

"If we're right, we'll have to rewrite that part of history," Professor Nils Christian Stenseth of the University of Oslo, one of the authors of the study, told the BBC.

The scientists investigated Europe's second plague pandemic, (wide spread of disease) which began with the infamous Black Death from 1347 to 1353 and continued on and off for four centuries.

Carried along trade routes?

They say pinning the blame solely on rats doesn't make sense.

Rats weren't found in large areas of northern Europe during the period, and the peaks (highest amount) of the plague outbreaks don't correspond well with the climate conditions that suit rapid spreading of the disease by rat fleas.

Instead, by analyzing climate data gleaned (taken from) tree rings, they found clues that suggest the plague might have repeatedly been carried back into Europe from outbreaks among rodents in Central Asia. (Mongolia Area)

"We show that wherever there were good conditions for gerbils and fleas in Central Asia,(Mongolia Area) some years later the bacteria shows up in harbor cities in Europe and then spreads across the continent," Stenseth told the BBC.

The scientists say they think it's possible the plague was reintroduced each time by the trading networks of the era.

Caravans of traders and their camels that traveled through infested areas in Central Asia (Mongolia Area) could have picked up the disease and sent it along trade routes reaching into Europe.

Pet gerbils not a risk

To determine whether they're right, the researchers plan to analyze ancient plague DNA taken from victims of the pandemic.

But if rats are hoping the scientists' theory will get them off the hook entirely, they should think again. The study says they could still have played a part in the spread of plague by ships.

And for people suddenly worried about their pet gerbil, there's no cause for alarm.

"If you get your gerbil at a pet store ... you have nothing to worry about," Ken Gage, a plague expert for the Centers for Disease Control and Prevention, told NPR.