

# Researchers discover bacterial diversity in Justinianic Plague

June 5 2019, by Bob Yirka

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The skulls of two plague victims. Credit: M. Schweissing, SNSB - Staatssammlung für Anthropologie und Paläoanatomie München

A large international team of researchers has discovered a previously unknown level of diversity in the Justinianic Plague (also known as the

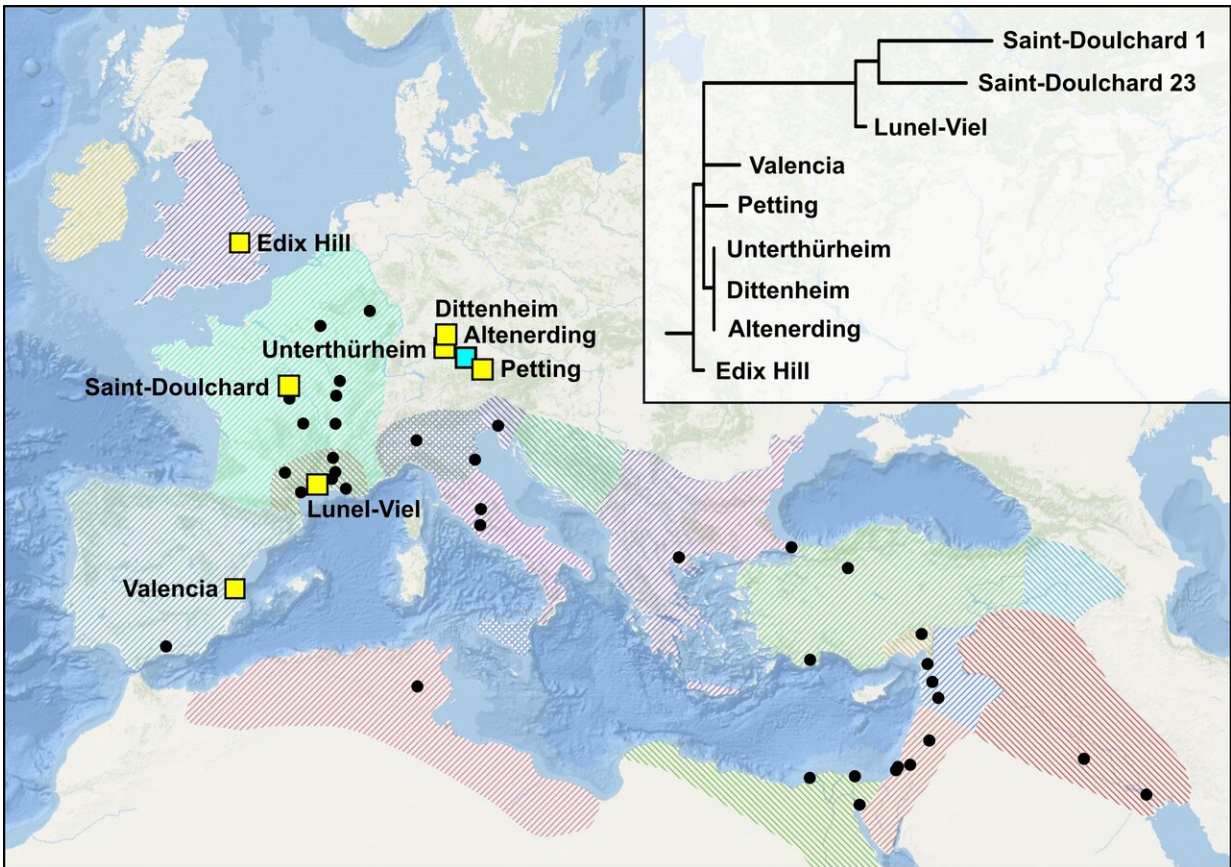
First Pandemic). In their paper published in *Proceedings of the National Academy of Sciences*, the group describes their study of the bacteria *Yersinia pestis* and what they learned about it.

*Y. pestis* is the [bacteria](#) responsible for several plagues throughout history. It was the source of the bubonic, septicemic, and pneumonic plagues. In this new effort, the researchers were interested in learning more about the first known pandemic that came about due to *Y. pestis* infections. That plague, which ran from approximately 541 to 750, was named after the Roman Emperor Justinian I. Some historians have suggested it may have killed approximately 25 percent of the population of the Roman Empire.

To learn more about *Y. pestis* during the First Pandemic, the researchers studied the remains of people killed by it and buried in sites in Germany, France and Spain. They also looked at the remains of people buried during the same time period at a site in Britain to establish whether the pandemic ever made it to the British Isles. The team studied the remains from 21 sites, and were able to find and reconstruct the *Y. pestis* genome in eight instances. After sequencing, they compared what they found to sequencing data from other studies involving both ancient and modern forms of the bacteria.

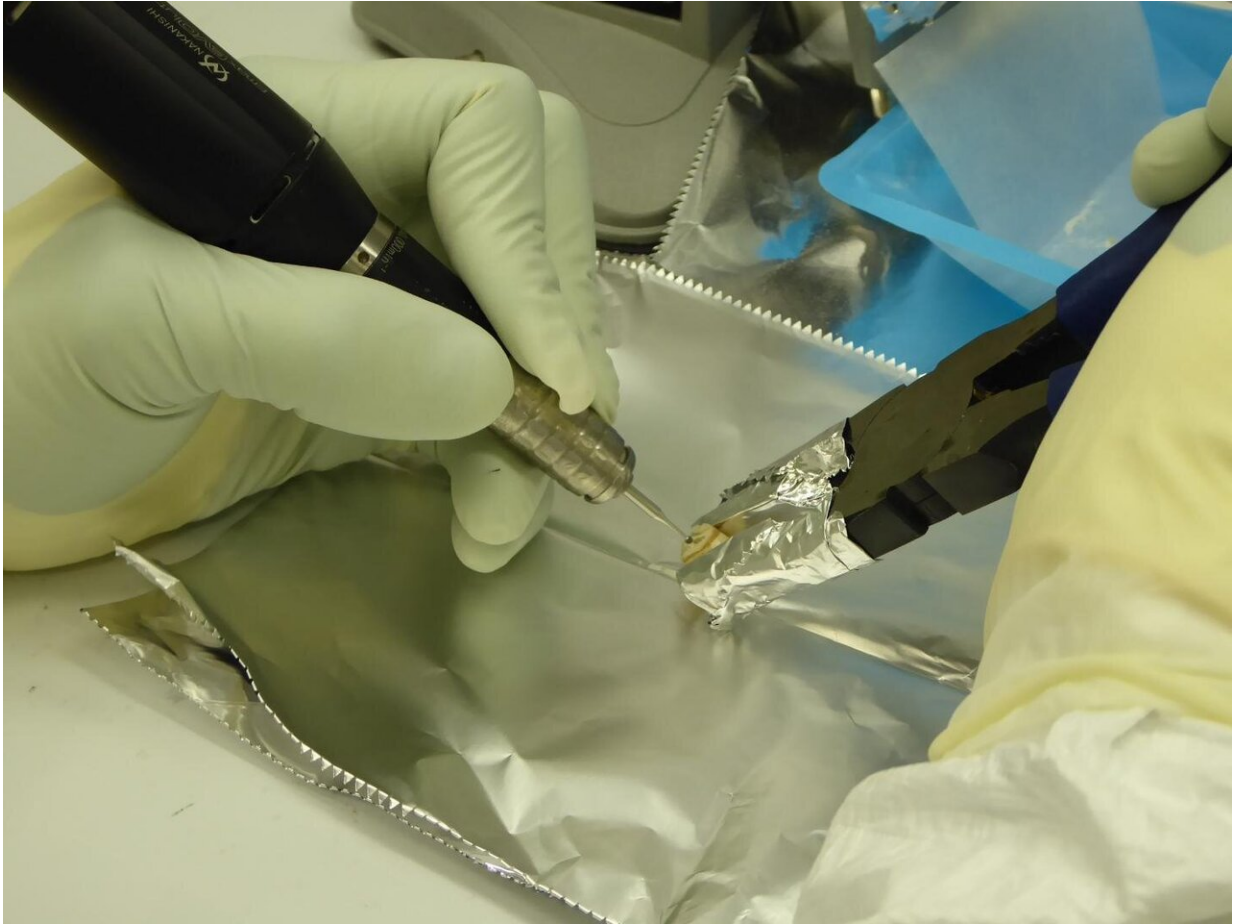


Necklace of a woman who died of the plague. Credit: S. Friedrich, Archaeological State Collection Munich



Map and phylogenetic tree showing the newly published (yellow) and previously published (turquoise) genomes. Shaded areas and dots represent historically recorded outbreaks of the First Pandemic. Credit: Marcel Keller





Sampling of a tooth from a suspected plague burial. Credit: Evelyn Guevara



Lunel-Viel (Languedoc-Southern France). Victim of the plague thrown into a demolition trench of a Gallo-Roman house; end of the 6th-early 7th century. Credit: 1990; CNRS - Claude Raynaud

The team reports that they did find evidence of *Y. pestis* in Britain (at a [site](#) called Edix Hill), confirming that the pandemic reached the British Isles. They also found diversity in strains of the bacteria that had not been seen before. They report that they found eight from Germany, Britain, Spain and France. The researchers note that their findings show that there were multiple strains of the bacteria involved in the pandemic and that they were all closely related. They also report that despite their success in finding new strains of the bacteria, they were still unable to pin down the onset of the First Pandemic. They suggest the bacteria likely got its start in Central Asia, long before the [pandemic](#) got underway.

**More information:** Marcel Keller et al. Ancient *Yersinia pestis* genomes from across Western Europe reveal early diversification during the First Pandemic (541–750), *Proceedings of the National Academy of Sciences* (2019). [DOI: 10.1073/pnas.1820447116](https://doi.org/10.1073/pnas.1820447116)

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