

Little too late: Researchers identify disease that may have plagued 700-year-old skeleton

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European researchers have recovered a genome of the bacterium *Brucella melitensis* from a 700-year-old skeleton found in the ruins of a Medieval Italian village.

Reporting this week in *mBio*, the online open-access journal of the American Society for Microbiology, the authors describe using a technique called shotgun metagenomics to sequence DNA from a calcified nodule in the pelvic region of a middle-aged male skeleton excavated from the settlement of Geridu in Sardinia, an island off the coast of Italy. Geridu is thought to have been abandoned in the late 14th century. Shotgun metagenomics allows scientists to sequence DNA without looking for a specific target.

From this sample, the researchers recovered the genome of *Brucella melitensis*, which causes an infection called brucellosis in livestock and humans. In humans, brucellosis is usually acquired by ingesting unpasteurized dairy products or from direct contact with infected animals. Symptoms include fevers, arthritis and swelling of the heart and liver. The disease is still found in the Mediterranean region.

"Normally when you think of calcified material in human or animal remains you think about tuberculosis, because that's the most common infection that leads to calcification," says senior study author Mark Pallen, PhD, professor of microbial genomics at Warwick Medical School in Coventry, England. "We were a bit surprised to get *Brucella* instead."

The [skeleton](#) contained 32 hardened nodules the size of a penny in the pelvic area, though Pallen says it's unclear if they originated in the pelvis, or higher up in the chest or other body part.

In additional experiments, the research team showed that the DNA fragments extracted had the appearance of aged DNA – they were shorter than contemporary strands, and had characteristic mutations at the ends. They also found that the medieval *Brucella* strain, which they called Geridu-1, was closely related to a recent *Brucella* strain called Ether, identified in Italy in 1961, and two other Italian strains identified in 2006 and 2007.

Pallen and others have used shotgun metagenomics before to detect pathogens in contemporary and historical human material. Last summer, he published a report in the *New England Journal of Medicine* describing the recovery of tuberculosis genomes from the lung tissue of a 215-year-old mummy from Hungary. He also has identified *Eschericia coli* from stool samples during a 2011 outbreak in Germany.

Pallen's team is now testing the technique on a range of additional samples, including historical material from Hungarian mummies; Egyptian mummies; a Korean mummy from the 16th or 17th century; and lung tissue from a French queen from the Merovingian dynasty, which ruled France from the 5th to 8th centuries; as well as contemporary sputum samples from the Gambia in Africa.

"Metagenomics stands ready to document past and present infections, shedding light on the emergence, evolution and spread of microbial pathogens," Pallen says. "We're cranking through all of these samples and we're hopeful that we're going to find new things."

Provided by American Society for Microbiology

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