

Skeletons point to Columbus voyage for syphilis origins

More evidence emerges to support that the progenitor of syphilis came from the New World

Skeletons don't lie. But sometimes they may mislead, as in the case of bones that reputedly showed evidence of syphilis in Europe and other parts of the Old World before Christopher Columbus made his historic voyage in 1492.

None of this skeletal evidence, including 54 published reports, holds up when subjected to standardized analyses for both diagnosis and dating, according to an appraisal in the current Yearbook of Physical Anthropology. In fact, the skeletal data bolsters the case that syphilis did not exist in Europe before Columbus set sail.

"This is the first time that all 54 of these cases have been evaluated systematically," says George Armelagos, an anthropologist at Emory University and co-author of the appraisal. "The evidence keeps accumulating that a progenitor of syphilis came from the New World with Columbus' crew and rapidly evolved into the venereal disease that remains with us today."

The appraisal was led by two of Armelagos' former graduate students at Emory: Molly Zuckerman, who is now an assistant professor at Mississippi State University, and Kristin Harper, currently a post-doctoral fellow at Columbia University. Additional authors include Emory anthropologist John Kingston and Megan Harper from the University of Missouri.

"Syphilis has been around for 500 years," Zuckerman says. "People started debating where it came from shortly afterwards, and they haven't stopped since. It was one of the first global diseases, and understanding where it came from and how it spread may help us combat diseases today."

'The natural selection of a disease'

The treponemal family of bacteria causes syphilis and related diseases that share some symptoms but spread differently. Syphilis is sexually transmitted. Yaws and bejel, which occurred in early New World populations, are tropical diseases that are transmitted through skin-to-skin contact or oral contact.

The first recorded epidemic of venereal syphilis occurred in Europe in 1495. One hypothesis is that a subspecies of *Treponema* from the warm, moist climate of the tropical New World mutated into the venereal subspecies to survive in the cooler and relatively more hygienic European environment.

The fact that syphilis is a stigmatized, sexual disease has added to the controversy over its origins, Zuckerman says.

"In reality, it appears that venereal syphilis was the by-product of two different populations meeting and exchanging a pathogen," she says. "It was an adaptive event, the natural selection of a disease, independent of morality or blame."

An early doubter

Armstrong, a pioneer of the field of bioarcheology, was one of the doubters decades ago, when he first heard the Columbus theory for syphilis. "I laughed at the idea that a small group of sailors brought back this disease that caused this major European epidemic," he recalls.

While teaching at the University of Massachusetts, he and graduate student Brenda Baker decided to investigate the matter and got a shock: All of the available evidence at the time actually supported the Columbus theory. "It was a paradigm shift," Armstrong says. The pair published their results in 1988.

In 2008, Harper and Armstrong published the most comprehensive comparative genetic analysis ever conducted on syphilis's family of bacteria. The results again supported the hypothesis that syphilis, or some progenitor, came from the New World.

A second, closer look

But reports of pre-Columbian skeletons showing the lesions of chronic syphilis have kept cropping up in the Old World. For this latest appraisal of the skeletal evidence, the researchers gathered all of the published reports.

They found that most of the skeletal material did not meet at least one of the standardized, diagnostic criteria for chronic syphilis, including pitting on the skull known as caries sicca and pitting and swelling of the long bones.

The few published cases that did meet the criteria tended to come from coastal regions where seafood was a big part of the diet. The so-called "marine reservoir effect," caused by eating seafood which contains "old carbon" from upwelling, deep ocean waters, can throw off radiocarbon dating of a skeleton by hundreds, or even thousands, of years. Analyzing the collagen levels of the skeletal material enabled the researchers to estimate the seafood consumption and factor that result into the radiocarbon dating.

"Once we adjusted for the marine signature, all of the skeletons that showed definite signs of treponemal disease appeared to be dated to after Columbus returned to Europe," Harper says.

"The origin of syphilis is a fascinating, compelling question," Zuckerman says. "The current evidence is pretty definitive, but we shouldn't close the book and say we're done

with the subject. The great thing about science is constantly being able to understand things in a new light."

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