

Pressemitteilung

Universität Basel

Christian Heuss

24.01.2024

<http://idw-online.de/de/news827434>

Forschungsergebnisse, Wissenschaftliche Publikationen
Biologie, Geschichte / Archäologie, Kulturwissenschaften, Medizin
überregional



Syphilis-like diseases were already widespread in America before the arrival of Columbus

Researchers at the Universities of Basel and Zurich have discovered the genetic material of the pathogen *Treponema pallidum* in the bones of people who died in Brazil 2,000 years ago. This is the oldest verified discovery of this pathogen thus far, and it proves that humans were suffering from diseases akin to syphilis – known as treponematoses – long before Columbus’s discovery of America. The new findings, published in the scientific journal *Nature*, call into question previous theories concerning the spread of syphilis by the Spanish conquistadors.

The history of the emergence and spread of infectious diseases was of great importance for global health even before the Covid-19 pandemic. With modern laboratory methods, researchers can now detect the tiniest traces of DNA from pathogens in prehistoric finds. That means they can trace back how these pathogens spread historically and their evolutionary development.

An international research group led by Professor Verena Schünemann from the University of Basel, formerly at the University of Zurich, in collaboration with ETH Zurich and the Universities of Vienna and Sao Paulo, examined prehistoric bones belonging to four individuals who died 2,000 years ago in the coastal region of Santa Caterina in Brazil. For some of the individuals visible pathological changes to the prehistoric bones were detected which could indicate that the deceased were suffering from an illness similar to syphilis.

Prehistoric DNA from bones dating over 2,000 years old

The researchers used dentists’ drilling tools to remove minuscule samples of bone under sterile conditions. From those samples they isolated prehistoric genetic material (ancient DNA) belonging to the syphilis pathogen. Their study, published in the renowned scientific journal *Nature*, demonstrates that all the bacterial genomes that have been investigated can be attributed to the *Treponema pallidum* endemicum strain – that is, the pathogen that leads to bejel.

Treponematoses are a group of infectious diseases that includes the sexually transmitted disease syphilis. While syphilis as a venereal disease presents a global health risk, bejel, which is spread by skin contact, only occurs today in very arid regions of Africa and Asia.

“Our study has been able to show that endemic syphilis was already present in humid zones of Brazil around 2,000 years ago,” says Schünemann. This means that people were already becoming infected with endemic syphilis, probably via skin contact, more than 1,000 years before the arrival of Columbus in the New World.

Syphilis-like diseases originated pre-Columbus

Intense debates are still ongoing today among specialists and medical historians concerning whether Christopher Columbus's sailors and soldiers brought sexually transmitted syphilis from the New World to the Old upon their return in 1492. The illness spread rapidly from the end of the 15th century onwards, particularly in harbor towns.

"The fact that the findings represent an endemic type of treponemal diseases, and not sexually transmitted syphilis, leaves the origin of the sexually transmitted syphilis still unsettled," says Kerttu Majander, postdoctoral researcher at the University of Basel and one of the lead authors of the study. However, the authors consider that there is a lot to suggest that treponematoses were already widespread in Europe before Columbus's time.

"As we have not found any sexually transmitted syphilis in South America, the theory that Columbus brought syphilis to Europe seems to appear more improbable," agrees Schünemann. In point of fact, earlier discoveries by her group, for example in Finland and Poland, suggest that some forms of treponematoses already existed in Europe too.

Recombination could have driven the development of syphilis-like diseases

Many species of bacteria exchange traits that are of evolutionary benefit via what is known as horizontal gene transfer, or recombination. A comparison between the prehistoric DNA in the bones from Brazil and today's pathogens shows that such recombination events have indeed taken place. "We cannot pinpoint exactly when this exchange took place, but it is probably one of the driving mechanisms in the divergence between the subspecies that cause different treponemal infections," says Marta Pla-Díaz of the University of Basel, the other lead author of the study.

The DNA comparison also allows the date of the *Treponema pallidum* family's emergence to be deduced. Their investigations show that these pathogens have arisen at some point between 12,000 and 550 BCE. The history of these pathogens therefore stretches much further back than previously assumed.

"Although the origin of syphilis still leaves room for imagination, at least we now know beyond a doubt that treponematoses were no strangers to the American inhabitants who lived and died centuries before the continent was explored by Europeans," concludes Schünemann. She and her team are confident that advances in the analysis of prehistoric DNA could also lead to the discovery of the origin of venereal syphilis.

wissenschaftliche Ansprechpartner:

Professor Verena Schünemann, University of Basel, Department of Environmental Sciences, tel.: +41 61 207 42 11, email: verena.schuenemann@unibas.ch

Originalpublikation:

Kerttu Majander, Marta Pla-Díaz, et al.

Redefining the treponemal history through pre-Columbian genomes from Brazil

Nature (2024), doi: [10.1038/s41586-023-06965-x](https://doi.org/10.1038/s41586-023-06965-x)

<https://doi.org/10.1038/s41586-023-06965-x>



Skeleton at the site in Jubuicabeira II, Brazil.
Photo: Dr. Jose Filippini