

Scientific 'detective work' with South American mummies reveals they were brutally murdered

September 9 2022



The Marburg male mummy – macroscopic views of the whole mummy. Credit:

A-M Begerock, R Loynes, OK Peschel, J Verano, R Bianucci, I Martinez Armijo, M González, AG Nerlich

How frequent was violence in prehistoric human societies? One way to measure this is to look for trauma in prehistoric human remains. For example, a recent review of pre-Columbian remains found evidence of trauma from violence in 21% of males. So far, most studies of this kind have focused on skulls and other parts of the skeleton, but a potentially richer source of information are mummies, with their preserved soft tissues.

Now in a new study in *Frontiers in Medicine*, researchers use 3D computed tomography (3D CT) to examine three mummies from pre-Columbian South America, conserved since the late 19th century in European museums.

"Here we show lethal [trauma](#) in two out of three South American mummies that we investigated with 3D CT. The types of trauma we found would not have been detectable if these human remains had been mere skeletons," said Dr. Andreas G Nerlich, a professor at the Department of Pathology of Munich Clinic Bogenhausen in Germany, the study's corresponding author.

Nerlich and colleagues studied a male [mummy](#) at the Museum Anatomicum of the Philipps University Marburg, Germany, as well as a female and a male mummy at the Art and History Museum of Delémont, Switzerland. Mummies can form naturally when dry environments, for example in deserts, soak up fluids from a decomposing body faster than the decay can proceed—conditions common in the southern zones of South America.

Died between 740 and 1120 years ago

The Marburg mummy belonged to the Arica culture in today's northern Chile, and judging from the grave goods found with him, must have lived in a fishing community. Buried squatting down, he had well-preserved but misaligned [teeth](#) with some abrasions, as is typical for pre-Columbian people who used maize as a staple food. His lungs showed scars from past severe tuberculosis. From the features of the bones, the authors estimated that he was a young man between 20 and 25 years old, approximately 1.72 meters tall. He died between 996 and 1147 CE, as the radiocarbon results showed.

The Delémont mummies probably came from the region of Arequipa in today's southwestern Peru, based on the ceramics among the grave goods. Both were buried lying face up, which is unusual for mummies from the highlands of South America. Radiocarbon data showed that the man died between 902 and 994 CE, and the woman between 1224 and 1282 CE. They wore textiles woven from cotton and hairs of llamas or alpacas as well as vizcachas, rodents related to chinchillas. The state of the aorta and large arteries showed that the man suffered from calcifying arteriosclerosis in life.



The “Delémont man” (right) and the “Delémont woman” (left) – overview of the two mummies in their repository case. Credit: A-M Begerock, R Loynes, OK Peschel, J Verano, R Bianucci, I Martinez Armijo, M González, AG Nerlich

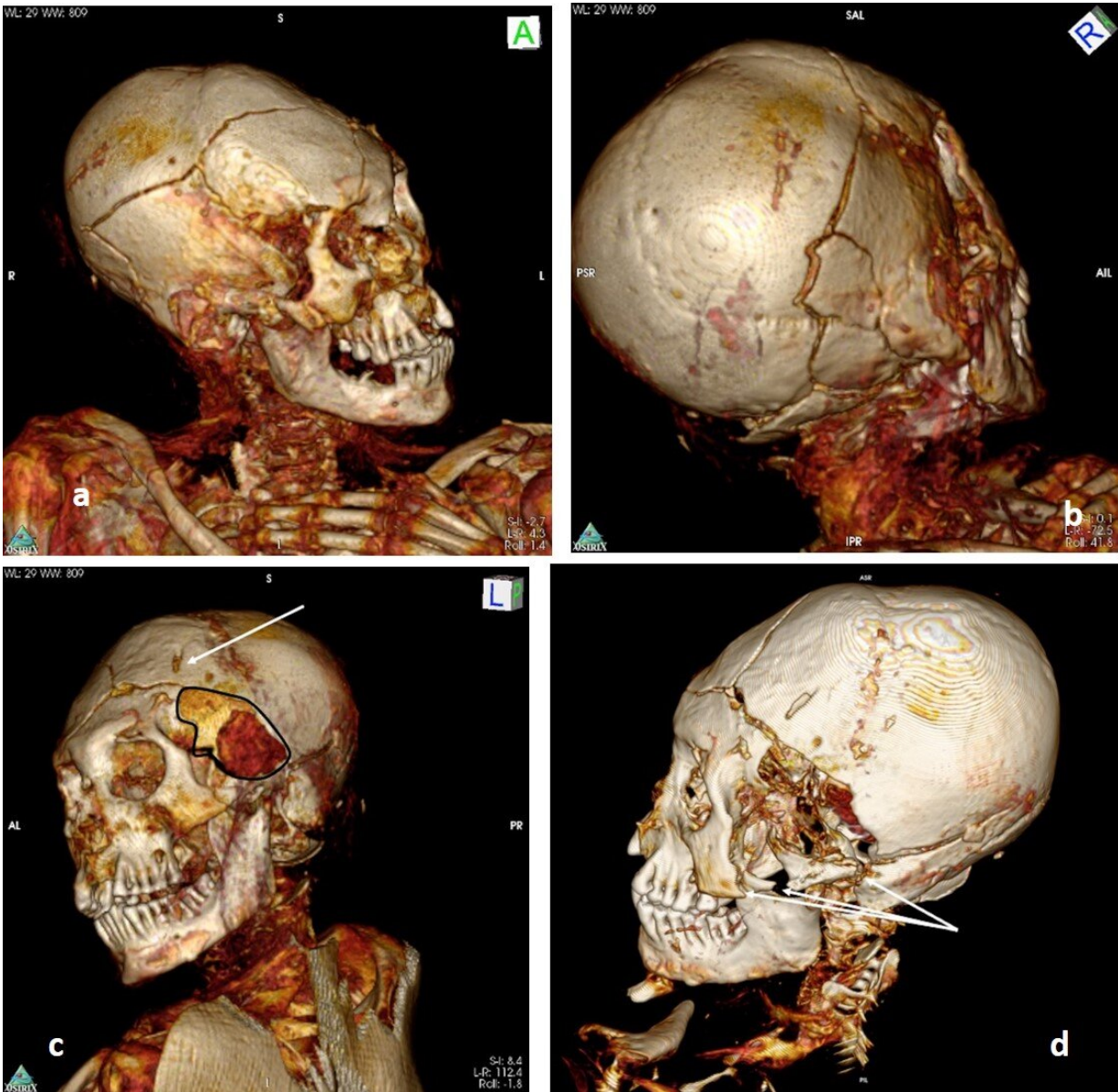
Two murder victims

The results show that both male mummies had died on the spot from extreme intentional [violence](#). The authors reconstructed that the Marburg mummy had died because either "one assaulter hit the victim with full

force on the head and [a] second assaulter stab[bed] the victim (who still was standing or kneeling) in the back. Alternatively, the same or another assaulter standing on the right side of the victim struck the head and then turned to the back of the victim and stabbed him."

Similarly, the male mummy from Delémont showed "massive trauma against the cervical spine which represent[s] most likely the cause of death. The significant dislocation of the two cervical vertebral bodies itself is lethal and may have led to immediate death."

Only the female mummy had died of natural causes. She also showed extensive damage to the [skeleton](#), but this occurred after death, probably during burial and not on purpose.



3D CT scan of the skull of the Délémont male mummy. (a-d): Features of perimortem skull trauma to the left side of the skull with a large perforating lesion at the left temporal region (arrow) and a fracture running into the skull. (d) shows the zygoma's fracture of the left side (arrows). Credit: A-M Begerock, R Loynes, OK Peschel, J Verano, R Bianucci, I Martinez Armijo, M González, AG Nerlich

Nerlich said, "The availability of modern CT scans with the opportunity for 3D reconstructions offers unique insight into bodies that would otherwise not have been detected. Previous studies would have either destroyed the mummy, while X-rays or older CT scans without three-dimensional reconstruction functions could not have detected the diagnostic key features we found here.

"Importantly, the study of human mummified material can reveal a much higher rate of trauma, especially intentional trauma, than the study of skeletons. There are dozens of South American mummies which might profit from a similar investigation as we did here."

More information: Trauma of Bone and Soft Tissues in South American Mummies—New Cases Provide Further Insight into Violence and Lethal Outcome, *Frontiers in Medicine* (2022). [DOI: 10.3389/fmed.2022.962793](https://doi.org/10.3389/fmed.2022.962793)

Provided by Frontiers

Citation: Scientific 'detective work' with South American mummies reveals they were brutally murdered (2022, September 9) retrieved 17 April 2024 from <https://phys.org/news/2022-09-scientific-south-american-mummies-reveals.html>

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