

DNA from Inca boy sacrificed 500 years ago shows how humans spread to South America

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The inset shows a picture of a portion of dissected lung from the mummy. A small piece of 350 mg was used for DNA extraction. Credit: (c) 2015 *Scientific Reports* (2015). DOI: 10.1038/srep16462

It sounds like something straight out of a "Hunger Games" novel: The rulers of a sprawling empire select beautiful children from throughout their vast territories and kill them in a ritualistic event to reinforce their power.

During the Inca civilization, which thrived in South America before the arrival of Europeans, these ritual sacrifices were known as "capococha." One of the victims was a 7-year-old boy who lived more than 500 years ago. His frozen, mummified remains were discovered at the edge of Argentina's Aconcagua, the tallest mountain outside of Asia.

Hikers found the mummy in 1985. Now, 30 years later, scientists have sequenced some of the boy's DNA and used it to learn more about the rise and extent of the Inca Empire. Their findings were published Thursday in the journal *Scientific Reports*.

Using a small sample of the boy's lung, researchers were able to piece together his entire mitochondrial genome. This is the DNA that powers the mitochondria, the energy sources inside cells. Unlike nuclear DNA, which comes from both parents, mitochondrial DNA contains only 37 genes that are passed down virtually unchanged from mother to child. The study authors said this was the first time scientists had decoded all of the mitochondrial DNA from a Native American mummy.

Members of the research team [\[?\]](#) from the University of Santiago de Compostela in Spain and the Argentine Forensic Anthropology Team, a scientific nonprofit organization [\[?\]](#) went to great lengths to make sure that the boy's DNA wasn't contaminated by any modern genetic material. They extracted the lung sample in a sterile operating room while wearing full-body suits, gloves and face screens. All of their equipment was cleaned in an autoclave and irradiated with UV to kill any contemporary DNA that might be present.

In addition, everyone who worked with the ancient sample had their mitochondrial DNA sequenced and cross-checked. (There was no overlap between their DNA and that of the Inca boy.)

To get the ancient DNA, the researchers extracted a 350-milligram

sample from the inside of the boy's lung and placed it in a Petri dish. The DNA was extracted, amplified in a PCR machine and sequenced in two separate laboratories. Both labs got the same results.

Those results placed the boy "perfectly" within a genetic population, or haplogroup, known as C1b that is typical of Native Americans, the study authors reported. Previous research has established that one of the people who first populated the Americas brought this genetic signature from Beringia (the land mass that once connected Siberia and Alaska) or the northern tip of North America.

However, the boy's mitochondrial genome had 10 distinct mutations that had not been seen together before in either ancient or modern DNA. The researchers named this branch of the haplotype "C1bi" (the "i" stands for Inca). The fact that his genetic signature was unique offers further evidence that the DNA sample wasn't contaminated, the researchers wrote.

Some of those 10 mutations are or were shared by others, and the researchers used that information to make some educated guesses about the boy's life and times. Most likely, his ancestors had been in South America for a long time, originating near the Andes about 14,000 years ago, they wrote.

When the researchers looked back to the most recent common ancestors the boy shared with people in other genetic groups, they found that their ages and locations matched up well with what historians knew about how the Inca civilization spread.

If scientists were to test the mitochondrial DNA of many more people alive today, they might turn up one of the boy's relatives, they wrote. If they can't be found, that would also provide important clues about "changes in the gene pool of South America since the period of the Inca

civilization," they wrote.

More information: Alberto Gómez-Carballa et al. The complete mitogenome of a 500-year-old Inca child mummy, *Scientific Reports* (2015). [DOI: 10.1038/srep16462](https://doi.org/10.1038/srep16462)

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