

about 2,300 years later still. The fifth specimen was not dated because of its condition. Only the woman's skull had a long, narrow shape, which is known as dolichocephaly.

To gauge whether the Lauricocha residents were descended from members of more than one migration, the team sequenced the DNA from their mitochondria, cellular organelles that are passed directly from mother to child, and thus trace maternal ancestry. All five people were found to be descended from maternal lines that are common among modern and ancient indigenous people of North and South America. The males' Y chromosomes put them on a lineage that arose in the region around the Bering Strait some 17,000 years ago — the most widely accepted time and place for the original human migration into the Americas. These and other DNA data suggested that all the Lauricocha humans are descended from the first humans to reach the Americas, supporting one migration into South America.

Not everyone accepts the argument. Such a wide-ranging conclusion cannot be drawn from a handful of remains found at a single site, says Tom Dillehay, an archaeologist at Vanderbilt University in Nashville, Tennessee. He argues that the 5,000-year gap between the earliest inhabitants at Monte Verde, which Dillehay excavated, and the earliest Lauricocha skeletons leaves the door open for earlier migrations.

“There may well be a single migration — they don't have the evidence for it,” he says.

Ancient human DNA from other parts of South America, such as the Amazon, may yet point to a second migration into the continent, agrees Fehren-Schmitz. His team is now analysing full genomes from Lauricocha and other South American sites to obtain a fuller picture of the continent's past.

Deborah Bolnick, a biological anthropologist at the University of Texas at Austin, accepts the argument for a single migration. But regardless of the number of waves, there would have been further population movements after that initial, southbound founding trek, she says, adding that analysis of full genomes from ancient South Americans will give a more nuanced picture of the continent's prehistory. Researchers studying ancient DNA have found evidence for a massive migration from present-day Russia and Ukraine into western Europe around 4,500 years ago², and Bolnick says that similar upheavals are bound to have happened in the Americas. In a 2014 paper, for instance, Fehren-Schmitz documented a migration into the Central Andes about 1,400 years ago, possibly driven by drought in lower-lying areas³.

Ancient South American genomes may also show how humans adapted to the New World. In a separate study, Fehren-Schmitz and his colleagues looked at a gene variant that protects

against altitude sickness. Between around 8,500 and 600 years ago, the presence of the variant increased markedly among the Andeans.

Fehren-Schmitz says that the finding is merely suggestive of local adaptation. But with full, ancient genomes in hand, researchers will be able to look more thoroughly for signs of adaptation to high altitude, says Bolnick. With that question in mind, her team is sequencing DNA from remains of mountain residents of Argentina. Ancient genomes from the Americas may also reveal how humans adapted to shifts in diet — early Americans domesticated maize (corn), potato and other crops — and to diseases imported from Europe, such as smallpox. South American prehistory, it seems, is about to get a lot more complicated. ■

1. Walter, A., Neves, W. A. & Hubbe, M. *Proc. Natl Acad. Sci. USA* **102**, 18309–18314 (2005).
2. Callaway, E. *Nature* **518**, 284–285 (2015).
3. Fehren-Schmitz, L. *et al. Proc. Natl Acad. Sci. USA* **111**, 9443–9448 (2014).

CORRECTION

The Editorial ‘Highway to health’ (*Nature* **520**, 407; 2015) stated that the African Centres for Disease Control and Prevention would need at least \$300 million and 60 staff members. This should have read \$60 million and 300 staff.