Paleogenomic analysis of archaeological leather samples from indigenous archaeological sites in Las Cañadas del Teide (Canary Islands, Spain)

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Résumé

Las Cañadas del Teide National Park is located in the high mountain area of Tenerife (Canary Islands). This territory has been occupied by human populations from pre-Hispanic to modern times. Consequently, we can find ample evidence of human presence within the National Park. Although many activities were developed in this space, the most representative indigenous archaeological sites in Las Cañadas del Teide are burial caves dated between 970-1050 AD to 1500-1580 AD. Optimal conservation conditions have allowed the recovery of leather pieces that the indigenous people used to wrap up the body of their deceased. Because their livestock mainly consisted of goats, sheep and pigs, this type of material offers the possibility of using new paleogenomic techniques to determine the species from which they were obtained. However, ancient DNA extraction from leather is challenging because the tanning process strongly degrades the genetic material and further complicates analyses due to the presence of enzyme inhibitors. In this study, we tested the use of two different DNA extraction methods (Wales & Kistler (2019) and a protocol modified from Kistler (2011)) and two bioinformatic pipelines (hypothesis-free and biased approaches) to the identification of Canarian indigenous leather samples. We recovered endogenous DNA using the protocol proposed by Wales & Kistler (2019), consisting of lysis with proteinase K and phenol:chloroform purification followed by silica spin column-based purification. We successfully identify goat (*Capra hircus*) as the best candidate for the leather sample species using the hypothesis-free metagenomic analysis and thus propose this method as the most appropriate for highly degraded samples. This is, to our knowledge, the first time an ancient leather sample has been successfully identified using next-generation sequencing, highlighting its potential as an ancient DNA source. The identification of the use of goat leather by the indigenous people in Las Cañadas is in agreement with biological, ecological and cultural evidence pointing to them as the more adapted livestock to survive in this high mountain environment. This result, added to the whole set of zooarchaeological evidence, allows us to propose that goats were the animal chosen for grazing in Las Cañadas del Teide.

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