First DNA study of ancient Eastern Arabians reveals malaria adaptation

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People living in ancient Eastern Arabia appear to have developed resistance to malaria following the appearance of agriculture in the region around five thousand years ago, a new study reveals.

DNA analysis of the remains of four individuals from Tylos-period Bahrain (300 BCE to 600 CE)—the first ancient genomes from Eastern Arabia—revealed the malaria-protective G6PD Mediterranean mutation in three samples.

The discovery of the G6PD Mediterranean mutation in ancient Bahrainis suggests that many people in the region's ancient populations may have enjoyed protection from malaria. In the present day, among the populations examined, the G6PD mutation is detected at its peak frequency in the Emirates, the study indicates.

Researchers discovered that the ancestry of Tylos-period inhabitants of Bahrain comprises sources related to ancient groups from Anatolia, the Levant and Caucasus/Iran. The four Bahrain individuals were genetically more like present-day populations from the Levant and Iraq than to Arabians. The group published their findings in *Cell Genomics*.

Experts from Liverpool John Moores University, the University of Birmingham Dubai, and the University of Cambridge worked with the Bahrain Authority for Culture and Antiquities and other Arabian institutes such as the Mohammed Bin Rashid University of Medicine and Health Sciences, Dubai, as well as research centers in Europe, including Université Lumière Lyon 2, Trinity College Dublin, and others.

Lead researcher Rui Martiniano, from Liverpool John Moores University, said, "According to our estimates, the G6PD Mediterranean mutation rose in frequency around 5–6 thousand years ago—coinciding with the onset of agriculture in the region, which would have created ideal conditions for the proliferation of malaria."

Due to poor ancient DNA preservation in hot and humid climates, no ancient DNA from Arabia has been sequenced until now—preventing the direct examination of the genetic ancestry of its past populations.

Marc Haber, from the University of Birmingham Dubai, said, "By obtaining the first ancient genomes from Eastern Arabia, we provide unprecedented insights into human history and disease progression in this region. This knowledge goes beyond historical understanding, providing predictive capabilities for disease susceptibility, spread, and treatment, thus promoting better health outcomes."

"The rich population history of Bahrain, and more generally of Arabia, has been severely understudied from a genetic perspective. We provide the first genetic snapshot of past Arabian populations—obtaining important insights about malaria adaptation, which was historically endemic in the region," commented Fatima Aloraifi, from the Mersey and West Lancashire NHS Trust.

Salman Almahari, Director of Antiquities and Museums at the Bahrain Authority for Culture and Antiquities, states, "Our study also paves the way for future research that will shed light on human population movements in Arabia and other regions with harsh climates where it is difficult to find well-preserved sources of DNA."

Data gathered from the analysis of the four individuals' remains allowed researchers to characterize the genetic composition of the region's pre-Islamic inhabitants—insights that could only have been obtained by directly examining ancient DNA sequences.

Researchers collected ancient human remains from archaeological collections stored at the Bahrain National Museum. They extracted DNA from 25 individuals, but only four were sequenced to higher coverage due to poor preservation.

Richard Durbin, from the University of Cambridge, who supervised the project, says "It is exciting to have been able to analyze ancient human genetic data from the remarkable burial mounds of Bahrain. We would

like to thank our colleagues in the Bahrain Authority for Culture and Antiquities for their support and contributions."

The finding of malaria adaptation agrees with archaeological and textual evidence that suggested malaria was historically endemic in Eastern Arabia, while the DNA ancestry of Tylos-period inhabitants of Bahrain corroborates archaeological evidence of interactions between Bahrain and neighboring regions.

More information: Ancient genomes illuminate Eastern Arabian population history and adaptation against malaria, *Cell Genomics* (2024). DOI: 10.1016/j.xgen.2024.100507. www.cell.com/cell-genomics/ful … 2666-979X(24)00034-X

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