UK's oldest human DNA obtained, revealing two distinct Paleolithic populations

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The first genetic data from Paleolithic human individuals in the U.K.—the oldest human DNA obtained from the British Isles so far—indicates the presence of two distinct groups that migrated to Britain at the end of the last ice age, according to new research.

Published today in *Nature Ecology and Evolution*, the new study by UCL Institute of Archaeology, the Natural History Museum and the Francis Crick Institute researchers reveals for the first time that the recolonization of Britain consisted of at least two groups with distinct origins and cultures.

The study team explored DNA evidence from an individual from Gough's Cave, Somerset, and an individual from Kendrick's Cave, North Wales, who both lived more than 13,500 years ago. Very few skeletons of this age exist in Britain, with around a dozen found across six sites in total. The study, which involved radiocarbon dating and analysis as well as DNA extraction and sequencing, shows that it is possible to obtain useful genetic information from some of the oldest human skeletal material in the country.

The authors say that these genome sequences now represent the earliest chapter of the genetic history of Britain, but ancient DNA and proteins promise to take us back even further into human history.

The researchers found that the DNA from the individual from Gough's Cave, who died about 15,000 years ago, indicates that her ancestors were part of an initial migration into northwest Europe around 16,000 years ago. However, the individual from Kendrick's Cave is from a later period, around 13,500 years ago, with his ancestry from a western hunter-gatherer group. This group’s ancestral origins are thought to be from the near East, migrating to Britain around 14,000 years ago.

Study co-author Dr. Mateja Hajdinjak (Francis Crick Institute) said, “Finding the two ancestries so close in time in Britain, only a millennium or so apart, is adding to the emerging picture of Paleolithic Europe, which is one of a changing and dynamic population.”

The authors note that these migrations occurred after the last ice age when approximately two-thirds of Britain was covered by glaciers. As the climate warmed and the glaciers melted, drastic ecological and environmental changes took place and humans began to move back into northern Europe.

Study co-author Dr. Sophy Charlton, who undertook the study whilst at the Natural History Museum, said, “The period we were interested in, from 20–10,000 years ago, is part of the Paleolithic—the Old Stone Age. This is an important time period for the environment in Britain, as there would have been significant climate warming, increases in the amount of forest, and changes in the type of animals available to hunt.”
Human jaw from Kendrick’s Cave dated to approximately 13,600 year ago. DNA was analyzed from this individual. Credit: R. Stevens

As well as genetically, the two groups were found to be culturally distinct, with differences in what they ate and how they buried their dead.

Study co-author Dr. Rhiannon Stevens (UCL Institute of Archaeology) said, "Chemical analyses of the bones showed that the individuals from Kendrick’s Cave ate a lot of marine and freshwater foods, including large marine mammals.

"Humans at Gough's Cave, however, showed no evidence of eating marine and freshwater foods, and primarily ate terrestrial herbivores such as red deer, bovids (such as wild cattle called aurochs) and horses."

The researchers discovered that the mortuary practices of the two groups also differed. Although there were animal bones found at Kendrick's Cave, these included portable art items, such as a decorated horse jawbone. No animal bones were found that showed evidence of being eaten by humans, and the scientists say that this indicates the cave was used as a burial site by its occupiers.

In contrast, animal and human bones found in Gough's Cave showed significant human modification, including human skulls modified into "skull-cups," which the researchers believe to be evidence for ritualistic cannibalism. Individuals from this earlier population seem to be the same people who created the Magdalenian stone tools, a culture known also for iconic cave art and bone artifacts.

Gough's Cave is also the site where Britain's famous Cheddar Man was discovered in 1903, dated to 10,564–9,915 years BP. In this study, Cheddar Man was found to have a mixture of ancestries, mostly (85%) western hunter-gatherer and some (15%) of the older type from the initial migration.

Co-author Dr. Selina Brace (Natural History Museum) said, "We really wanted to find out more
about who these early populations in Britain might have been.

"We knew from our previous work, including the study of Cheddar Man, that western hunter-gatherers were in Britain by around 10,500 years BP, but we didn't know when they first arrived in Britain, and whether this was the only population that was present."


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