

Tooth plaque provides unique insights into our prehistoric ancestors' diet

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This is one of the three richest Late Meroitic graves identified at the cemetery, that of a young male. Credit: Donatella Usai/Centro Studi Sudanesi and Sub-Saharan (CSSeS)

An international team of researchers has found new evidence that our prehistoric ancestors had a detailed understanding of plants long before the development of agriculture.

By extracting chemical compounds and microfossils from [dental calculus](#) (calcified dental plaque) from ancient teeth, the researchers were able to provide an entirely new perspective on our ancestors' diets. Their research suggests that purple nut sedge (*Cyperus rotundus*) – today regarded as a nuisance weed – formed an important part of the prehistoric diet.

Crucially, the research, published in *PLOS ONE* and led by the Universitat Autònoma de Barcelona and the University of York, suggests that prehistoric people living in Central Sudan may have understood both the nutritional and medicinal qualities of this and other plants.

The research was carried out at Al Khiday, a pre-historic site on the White Nile in Central Sudan. It demonstrates that for at least 7,000 years, beginning before the development of agriculture and continuing after agricultural plants were also available the people of Al Khiday ate the plant purple nut sedge. The plant is a good source of carbohydrates and has many useful medicinal and aromatic qualities.

Lead author Karen Hardy, a Catalan Institute for Research and Advanced Studies (ICREA) Research Professor at the Universitat Autònoma de Barcelona (UAB) and an Honorary Research Associate at the University of York, said: "Purple nut sedge is today considered to be a scourge in tropical and sub-tropical regions and has been called the world's most expensive weed due to the difficulties and high costs of eradication from agricultural areas. By extracting material from samples of ancient dental calculus we have found that rather than being a nuisance in the past, its value as a food, and possibly its abundant medicinal qualities were known. More recently, it was also used by the ancient Egyptians as perfume and as medicine.

"We also discovered that these people ate several other plants and we found traces of smoke, evidence for cooking, and for chewing plant

fibres to prepare raw materials. These small biographical details add to the growing evidence that [prehistoric people](#) had a detailed understanding of plants long before the development of agriculture."

Al Khiday is a complex of five archaeological sites which lie 25km south of Omdurman; one of the sites is predominantly a burial ground of pre-Mesolithic, Neolithic and Later Meroitic age. As a multi-period cemetery, it gave the researchers a useful long-term perspective on the material recovered.

The researchers found ingestion of the purple nut sedge in both pre-agricultural and agricultural periods. They suggest that the plant's ability to inhibit *Streptococcus mutans*, a bacterium which contributes to tooth decay, may have contributed to the unexpectedly low level of cavities found in the agricultural population.

Dr Stephen Buckley, a Research Fellow at the University of York's BioArCh research facility, conducted the chemical analyses. He said: "The evidence for purple nut sedge was very clear in samples from all the time periods we looked at. This plant was evidently important to the people of Al Khiday, even after agricultural plants had been introduced."

Dr Donatella Usai, from the Istituto Italiano per l'Africa e l'Oriente in Rome led the excavation and Dr Tina Jakob from Durham University's Department of Archaeology, performed the analysis of the human remains at Al Khiday. Anita Radini, an Archaeobotanist at the University of Leicester Archaeological Service (ULAS) and a PhD candidate at BioArCh, University of York, contributed to the analysis of microfossils found in the dental calculus samples.

Dr Usai said: "Al Khiday is a unique site in the Nile valley, where a large population lived for many thousands of years. This study demonstrates that they made good use of the locally available wild plant as food, as

raw materials, and possibly even as medicine."

Dr Hardy added: "The development of studies on chemical compounds and microfossils extracted from dental calculus will help to counterbalance the dominant focus on meat and protein that has been a feature of pre-agricultural dietary interpretation, up until now. The new access to plants ingested, which is provided by dental calculus analysis, will increase, if not revolutionise, the perception of ecological knowledge and use of [plants](#) among earlier prehistoric and pre-agrarian populations."

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More information: Dental calculus reveals unique insights into food items, cooking and plant processing in prehistoric Central Sudan, *PLOS ONE*, [dx.plos.org/10.1371/journal.pone.0100808](https://doi.org/10.1371/journal.pone.0100808)

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