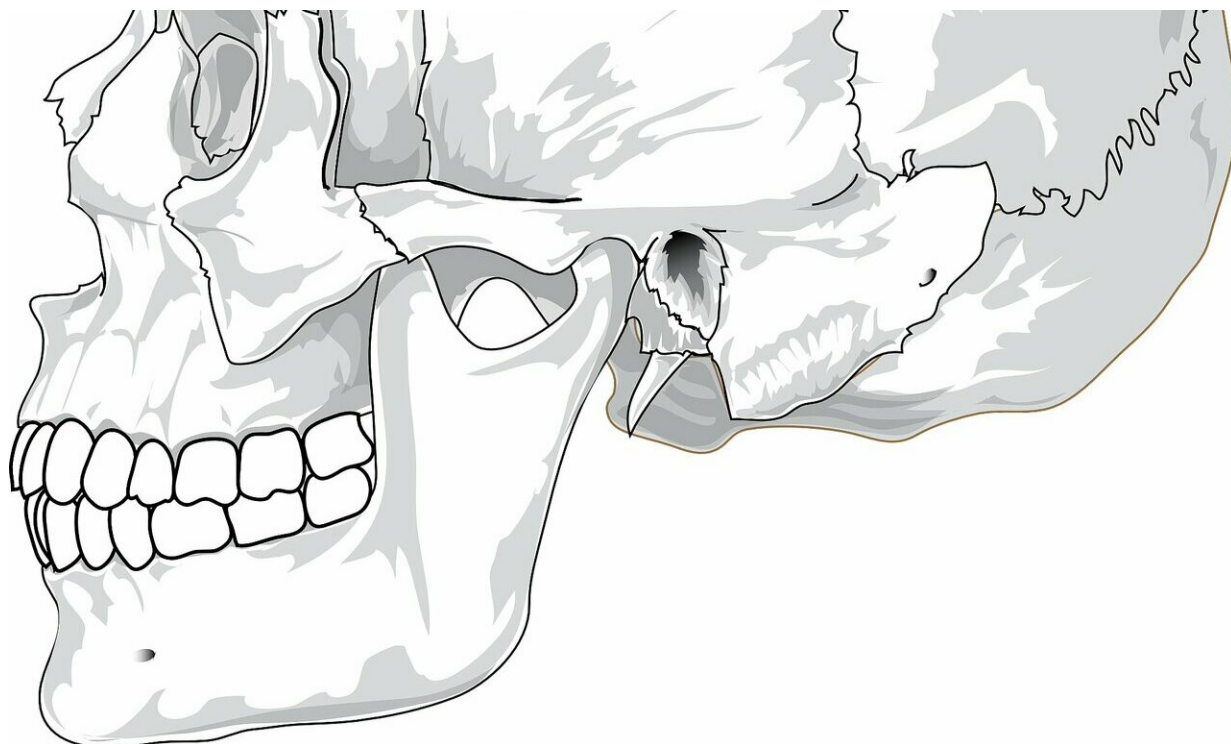


Extracting information from ancient teeth

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There's a surprising amount of information stored in the hardened plaque, or calculus, between teeth. And if that calculus belongs to the remains of a person who lived in ancient times, the information could reveal new insights about the past. But the tiny samples can be difficult to work with. Now, in ACS' *Journal of Proteome Research*, scientists apply a new method to this analysis, finding more proteins than

traditional approaches.

The human mouth is full of interesting molecules: DNA and enzymes in saliva, proteins and lipids from bits of food stuck between teeth, the bacterial citizens of the oral microbiome. Under the right conditions, those molecules can be preserved in dental calculus for thousands of years. Identifying the biomolecules preserved within ancient plaque gives researchers clues about how our ancestors lived, what they ate, what diseases they had and more. However, there's only so much plaque one can scrape off of old teeth, so it's important to apply methods that can extract the most information from minuscule samples. Although no gold-standard method for calculus analysis exists, filter-based techniques are often used, but they can be time consuming and can introduce contaminants. So, teams led by Michael Buckley and Cheryl Makarewicz wanted to see whether another method, called single-pot, solid-phase-enhanced [sample](#) preparation (SP3), could improve the number and complexity of protein fragments that could be analyzed from preserved [plaque](#).

The researchers, led by Karren Palmer, applied SP3 to the analysis of [calculus](#) from 153 ancient individuals dating from between the 1st and 4th century BCE. With SP3, functionalized magnetic beads grabbed onto protein fragments, making them easy to analyze by mass spectrometry. The researchers found that SP3 reliably increased the number of unique [protein](#) fragments they could identify in samples, including smaller peptides that two other methods, ultrafiltration and acetone precipitation, missed. SP3 was also easy to perform and less likely to introduce contaminants than the other methods. Using this approach, the researchers identified fragments of dairy proteins from the subjects' diets, as well as bacterial proteins that could shed light on ancient diseases.

More information: Karren S. Palmer et al. Comparing the Use of

Magnetic Beads with Ultrafiltration for Ancient Dental Calculus Proteomics, *Journal of Proteome Research* (2021). [DOI: 10.1021/acs.jproteome.0c00862](https://doi.org/10.1021/acs.jproteome.0c00862)

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