Dental calculus

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muses on a substance that endures long past its owner.

A part from the mathematical calculations required to run a modern dental practice, dental calculus has a history stretching eons into the past. By its preservation of gastronomic comestibles, dental calculus endures long after its mortal owner has died, providing an historic chronicle of long-past dietary intakes.

The build-up of microorganisms and food debris along the tooth crown that eventually calcifies through a complex process of mineralisation provides archaeologists and anthropologists with evidence of past and present human diets. The insights into the lifestyles that can be gleaned from the detritus embedded in dental calculus is astonishing. The indisputable evidence of the composition and contents of dental tartar reveals much about the environment from which food is procured.¹ The composition of human saliva provides a canvas upon which the food intake is encased in calculus.² Ecological dietary differences between Neandertals from continental Europe and the Mediterranean region of Southern Europe and the Near East have been discerned.^{3,4}

Moreover, the composition of dental calculus not only records food intake, but also the composition of the environment that provided the food. The incorporation of phytoliths in dental tartar provides evidence of the ingestion of fossil plants, indicative of ancient environments.⁵

The analysis of dental calculus provides micro-botanical evidence for the spread of cereal use during the Mesolithic-Neolithic transition in South Eastern Europe.⁶ Investigating plant micro-remains embedded in dental calculus of the Phoenician inhabitants of Motya (Sicily, Italy) reveals consumption.⁷

The health status and paleo diet of Mesolithic inhabitants of Motya, Sweden are revealed in a report by Norström E *et al.*⁸

Details of oral stress and palaeodietary changes among hunter-gatherers from the Negro River, Northern Patagonia, Argentina are detailed by Flensburg G *et al.*⁹

Remarkable ethnobotanical evidence has been gleaned from dental calculus of the Roman Imperial community inhabitants of the Ager Curenensis.¹⁰

Evidence of ferns as healing plants in medieval Mallorca, Spain has been revealed by analysis of dental tartar containing fern material.¹¹

The revelation of the ingestion of ancient alkaloids by detection of nicotine in calculus samples from the Americas has been reported by Eerkens J W *et al.*¹²

Moreover, direct evidence of fish and plant consumption in the Mesolithic Mediterranean has been provided by dental calculus and contained isotopes.¹³

The calcified biofilm of dental calculus as a cause of periodontitis has been explored by Akcali A *et al.*¹⁴

Insights into the inhabitants of the Copper-Bronze Age in central Italy have been revealed by plant micro-remains in dental calculus from Grotta dello Scoglietto (Southern Tuscany, Italy).¹⁵

The revelations that can be conjured from the dental debris that dental hygienists and periodontists are dedicated to delete provides an historical review of past and present diets. Our dietary preferences can be permanently embedded in our mouths for future odontologists to discern. ■

References

1. Liewerke A R. Diet and the aetiology of dental calculus. *Int J Osteoarchaeol* 1999; **9**: 219-232.
2. Tiwari M. Science behind human saliva. *J Nat Sci Biol Med* 2011; **2**: 53-58.
3. Droke J L, Schmidt C W, Williams F L *et al.* Regional variability in diet between Northern European and Mediterranean Neandertals: Evidence from dental microwear texture analysis. In Schmidt C W, Watson J T (eds). *Dental wear in evolutionary and biocultural contexts*. 1st edition. pp 225-241. San Diego: Elsevier Science Publishing Co Inc., 2020.
4. Droke J L. *Neandertal Dental Microwear Texture Analysis: A Bioarchaeological Approach*. Indianapolis (IN): University of Indianapolis, 2017. Available at: <https://uiindy.hkucommons.org/downloads/b46e9e40-b0bc-433c-89a1-d8c4d00ad453?locale=en> (accessed May 2021).
5. Weyrich L S, Dobney K, Cooper A. Ancient DNA Analysis of dental calculus. *J Hum Evol* 2015; **79**: 119-124.
6. Jovanović J, Power R C, de Becdelièvre C *et al.* Microbotanical evidence for the spread of cereal use during the Mesolithic-Neolithic transition in the Southeastern Europe (Danube Gorges): Data from dental calculus analysis. *J Archaeol Sci* 2020; **125**: 105288.
7. D'Agostino A, Canini A, Di Marco G, Nigro L, Spagnoli F, Gismondi A. Investigating plant micro-remains embedded in dental calculus of the Phoenician inhabitants of Motya (Sicily, Italy). *Plants (Basel)* 2020; **9**: 1395.
8. Norström E, Gustavsson R, Molin F, Gummesson S. Micro-fossil analysis of Mesolithic human dental calculus, Motya, Sweden - Indications of health status and paleo-diet. *J Archaeol Sci Rep* 2019; **26**: doi:10.1016/j.jasrep.2019.05.031.
9. Flensburg G, Serna A, Prates L. Oral stress and paleodiet change among hunter-gatherers from Negro River (northern Patagonia, Argentina) during the late Holocene. *Int J Osteoarchaeol* 2019; **29**: 1060-1071.
10. D'Agostino A, Gismondi A, Di Marco G *et al.* Lifestyle of Roman Imperial community: ethnobotanical evidence from dental calculus of the Ager Curenensis inhabitants. *J Ethnobiol Ethnomed* 2019; **15**: 62. doi:10.1186/s13002-019-0334-z.
11. Fiorin E, Sáez L, Malsosa A. Ferns as healing plants in medieval Mallorca, Spain? Evidence from human dental calculus. *Int J Osteoarchaeol* 2018; **29**: 82-90.
12. Eerkens J W, Tushingham S, Brownstein K J *et al.* Dental calculus as a source of ancient alkaloids: Detection of nicotine by LC-MS in calculus samples from the Americas. *J Archaeol Sci Rep* 2018; **18**: 509-515.
13. Cristiani E, Radini A, Boric D *et al.* Dental calculus and isotopes provide direct evidence of fish and plant consumption in Mesolithic Mediterranean. *Sci Rep* 2018; **8**: 8147. doi:10.1038/s41598-018-26045-9.
14. Akcali A, Lang N P. Dental calculus: the calcified biofilm and its role in disease development. *Periodontol 2000* 2018; **76**: 109-115.
15. Lippi M M, Pisaneschi L, Sarti L *et al.* Insights into the inhabitants of the Copper-Bronze Age in Central Italy: Plant microremains in dental calculus from Grotta dello Scoglietto (Southern Tuscany, Italy). *J Archaeol Sci Rep* 2017; **15**: 30-39. ✦

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