Animal Fats and Ancient Pyro-Technologies: Reading the Residues in Archaeological Hearth Deposits

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Résumé

Processing and combustion of animal products including bone, fat, and oil for food and fuel can provide a crucial source of calories, heat, and light in cold, fuel-poor environments. Previous studies have shown that remnant lipids from the combustion and processing of animal products preserve exceptionally well in many Arctic sites, and various terrestrial and aquatic lipid sources can be identified through combined molecular and isotopic analyses. Similar analyses could be applied to fire-related sediments from some Middle and Upper Paleolithic sites. However, there are added challenges to the detection and identification of lipid sources in very old deposits and those located in warmer environmental settings. Lipid concentrations in Middle and Upper Paleolithic combustion structures are expected to be much lower than those encountered in more recent Arctic sites. Furthermore, difficulties distinguishing certain more recent lipids from ancient lipids could introduce interpretive errors. Given these concerns, biomarker selection in this study has focused on compounds with greater long-term preservation potential than those typically relied upon in arctic settings. Our research is also focused on specific molecules that can be linked to combustion events. This talk will present data on the molecular and isotopic analysis of black layers from experimental fires as well as data from laboratory heating experiments. Experimental fires were constructed with various combinations of ruminant long-bones, seal oil, and wood. Laboratory heating experiments sought to produce the same biomolecules under more controlled conditions using a variety of animal tissues, temperature programs, and artificial sediments. Analysis of black layers from experimental fires and laboratory heating experiments have identified a suite of biomarkers formed through pyrolysis of animal fats, which are otherwise rare in the environment. Applications to Middle and Paleolithic fire-related sediments may provide a unique line of evidence on resource processing and technological behaviors related to heating, lighting, and food preparation.

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