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COMPOUND SPECIFIC RADIOCARBON DATING OF POTTERY VESSELS FROM THE LATE LA TENE SITE SKLARSKE VALLEY (SUMAVA MOUNTAINS, CZECH REPUBLIC)

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Fragments of archaeological pottery are one of the most common artefacts excavated in archaeological sites. However, radiocarbon dating of these artefacts nor their total lipid extracts have not brought reliable radiocarbon results due to wide spectrum of carbonaceous compounds from various reservoirs which contributed to the overall lipid composition. The only possibility is to use a compound-specific radiocarbon dating analysis (CSRA) approach to date specific biomarkers from the sample. In the case of pottery dating, the solution came with the advent of robust analytical chromatographic techniques. By using preparative gas chromatography to isolate the most concentrated fatty acids in pottery lipid extracts and subsequent AMS radiocarbon dating of these acids we are nowadays able to obtain reliable radiocarbon dates of archaeological pottery.

In this study, we extracted lipids from 24 fragments of the Late La Tène pottery excavated at the site of Sklarske Valley (Sumava Mountains, Czech Republic) to contribute an overall picture of dietary strategy at the site and to possibly obtain some AMS radiocarbon dates from the concentrated lipid extracts using CSRA approach. Total lipid extracts dominated by long saturated fatty acids, mostly by palmitic (C16:0) and stearic (C18:0) fatty acids. Plant lipids were confirmed by the presence of fatty alcohols, very long fatty acids, and alkanes. Further, resinous lipophilic biomarkers were confirmed by the presence of abietic acid derivatives, and the presence of long mid-chain ketones revealed high-temperature heating of some of the original vessels. The detected fatty acids and their distribution suggested an animal fat type source of the extracted compounds. This was also confirmed by the δ 13C and Δ 13C values of the palmitic and stearic fatty acids confirming mostly ruminant fat origin.

Two of the very concentrated lipid extracts were chosen for compound-specific radiocarbon analysis and were, thus, sampled for preparative GC technique to isolate C16 and C18 FAMEs which were then combusted to CO2, graphitized, and AMS radiocarbon dated. We were not able to get radiocarbon dates from C16 fatty acids as the amount of isolated carbon was not sufficient for subsequent radiocarbon dating (below 200 μ g of carbon). However, radiocarbon dates of C18 fatty acids showed a good agreement with the other dates obtained from the Sklarske Valley site and fitted well with the site chronology. Still, resulting intervals were quite broad and dates could be possibly improved by applying a solvent-less trapping technique to preparative GC process to maximally eliminate any introduction of contaminating exogenous carbon to the isolated sample. This improvement has been undergoing further research.

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