

## **Case Studies – Master M1 – Université Côte d’Azur**

### **PROPOSED STUDY**

**Comparing lipid profiles of triacylglycerols in archaeological and reference samples for the identification of animal fats processed in ceramic vessels**

**Aim:**

1. Given a set of data from chromatograms on triacylglycerols (TAG) distribution, establish statistical methods of comparison of the data
2. Likewise, study the differences between archaeological data and data published or obtained in the lab on contemporary reference materials
3. If temporally possible, study relationships between chemical and archaeological data (shape of the pottery, amount of lipids, triacylglycerol distribution, etc.)

Natural substances such as milk, beeswax, plant oils or animal fats are very poorly known for Prehistory because they are badly preserved in the archaeological record.

Their chemical analysis is necessary, especially by gas chromatography and mass spectrometry, to determine their nature, their origin and their degree of transformation and degradation.

Archaeological samples take the form, for example, of carbonised residues on tools or objects or invisible substances that are absorbed into the porous walls of ceramic vessels.

After extracting lipids from these matrices, chromatograms are obtained from which the molecules detected can be quantified.

A class of lipids, the triacylglycerols, is of particular interest. The data obtained consist of tables of retention time (time necessary for the molecule to travel through the chromatographic system) and area of each peak. The distribution of these triacylglycerols may be diagnostic of an origin (sheep, goat, cow, dairy products, etc.) but at the moment, it is not possible to establish objective comparisons.

The purpose of this training will thus be, for a set of data obtained on about 50 archaeological vessels, to investigate statistical methods (i.e., Principal Component Analysis, Hierarchical Clustering, ...) to compare different distributions of TAG and to compare them with reference samples.

In a second step, the correlation between these data and other archaeological and chemical data (lipid concentration, shape of the pottery, other molecular compounds identified, etc.) could also be investigated, in order to obtain a more comprehensive characterisation of the archaeological samples.

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