



1. THASIAN CIRCLE : Metabolomic analysis of amphora organic content



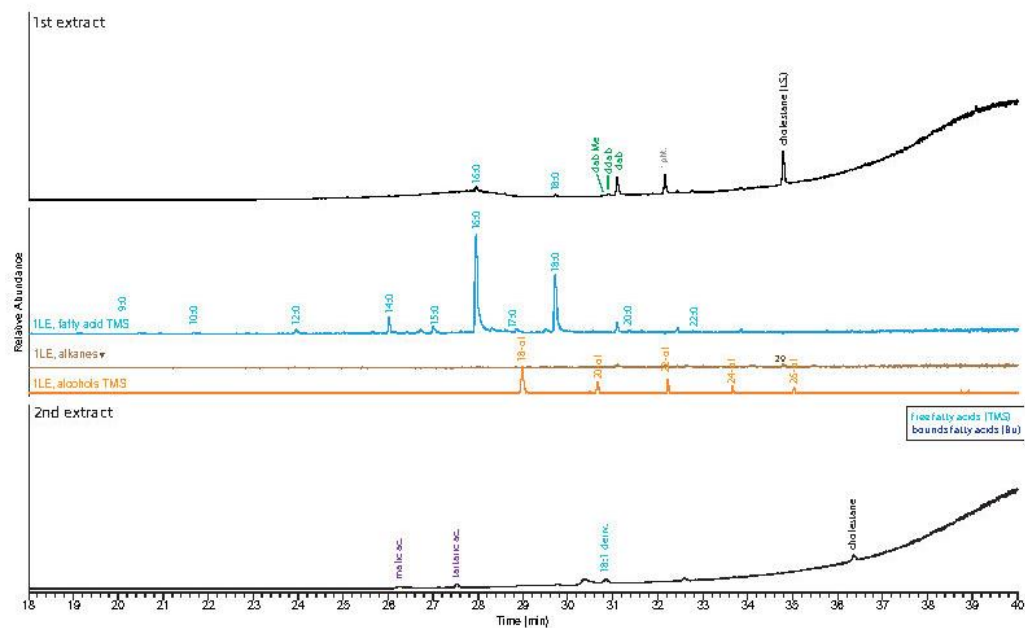
Harbor of Apollonia pontica. Last third of the 5th c. BC

This amphora posed many problems for the analysis of its two extracts. Its very high inorganic sulfur content (molecular sulfur of formula S₈) deteriorated the GC column by adsorbing onto the column phase, and greatly soiled the mass spectrometer source by adsorbing onto the metal parts of the source and quadrupoles. The column had to be cut to remove the injected sulfur, then finally discarded and replaced by a new one. As the MS source is highly polluted, the ionized molecules in the source stick to the walls and sulfur and are no longer detected, resulting in a very weak signal. As a result, the sample cannot be analyzed.

Our results are as follows:

- first lipid extract showing a very weak and poorly resolved chromatographic profile, composed of conifer pitch markers and fats (fatty acids). No sterols were detected due to heavy pollution.
- Second extract: low levels of tartaric and malic acids, cTar 18.18 µg/g, Mal/Tar 3.18, characteristic ratio of a fruit rich in malic acid. Apple can be ruled out.

Conclusion. - The amphora was waterproofed with a mixture of sulfur and conifer pitch. The very high concentration of sulfur did not allow us to obtain correct results and partially damaged the material. However, we were able to identify a fruit rich in malic acid (*Rosaceae* other than apple).



Chromatograms of the first and second lipid extracts obtained from impregnations of the amphora, trimethylsilylated (ZB5-MSi column, Exactive mode EI detector 70 eV resolution 60k).