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The Final Bronze Age was a key period for Human history in the Alps since numerous human occupations developed on lake shores attest to an increased anthropication of alpine ecosystems at that time [1]. Successions of abandonment and occupations were most probably climatically-driven through lacustrine level variations [2]. Our recent results on a sediment core drilled in Lake le Bourget provide a detailed record of the evolution of past human activities for this period by using a molecular biomarker specific of millet cultivation [3]. These original results motivated the research of new molecular biomarkers of human activities.

This study focuses on biomarker imprints of archaeological levels that correspond to former settlement layers preserved in sub-aqueous conditions (3 m depth) at the Chatillon station of Lake le Bourget (Chindrieux, France). A 70 cm long core has been retrieved from Final Bronze Age IIIb archaeological layers that cover the Neolithic lacustrine chalks. The stratigraphy has been established by subaquatic archaeological investigations, the chronological frame being based on artefacts, dendrochronology and radiocarbon dates.

Archaeological levels are peculiarly well preserved with numerous vegetal debris (wood and bark shaves and twigs, seeds, charcoals…), ceramics, shells (bivalves and gasteropods) and gravels interspaced with more argillaceous levels.

Lipids from 20 samples collected in the different stratigraphic units were extracted and separated into neutrals and acidic compounds. The neutral compounds were further separated into aliphatics, aromatics, ethers and ketones before identification and quantitation by gas chromatography-mass spectrometry.

Triterpenes were abundant in archaeological layers whereas few were detected in lacustrine chalks. The aliphatic and aromatic fractions are mainly composed of des-A-triterpenes and aromatic derivatives of triterpenes (tetranor-oleana(ursa, lupa)heptaenes, dinor-oleana(ursa, lupa)trienes and tetraenes, lanosta(eupha)pentaenes and hexaenes) that largely exceed n-alkane abundances. Miliacin is the dominant compound detected in the ether fraction with concentrations ranging from 0 (in lacustrine chalks) to 6 µg/g sediment in archaeological levels. The ketone fraction contains abundant and original pentacyclic triterpene ketones such as friedelin (up to 3 µg/g) and a compound identified as adian-5-en-3-one [4] (up to 2 µg/g). The variability in triterpene imprints probably reflects variable sources of organic material in archaeological levels and differential physico-chemical conditions in the medium.

Fig. 1. Subaquatic photo of the Chatillon station during an archaeological survey revealing the stratigraphic succession of archaeological levels and the disposition of wooden piles. Credits : E. Champelovier / Drassm.

References

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