Biomolecular identification of prehistoric shell ornaments

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Résumé

Mollusc shells are one of the most widespread and iconic raw materials used in prehistory to make ornaments. Different species of shells underwent consistent exploitation as far back as early prehistory (e.g. Nassarius in Middle Stone Age sites), and were chosen on the basis of their aesthetic qualities and material properties. The selection of certain species and the ornaments' typology can be used as a proxy for reconstructing patterns of cultural diversity, cohesiveness of local communities and changes in past societies. This would in turn help to untangle the complex processes that have contributed over time to the shaping of present-day European cultural and biological population diversity.

Taxonomic identification of shell ornaments among prehistoric artefacts remains challenging, due to the fact that working the material (e.g. polishing) and/or degradation during burial may have disguised or altered diagnostic morphological features. Moreover, shell ornaments do not typically attract the full attention of the archeometrist as a "cultural heritage" item and are rarely considered for comprehensive analysis using the latest innovative technologies. This hinders the possibility of building large datasets of securely-identified ornaments which can be used to reconstruct past environments as well as trade and exchange networks.

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We exploit technological advances in biomolecular archaeology (analysis of proteins using mass spectrometry or "ZooMS", and stable isotope geochemistry) and state-of-the-art spectroscopic techniques (for microstructural and morphological studies) and focus on the identification of shells that have been notably important for European prehistory, including Unionoidae (freshwater bivalves, source of mother- of- pearl), Nassariidae and Spondylidae from Upper Palaeolithic, Mesolithic and Neolithic sites. We also address the issue of how to distinguish between fossil shells (i.e. from geological outcrops) and shells that were coeval to the makers of the ornaments.

Our research shows great potential even for small, heavily degraded or fragmentary shells and ornaments; this could yield precious insights into patterns of landscape use and human mobility against a changing environmental backdrop during the Pleistocene and the Holocene, revealing possible routes for the exchange of materials and ideas.