Ancient proteins: current challenges in identification and characterization

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Lessons from the past. Materials used in the past in artworks and crafts have been the subject of numerous investigations. The recent technical advances in bioanalytical chemistry and mass spectrometry (MS) allowed the emergence of methods fully adapted to the study of ancient proteins in works and objects of our cultural heritage, and specifically are central to several paleoproteomic projects aimed to develop knowledge as well as to provide molecular details useful for conscious restoring interventions.

While, early in this century, the big question was whether it was possible to identify proteins in degraded and complex environments such as those of artistic objects and archaeological finds, the biggest challenges we are facing today in relation to proteins in cultural heritage materials, relate to the characterization of their modifications and degradation profile, their networks and interaction with other components (organic and inorganic material). The molecular signatures impressed in the primary structure reflect the environment and the age the objects lived in, but also the conformational changes the proteins underwent upon interacting with the other chemical component the objects were made of. Study cases will be presented ranging from proteins within the pictorial matrices of tempera paintings to bone proteins exposed to peculiar burial environments such as those experienced by victims of volcanic eruption.

On the other side, methodology development is now in the direction of facing the compelling request for less invasive and more sensitive analyses that can meet the needs of the world of cultural heritage. The development and implementation of innovative tools for sampling proteins in ancient objects will be presented.