

21 February 2019 – h. 14:00-18:00

Classroom: Aula B, Department of Life Sciences and Systems Biology, Via Accademia Albertina 13

Beatrice De Marchi (14:00-16:00)

Biological materials in archaeology: identification using ancient molecules

A part from lithics, ceramics, glass and other inorganic materials, artefacts recovered from archaeological sites tend to be made of hard animal tissues, which therefore have a biological origin: bone, shell, antler, ivory, coral. These materials are nearly impossible to identify, either because they are found in a fragmentary state, or because they are heavily worked. As such, we are unable to reconstruct the biographies of these objects, which would reveal the way our ancestors interacted with their environments since deep prehistoric times.

In recent years, the study of ancient biomolecules (DNA, proteins, lipids and carbohydrates), which are entombed in biological hard tissues, through -omics technologies has become an important tool for characterizing cultural heritage materials, including archaeological artefacts and art objects. This seminar will address specifically the analysis of ancient proteins by mass spectrometry (palaeoproteomics) and its applications for reconstructing the origin of materials (e.g. shell personal ornaments), as well as their extent of degradation, using examples from the deepest prehistory to modern times.

Enrica Pessione (16:00-18:00)

Microbial biodeterioration of archeological and historical artefacts: biochemical aspects

Microbial deterioration accounts for a significant percentage of the degradation processes that occur on archeological/historical objects and artworks, and identifying the causative agents of such a phenomenon should be a priority, in consideration of the need to conserve these important cultural heritage items.

The present talk will illustrate the biochemical aspects of the interactions occurring between microorganisms and nutrients that are present in stones, wood, films, paintings and modern art specimens (namely, collagen, cellulose, gelatin, albumin, lipids and hydrocarbons). Some examples, highlighting that a good knowledge of these interactions is essential to in-depth understanding the factors that favor colonization, will be discussed.

Part 1: bacteria as biodeteriogens: carbon and nitrogen as nutrients, autotrophic and heterotrophic metabolism, end-products and secondary metabolites. Biofilms and pigments. Enzymatic degradation of natural compounds. Biodeterioration of wood and paper: the role of lignocellulolytic microorganisms. Textile material: cellulolytic, keratinolytic, collagenolytic, fibroino lytic and esterase-producing microorganisms.

28 March 2019 – h. 14:00-18:00

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Enrica Pessione (14:00-16:00)

Microbial biodeterioration of archeological and historical artefacts: biochemical aspects

Microbial deterioration accounts for a significant percentage of the degradation processes that occur on archeological/historical objects and artworks, and identifying the causative agents and their metabolic pathways should be a priority, in consideration of the need to conserve these important cultural heritage items.

The two seminars will illustrate the biochemical aspects of the interactions occurring between microorganisms and nutrients that are present in stones, wood, paper, textiles, films, paintings and modern art specimens (namely, collagen, cellulose, gelatin, albumin, lipids and hydrocarbons). Some examples, highlighting that a good knowledge of these interactions is essential to in-depth understanding the factors that favor colonization, will be discussed.

Part 2: Biodeterioration of stone material: the contribution of autotrophic organisms and syntrophic chains. Painting biodeteriogens: lipolytic, amylolytic, proteolytic, solventogenic, acidogenic and pigment-producing microorganisms. Motion picture films and photographic material biodeterioration: the contribution of gelatine liquefiers. Synthetic polymer-based modern artworks and human history proofs: the risk of xenobiotic-degraders.

Mariangela Girlanda, Samuele Voyron (16:00-18:00)

Omics approaches as tools for cultural heritage studies

Omics approaches offer cutting-edge tools for the characterization of cultural heritage materials and the conservation biology of artworks.

Culture-independent methods derived from environmental genomics, assisted by high-throughput DNA sequencing, allow unprecedented yield and resolution in the identification and monitoring of microbial populations (fungi, bacteria and lichens) involved in biodeterioration of works of art.

The study of the microbial biodiversity associated with cultural heritage materials is of crucial interest to prevent their biodeterioration. This session will focus on the use culture independent methods for the evaluation of the microbial biodiversity associated to cultural heritage materials by means DNA metabarcoding techniques (NGS- Next Generation Sequences). A case study will be display: the mycoflora associated to foxing spots on the Terraneo Herbarium (date late 1600). Case studies presented will focus on the use of metabarcoding of fungal communities associated to foxing spots on ancient paper.