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EUROPEAN NETWORK
ON RESEARCH PROGRAMME
APPLIED TO THE PROTECTION
OF TANGIBLE CULTURAL HERITAGE

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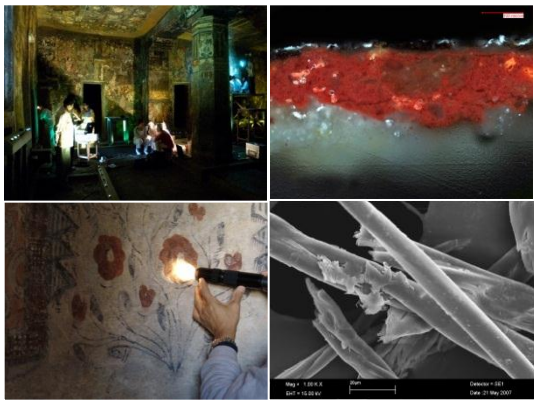
SEVENTH FRAMEWORK PROGRAMME
Seventh Framework Programme

WORK PACKAGE 5

International Workshop

SCIENCE AND CULTURAL HERITAGE IN EUROPEAN TRAINING



September 21st, 2011

12.20 – 12.40

RESEARCH RESULTS APPLIED TO PRACTICAL CONSERVATION-RESTORATION WITHIN THE AREA OF LEATHER AND PARCHMENT

René Larsen
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From the beginning practical conservation and restoration of leather and parchment in the form of books and manuscripts was based on craftsmanship. This practice was later supplemented by knowledge and methods gained from research and scientific experiments. However, the crafts approach to conservation and restoration is still the most prevailing in many archives and libraries throughout Europe. This is the case both in terms of techniques and materials, and not least in terms of a lack of systematic assessment and diagnosis in relation to the processing and storage of books and manuscripts. A change of this culture is only possible through the development of methods of assessment and diagnosis, in close cooperation with end users in practical conservation-restoration. A further condition is that these methods are simple micro-and non-destructive and provides adequate information on the status and type of degradation. Last but not least, this should be accompanied by dissemination of knowledge from recent research on the causes and mechanisms of deterioration and the effect of the influence of environmental factors and interventions on the object materials.

It has been shown that data on vegetable tanned leather and parchment obtained by simple visual and microscopic methods correlate well with those obtained by advanced measurements on the mesoscopic, nanoscopic and molecular level and that they are useful to categorize the materials in their various states of deterioration. Furthermore, with the help of these simple methods it has been shown that the effect of moisture and damp treatments on leather and parchment, as well as the condition under which these materials are normally stored and exhibited is so great that these must be questioned. This has recently been tested successfully on a workshop on assessment of parchment, which helped making the benefits and the need for a research-based scientific approach into practical conservation-restoration even more obvious to the participants.

12.00 – 12.20

INTERNATIONAL EXPERIENCES IN EDUCATION FOR CULTURAL HERITAGE

Mario Micheli
Dipartimento di Studi Storico- Artistici, Archeologici e sulla Conservazione
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In the second half of the twentieth century, commencing with some pioneering initiatives, such as in Italy the creation of the School of Restoration within the Central Institute for Restoration, model training courses for professionals in the field of tangible cultural heritage conservation and restoration were developed and refined. Such models constituted fundamental reference points throughout the successive decades, during which national training systems were launched and consolidated.
In the last ten years or so, contemporaneous with transformations that have taken place in European countries in relation to the training of cultural heritage conservation and restoration professionals, some interesting educational experiments have been conducted in a number of developing countries, encouraged by the initiatives of various international cooperation institutions.
Such experimental work has been closely analyzed and discussed, and has led to the emergence of training models that can be replicated in many geographical areas or countries which, in the field cultural heritage, count a wide range of already well-structured traditional practices.

NET-HERITAGE (European Network on Research Programme Applied to the Protection of Tangible Cultural Heritage) is the first significant initiative which has set out to coordinate national RTD programmes of European countries, and support European programmes in research applied to the protection of Tangible Cultural Heritage.
Within the Net-Heritage Project **Work Package 5** *Implementation of joint activities through the coordination of advanced training in the field of Tangible Cultural Heritage* was mainly aimed to improve possibilities for the advanced training of professionals; develop a coherent and high-profile Advanced Training Programme in science-based conservation in Europe; promote and encourage the dissemination of research results; promote partnerships and mutual learning between EU member states.
The Workshop will focus on dissemination and sharing of the Work Package 5 outcomes. The methodological approach on conservation and restoration of cultural heritage emerged during the WP5 activities has been summarized in Recommendations forming the Framework for Advanced Education in the field of conservation-restoration and science for conservation. These Recommendations are essential to encourage opportunities to carry out advanced study and research in a broadest possible range of disciplines of the heritage field and thereby to meet better the many challenges to the long-term preservation of European Cultural Heritage.

Ministero per I Beni e le Attività Culturali
Complesso Monumentale di San Michele a Ripa
Sala dello Stenditoio
Via di San Michele 22, Roma

9.00 – 9.30 **Registration**

Chairman Lukasz Bratasz

9.30 – 9.40
Antonia P. Recchia
Coordinator NET-HERITAGE Project

9.40 – 9.50
Cristina Sabbioni
ISAC-CNR

9.50 – 10.00
Lidia Laura Rissotto
ISCR-MiBAC

10.00 – 10.10
Luigi Campanella
Università degli Studi di Roma 'Sapienza'

10.10 – 10.40 **Coffee break**

10.40 – 11.00
Model Framework for Advance Education in Conservation and Science for Conservation
May Cassar
Centre for Sustainable Heritage - University College London

11.40 – 12.00

MATHEMATICAL MODELS OF STONE DAMAGE

Roberto Natalini[1] e Elisabetta Giani[2]
[1] Istituto per le Applicazioni del Calcolo "M. Picone"
Consiglio Nazionale delle Ricerche
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[2] Laboratorio di Fisica e Controlli Ambientali
Istituto Superiore per la Conservazione e il Restauro

There is an extensive literature about the deterioration mechanisms of natural building stones, both in connection with problems concerning modern and historical buildings. Acidity in the air is essentially caused by pollutants, such as sulphur and nitrogen oxides, which are emitted into the atmosphere by sources related to industry, transportation and heating. Although in recent years we have assisted to a decay of the levels of pollution in the urban areas in Europe, we have still consistent levels of HNO_3 and other aggressive species as sulphur dioxide and ozone. As is well-known, SO_2 and NO_x react with calcium carbonate stones to form sulphates and nitrates, which, due to their solubility in water, may be drained away or, if protected from the rain, may form crusts, that eventually exfoliate. Effective mathematcal simulation tools will be crucial in considering the fine scale evolution of reaction pathways, possibly in complex geometries, as requested by an improved policy of prevention and monitoring of chemical damage on historical monuments. For instance, it should be important to assist stakeholders to assign a degree of priority for an optimal scheduling of cleaning operations, also taking into account the local geometry and the exposure of the concerned stones.
In this lecture, we shall present a mathematical models, which arise to assist the restoration and the conservation of natural stones used in ancient monuments and artifacts. The model describes the growth of the gypsum crust on the surface of marble stones, under the aggression of pollution (atmospheric sulphur dioxide), taking into account both swelling of the external gypsum layer and the influence of humidity. We have intensively studied this model from an analytical and numerical side, obtaining a precise description of the qualitative behavior of solutions and an efficient numerical approximation. Extensive tests of this model have been performed in the last years, both in situ and in lab, in collaboration with the Istituto Superiore per la Conservazione e il Restauro and the CISTEC of the University of Rome "La Sapienza", in the framework of the Vittoriano Project.

11.20 – 11.40

THE ART OF NANOSCIENCE FOR THE CONSERVATION OF ART

Luigi Dei
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In the recent decades nanoscience and nanotechnology have played an increasing and fundamental role in developing and improving the various techniques of cultural heritage conservation. The conservation of an artistic masterpiece requires several very delicate procedures where the correct choice of a suitable material is one of the most crucial and important steps.
The present contribution deals with the story of how the art of nanoscience and nanotechnology is succeeding in the last years in revolutionizing the approach to the conservation of art, namely the wonderful wall paintings decorating many marvellous churches and historical buildings and easel paintings shown in Museums around the world.
At the CSGI Consortium Laboratories, c/o the Chemistry Department "Ugo Schiff" of the University of Florence, we started at the end of '80 to pursue the research strategy of developing nanomaterials [$Ca(OH)_2$] that are able to consolidate wall paintings introducing in the ancient paintings only the original binder used by the artist, i.e. slaked lime. Moreover, in recent years we succeeded in setting up aqueous polymeric dispersions of poly(vinyl alcohol) (PVA) able to incorporate considerable amounts of organic solvents and having very peculiar viscoelastic properties to make them very promising for selective cleaning of easel paintings surfaces.
The speech will cover the topics of the recent advances in nanomaterials chemistry aimed at achieving the recovery of the mechanical properties of degraded frescoes and selective cleaning of easel paintings by means of the above mentioned nanotechnological systems. Synthesis, characterisation, and case studies of application of $Ca(OH)_2$ nanoparticles in famous fresco paintings, and of nanostructured PVA systems for cleaning panel and canvas paintings will be illustrated with particular emphasis on the materials science potentialities in the general field of art conservation.

11.00 – 11.20
Science and Cultural Heritage at the Getty Conservation Institute
Giacomo Chiari
The Getty Conservation Institute

11.20 – 11.40
The Art of Nanoscience for the Conservation of Art
Luigi Dei
Università degli Studi di Firenze

11.40 – 12.00
Mathematical models of stone damage
Roberto Natalini
IAC-CNR

12.00 – 12.20
International experiences in education for Cultural Heritage
Mario Micheli
Università degli Studi 'Roma Tre'

12.20 – 12.40
Research results applied to practical conservation-restoration within the area of leather and parchment
René Larsen
The Royal Danish Academy of Fine Arts

12.40 – 13.00 Discussion

13.00 Lunch

10.40 – 11.00

MODEL FRAMEWORK FOR ADVANCE EDUCATION IN CONSERVATION AND SCIENCE FOR CONSERVATION

May Cassar
Centre for Sustainable Heritage
University College London
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NET-HERITAGE – The European Network on Research Programme Applied to the Protection of Tangible Cultural Heritage is the first significant initiative of the European Union to coordinate national research and advanced education programmes.
The consortium carried out a Europe-wide survey of opportunities for advanced education in conservation-restoration and science for conservation. The survey demonstrated that there are educational instruments for developing professionals, managers and researchers working in the cultural heritage field including doctoral study and research, long courses not leading to PhD degree, and short courses. It also revealed that strong links and coordination exist between university based research and museums and heritage organisations with matching research needs, providing rich examples of excellent, end-user valued research.
A report analysing the results and presenting the conclusions of the survey was prepared. A Panel of Experts, representing diverse European geographical areas, and traditions with different professional backgrounds, was set up to identify gaps and barriers to the development and strengthening of the conservation profession and the efficient use of the potential of the field. The Experts proposed a number of recommendations to improve opportunities of advanced study and research, enable the development of a more effective cadre and ensure sustainable public access and protection of cultural heritage. The recommendations form a model framework for the advanced education which meets needs of XXI century professionals working in the cultural heritage field.
The model framework for advance education was supported by 10 ministries of the memeber states and other reputable international organisations.

11.00 – 11.20

SCIENCE AND CULTURAL HERITAGE AT THE GETTY CONSERVATION INSTITUTE

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Major research projects carried out in the Science Department of the GCI are described, with particular emphasis given to newly developed techniques applied to both collections of objects and archaeological sites. The use of non-invasive portable instrumentation is preferred, but the taking of samples is almost always a necessity if one wishes to fully understand a problem. Analytical imaging (the art of mapping situations similar to each other from the chemical-physical point of view) is of tremendous help in minimizing the number of samples and allowing one to collect the few that are needed in an intelligent way. The procedures described include: portable XRD/XRF, CT-scan for medium-large bronzes, laser speckle interferometry to detect plaster detachments, VIL (visually induced luminescence) that captures only Egyptian Blue in an image, and microfoedometry to assess the resistance to light of colorants.
The objects analyzed range from illuminated manuscripts to contemporary art, to mural paintings at Ercolano and Tutankhamen's tomb, to Roman bronze statues.