

RELATED ABSTRACTS

Scientific Investigation, Preservation and Restoration of Works of Art

Comparative analysis on the archaeological content of imagery from Google Earth. Lately, many articles have been written for the use of satellite images from Google Earth. Some of them are dealing with the identification of new or already known archaeological sites. This work is an effort to analyse and evaluate the capacity of the Google Earth satellite images to identify new archaeological remains. The pilot area of the Eastern Macedonia, Greece has already been studied with the systematic-methodical selection process of satellite images and other archaeological predictive tools, such as historic and modern maps, historical aerial photographs, land distribution diagrams, etc., led to the detection of hundreds of new archaeological sites.

Kaimaris D., Georgoula O., Patias P., Stylianidis E.,

JOURNAL OF CULTURAL HERITAGE, 12, 3, 263-269, JUL-SEP 2011, DOI: 10.1016/j.culher.2010.12.007

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Quantitative indexes based on geomorphologic features: A tool for evaluating human impact on natural and cultural heritage in caves. This work deals with the design of a method for evaluating both the degree of conservation of the geomorphologic heritage and the human impact linked to opening karstic caves for tourist use. The methodology was developed in Tito Bustillo Cave, a cave of tourist interest in Northern Spain, declared as a part of a World Human Heritage Site in 2008. A detailed geomorphologic map of the cave floor including natural features and anthropogenic features was drawn up at a scale of 1:250. The map was transferred to a Geographical Information System (GIS), allowing to draw up a geomorphologic heritage map of the cave by grouping the geomorphologic features in three categories: natural heritage, cultural heritage and geomorphologic impact features derived from tourist use. Four quantitative indexes using several surface parameters derived from the cave heritage map and the surface of the natural cave (S(C)) were established and measured. The Geomorphologic Heritage Conservation Index (G(HC)) considers the surface of natural geomorphologic heritage; the Total Anthropogenic Influence index (T(A)) is calculated from the total surface of anthropogenic features; the Cultural Heritage Index (C(H)) considers the extent of the Cultural Heritage with a surface expression in the floor cave, while the Index of Geomorphologic Impact linked to Tourist Use (G(TU)) is obtained from the surface of anthropogenic features derived from cave conditioning for tourist use. The obtained values range from 0.51 to 0.57, suggesting a significant impact on the natural geomorphologic heritage of the cave because of the opening of the cave to tourists. Geomorphologic heritage maps and the derived indexes can serve as useful quantitative tools to enhance cave cultural and natural heritage, and therefore, can contribute to cave management in tourist caves.

Jimenez-Sanchez M., Dominguez-Cuesta M.J., Aranburu A., Martos E.,

JOURNAL OF CULTURAL HERITAGE, 12, 3, 270-278, JUL-SEP 2011, DOI: 10.1016/j.culher.2011.01.004

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Recovery of the traditional colours of painted woodwork in the Historical Centre of Lugo (NW Spain). The rehabilitation of the degraded medieval quarter of A. Tineria, in Lugo (NW Spain) included the recovery of the traditional colours on plasters and woodwork. To achieve this aim, the paint materials on wooden elements (window frames and doors) have been characterised firstly by means of colour measurements on site, with a portable solid reflection spectrophotometer, and secondly by pigment analysis of paint samples, using OM, SEM-EDS and MRS. The results revealed that the predominant colour in the cityscape of the 19th and early 20th century was red, and that the paints contained red ochre of a local origin, in some cases with the addition of red lead. Other minor colours were identified as well: blue paints contained ultramarine blue or Prussian blue, yellow paints contained lead oxide and green paints were based on copper pigments or on a mixture of Prussian blue and yellow lead oxide. Extenders like barium sulfate, gypsum or calcite were often added to the paints. Finally, the turquoise paints were applied in recent times, as titanium white and phthalocyanine green (both industrially synthesised in the 20th century) were identified in their composition. These results have contributed to the elaboration of the Colour Plan of the Historic Centre of Lugo. The rehabilitation of A. Tineria is still ongoing and has received one of the United Nations' International Dubai awards in 2008, recognizing good practices and local leadership.

Prieto B., Sanmartín P., Pereira-Pardo L., Silva B.,

JOURNAL OF CULTURAL HERITAGE, 12, 3, 279-286, JUL-SEP 2011, DOI: 10.1016/j.culher.2010.12.009

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Provenance of marbles from the octagonal building at Gadara "Umm-Qais", Northern Jordan. This study investigates the provenance of white and colored marbles sampled from architectural elements of the octagonal building at ancient Gadara (Umm Qais), Northern Jordan. The octagonal building dates to the Roman times and was used in later periods. The samples were described macroscopically, then analyses of petrographic thin sections, stable isotopes of oxygen and carbon and major and some trace elements were carried out. The results were compared to the databases reported for the main marble sources of the Mediterranean used in ancient times. Most of the white marbles are probably from Proconnesus (Turkey), whereas Docimium (Turkey), Naxos and Thasos (Greece) are minor sources. The most probable source of the green marble "cipollino verde" is Karystos (Greece), while the red marbles probably come from Iasos (Turkey).

Al-Bashaireh K.,

JOURNAL OF CULTURAL HERITAGE, 12, 3, 317-322, JUL-SEP 2011, DOI: 10.1016/j.culher.2011.01.005

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Laser scanning the Garisenda and Asinelli towers in Bologna (Italy): Detailed deformation patterns of two ancient leaning buildings. The Asinelli and Garisenda towers are the main symbols of the city of Bologna (Italy). These leaning towers, whose heights are about 97 and 48m respectively, were built during the early 12(th) century and are two of the few surviving ones from about 100 tall medieval buildings that once characterized the city. Therefore, they are part of the Italian cultural heritage and their safeguard is extremely important. In order to evaluate in detail the deformations of these towers, in particular the deviations from a regular inclination of their walls, the terrestrial laser scanning (TLS) has been used and an efficient direct analysis method has been developed. The towers have been scanned from six viewpoints, providing 19-point clouds with a complete coverage of the visible surfaces with large overlap areas. For each tower, after the registration of the partial point clouds into a common reference frame, an accurate morphological analysis of the acquired surfaces has been carried out. The results show several zones affected by significant deformations and inclination changes. In the case of the Asinelli tower, for which a finite element model is available, the results have also been interpreted on the basis of the static load and normal modes. The correspondence between the measured deformation and the theoretically expected deformation, caused by a seismic sequence, is clear. This fact suggests a high sensibility of the tower to dynamic loads. Although a direct evaluation of the risk cannot be carried out with the obtained results, they lead to the general indication that the structural health of these buildings must be frequently checked and that man-made loads (e.g. vibration due to vehicular traffic) should be avoided or at least reduced.

Pesci A., Casula G., Boschi E.,

JOURNAL OF CULTURAL HERITAGE, 12, 2, 117-127, APR-JUN 2011, DOI: 10.1016/j.culher.2011.01.002

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Characterization of Maya Blue pigment in pre-classic and classic monumental architecture of the ancient pre-Columbian city of Calakmul (Campeche, Mexico). This paper presents the first evidence of the use of Maya Blue pigment in late pre-classic (c.300BC-300AD) architecture in the Maya Lowlands. This was detected combining an innovative technique, the voltammetry of microparticles (VMP), with atomic force microscopy (AFM), transmission electron microscopy (TEM), scanning electron microscopy/energy dispersive X-ray microanalysis (SEM/EDX), visible spectrophotometry and Fourier transform infrared spectroscopy (FTIR). The pigment was found on the polychrome facade of substructure IIC of pre-Columbian city of Calakmul (Campeche, Mexico). The identification of Maya Blue in this building may prove to be the earliest known use of this colour on the monumental architecture of the Maya Lowlands. The colour was seen to precede the Maya Blue pigments identified in other archaeological sites and dated from later periods and this, together with the analytical results recently obtained in the early classic (c.300AD-600AD) and the late classic (c.600AD-850/900AD) wall paintings of Calakmul, reveal the technical development of this complex pigment in Maya wall painting throughout classic and post-classic periods.

Pascual M.L.V.D., Domenech-Carbo M.T., Domenech-Carbo A.,

JOURNAL OF CULTURAL HERITAGE, 12, 2, 140-148, APR-JUN 2011, DOI: 10.1016/j.culher.2009.12.002

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Tannins characterisation in new and historic vegetable tanned leathers fibres by spot tests. This paper describes the adaptation and evaluation of three chemical tests for tannins characterisation in vegetable tanned leathers. Tests were performed on fibres of new leathers tanned with different known vegetable tannins and historic leathers. Rhodanine test, nitrous acid test and acid butanol test, developed to identify, respectively, gallotannins, ellagitannins and condensed tannins, are described. Ferric test and vanillin test, the two traditional tests used for vegetable tanned leathers characterisation, were also performed and their usefulness discussed. Gallic acid, ellagic acid and catechin, structural constituents of the different classes of tannins were also tested. Results of the developed methodology allowed the identification of tannins' chemical class in new and historic leather samples studied. Data obtained permitted to verify the information on tanning materials used in new leathers. Vegetable tanning technology was confirmed in historic samples and tannins were characterised. This study shows that these tests are useful and can be a valuable source of information to evaluate new vegetable tanned leathers quality for conservation and restoration purposes as well as historic leathers tanning technology.

Falcao L., Araujo M.E.M.,

JOURNAL OF CULTURAL HERITAGE, 12, 2, 149-156, APR-JUN 2011, DOI: 10.1016/j.culher.2010.10.

A comparative study by infrared spectroscopy and optical oxygen sensing to identify and quantify oxidation of Baltic amber in different ageing conditions. The aim of this study was to provide evidence about the interaction between Baltic amber and oxygen, essential to understanding the mechanisms by which the material degrades and to propose techniques for preventive conservation based on the control of environmental parameters where amber objects are stored or displayed. To investigate the oxidation of Baltic amber, the methodology consisted of artificial ageing, in order to initiate degradation of model amber samples, and non-destructive analytical techniques, in order to identify and quantify changes in chemical properties and oxygen consumption. Pellet-shaped samples, obtained from pressed amber powder, were exposed to different microclimatic conditions, subjected to accelerated thermal ageing and analysed by infrared spectroscopy together with optical oxygen sensing. The experiments provided comparable results about the oxidation state of the molecular structure and the consumption of atmospheric oxygen in similar conditions, confirming the degrading role of oxygen.

Pastorelli G.,

JOURNAL OF CULTURAL HERITAGE, 12, 2, 164-168, APR-JUN 2011, DOI: 10.1016/j.culher.2010.11.

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An investigation into the removal of starch paste adhesives from historical textiles by using the enzyme alpha-amylase. The alpha-amylase enzyme has been reported during the last decade to be used for removal of the excess starch adhesive paste, which is usually used to fix textiles on paper, textiles, wood panels, or other rigid support materials. The final aim of this work was the application of alpha-amylase in order to remove the old starch from historical textiles in an attempt to conserve them under mild conditions. An extensive study was undertaken using various types of textiles in order to identify the optimum condition for the use of the enzyme, in relation to time, concentration, temperature and pH, before any other attempt. The first step was to simulate the textile ageing. The fabrics were coated with starch paste adhesive, and then a process of artificial thermal ageing was made on samples for different periods of time. After that the enzyme was applied to the samples, at different concentrations and at different intervals. This study also presents interesting results concerning the effect of the enzymatic treatment on the mechanical and optical parameters of linen, silk and cotton, dyed with madder or turmeric dye mordanted with CuSO₄ or ferric citrate. Finally, the removal of enzymatic residues from textiles after the treatment has been studied. The application section has been fulfilled by using the whole process in a piece of a historical carpet from fabric adhered with starch. This piece of carpet is in the museum of the Faculty of Applied Arts, Helwan University in Egypt.

Ahmed H.E., Kolis F.N.,

JOURNAL OF CULTURAL HERITAGE, 12, 2, 169-179, APR-JUN 2011, DOI: 10.1016/j.culher.2010.08.

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Effect of burial environment on crocodile bones from Hawara excavation, Fayoum, Egypt. Many different archaeological materials were found in Hawara (Fayoum, Egypt) during the excavation of the Egyptian-Polish mission in 2008. A complete crocodile skeleton, and many incomplete crocodiles were found in this area. The skeletons of these crocodiles suffered from salt crystallization, erosion, pitting, change of the color, etc. This study focuses on the mechanism of deterioration processes that affects bone and tusks. Surface modification, change of color, study of soil components and bone crystallinity, degradation of collagen, pH, bone histology, and the surface morphology were investigated by visual examination, UV spectrophotometry, X-ray diffraction, FTIR, pH meter, polarized light microscope (PLM) and scanning electron microscope (SEM), respectively. The results revealed that soluble salt (sodium chloride) and insoluble salt (calcium sulfate) played an important role in the deformation of bone. FTIR proved that archaeological bones undergo changes in their chemical stability. Differing colors, and cracks on the surface of the bones indicate that they were exposed to different temperatures.

Abdel-Maksoud G., Abdel-Hady M.,

JOURNAL OF CULTURAL HERITAGE, 12, 2, 180-189, APR-JUN 2011, DOI: 10.1016/j.culher.2010.12.

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Stability studies of materials applied in the restoration of a baroque oil painting. In the restoration of a baroque altar painting "Coronation of the Virgin Mary" originating in the 18th century, a selection of materials was based on the examination of their stability evaluated by objective physico-chemical methods and by visual inspection. The stability of fillings prepared by traditional recipes, and new ones based on modern, commercially available materials, was assessed. To study the colour stability, techniques of light and thermal induced accelerated ageing were applied. Simultaneous thermal analysis (DTA and TG) was applied in order to study the thermo-oxidative stability of the materials. The commercial contemporary material Litostucco appeared the least suitable of all of investigated samples; however, it is possible to improve its stability by modification with additives, mainly kerotix. The fillings prepared by traditional recipes, with the exception of wax, are suitable for restoration of the oil painting.

Vizarova K., Rehakova M., Kirschnerova S., Peller A., Simon P., Mikulasik R.,

JOURNAL OF CULTURAL HERITAGE, 12, 2, 190-195, APR-JUN 2011, DOI: 10.1016/j.culher.2011.01.

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Determining the resonance wood provenance of stringed instruments from the Cherubini Conservatory Collection in Florence, Italy. The wood provenance of what is considered today's most important collection of stringed instruments by Tuscan violin-makers, the Collection of the "Luigi Cherubini" Conservatory, at the Accademia Gallery in Florence, was analyzed dendrochronologically. On the basis of 95 geographically very widely distributed master chronologies, the most likely areas of origin of the Norway spruce wood used for the construction of 32 from a total of 37 instruments were determined. Consequently, the most important centres of wood supply were established. Finally, a location in the Tuscan-Emilian Apennines was identified as the likely provenance of a considerable quantity of timber used in the construction of these instruments. The results provide a new prospect in studying the geographical origins of the wood from which stringed instruments were made in the past, by using dendrochronological analysis.

Bernabei M., Bontadi J.,

JOURNAL OF CULTURAL HERITAGE, 12, 2, 196-204, APR-JUN 2011, DOI: 10.1016/j.culher.2010.12.

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Surface investigation of some medieval silver coins cleaned in high-frequency cold plasma. Processing in cold plasma (cleaning and/or decontamination) represents an ecological alternative for applications in various domains of a diverse range of materials. Considering the advantages it presents, high-frequency cold plasma has been employed to remove the corrosion products found on the surface of some silver coins pertaining to a Polish medieval numismatic collection. The effects of plasma treatment have been evaluated through the investigation of the coin surface before and after the treatment, by means of different analytical techniques: scanning electron microscopy-energy dispersive X-ray microanalysis (SEM-EDX), X-ray diffraction (XRD), FTIR spectroscopy and colorimetric measurements.

Ioanid E.G., Ioanid A., Rusu D.E., Doroftei F.,

JOURNAL OF CULTURAL HERITAGE, 12, 2, 220-226, APR-JUN 2011 DOI: 10.1016/j.culher.2010.09.004

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Ethical issues in research and publication of illicit cultural property. There is much discussion in conservation, if it is ethical for conservators to 'touch' illicit antiquities. One of the problems in studying unprovenanced archaeological objects is their publication. Many archaeologists believe that they should never publish or cite in print unprovenanced antiquities, because it indirectly supports illicit trafficking of antiquity. Some museum professionals believe that conservators' technical and/or scientific study of such material helps to fight against criminal activity by identifying fakes and forgers. Whatever the belief, research and publication in conservation currently do not provide ethical reviews when studies involve such problematic material in order to ensure scientific integrity of the results. The paper presents case studies where ethical standards may have needed to be considered and discusses the complexity involved in authentication studies of such antiquities. The paper concludes that a standard should be drafted on ethics in research and scientific publication of cultural property similar to the biomedical field, which warns when papers deal with human and animals testing.

Argyropoulos V., Polikreti K., Simon S., Charalambous D.,

JOURNAL OF CULTURAL HERITAGE, 12, 2, 214-219, APR-JUN 2011, DOI: 10.1016/j.culher.2010.09.007

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PIXE-PIGE analysis of 18th and early 19th century creamware from Slovenia and Northern Italy. The methods of PIXE and PIGE were applied for the analysis of cream-coloured earthenware ceramics produced in the territory of Northern Italy and central Slovenia. The light elements were found sufficiently discriminative to distinguish between different producers. Two sites of clay sources in Slovenia were identified and sampled. The differences between them are insignificant and indicate that the differences between the manufacturers resulted from different mixtures of the batch mass with limestone.

Kos M., Smit Z.,

JOURNAL OF CULTURAL HERITAGE, 12, 2, 236-242, APR-JUN 2011, DOI: 10.1016/j.culher.2010.12.010

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On the Utility of Spectral-Maximum-Based Automated Thread Counting from X-Radiographs of Paintings on Canvas. This paper establishes that the two-dimensional Fourier transform, spectral-maximum-based extraction of thread density appears suited to automatic thread counting from scanned X-radiographs of paintings for a range of European painters from the seventeenth century to the early twentieth century. With regularly woven canvas, striping occurring in color-coded maps of local thread count can be used to identify rollmate candidates originally separated by as much as a few meters, maybe more. These results suggest that recently developed spectral-maximum-based thread counting algorithms are sufficiently sophisticated to support major efforts in archival thread counting as key forensic data in a variety of art historical investigations. Still, the canvas and priming used by some artists require a more refined approach to automated thread counting than a simple spectral-maximum-based scheme.

Johnson C.R., Jr., Johnson D.H., Hamashima N., Yang H.S., Hendriks E.,

STUDIES IN CONSERVATION, 56, 2, 104-114, 2011

Colour Change in Sample Reconstructions of Vincent van Gogh's Grounds due to Wax-Resin Lining. This study examined the visual impact (colour change) of wax-resin lining on sample reconstructions of Vincent van Gogh's grounds, made as part of the Historically Accurate Oil Painting Reconstruction Techniques (HART) Project. The lining method followed that used by J.C. Traas for lining paintings by Van Gogh between 1926 and 1933. Visual changes in the ground samples after lining were noted and colour change was measured using a reflectance spectrophotometer. The binding medium of the ground was found to be the most significant factor with the greatest darkening occurring in samples bound in glue, followed by emulsion and oil. The presence and the method of application of size used in the preparation of the ground samples and the inorganic composition also influenced darkening and colour change as a result of lining. Grounds on unsized canvas darkened the most, while a layer of gelled size reduced impregnation with the lining adhesive and concomitant darkening. Chalk-containing grounds darkened more than grounds containing barium sulphate or lead white. Comparisons between the reconstruction samples and wax-resin lined paintings by Van Gogh highlighted difficulties in attributing the darkening of the ground in the paintings to the lining or to other factors, such as staining by original oil binder in the paint.

Nieder E., Hendriks E., Burnstock A.,

STUDIES IN CONSERVATION, 56, 2, 94-103, 2011

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On site consolidation of burnt and partially charred wood in dry conditions. Forty years ago in a 19th-century church in Torino, a small fire partially burned some of the decorative external boards of the sound-box of the organ. The focus of this present work was to find a treatment able to consolidate partially burnt wood in dry conditions, in which the external charred layer would be lost if not well preserved because of its incoherence. The product had to be applied onsite on an architectural structure intended to be reused again (and not simply exhibited). This circumstance is rarely encountered in the conservation of wooden Cultural Heritage. The efficacy of treatments was evaluated on the basis of a suitable and original experimental methodology, which took into account both the immediate and long-term behaviour of the various tested products. Although the opportunity to carry out this work came from a real case, both the selected product and the set up evaluation methodology have a general validity and they can be effectively used in other similar situations in which a slight antipowdering effect is required for treatment.

Pizzo B., Garabelli G., Varetto M., Brancati L.E., Locandieri M., Pecoraro E., Macchioni N.,

JOURNAL OF CULTURAL HERITAGE, 12, 1, 19-27, MAR 2011, DOI: 10.1016/j.culher.2010.09.003

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Protective action against fungal growth of two consolidating products applied to wood. This study assessed the protective action against biological fungal growth of two consolidating products applied to wood. Experiments examined effects produced by white and brown rot fungi on White poplar (*Populus alba*) and Norway spruce (*Picea abies*) treated with two consolidants, Paraloid B72 and Regalrez 1126, applied both individually and together, with the aim of evaluating differing levels of penetration into and location in the wood. The main aim was to test whether these products, which are generally applied during restoration, could act against fungal growth on healthy wood or increase biological attack. Changes in both morphological and chemical levels induced by fungal attack were observed, susceptibility to biological colonisation was analysed, and protective efficacy was tested. Several series of wood samples treated with the above products were placed on agar plates inoculated with two fungal species (brown-rot decay fungus, *Fomitopsis palustris*, and white-rot decay fungus, *Trametes versicolor*) and growth was observed for 2 months. The results for Norway spruce showed selective development of one of the two rots according to product application: both products applied together caused slowed growth of both fungal species. The White polar samples treated with the consolidants, both alone and together, all showed similar behaviour. SEM analysis was also carried out in order to observe changes in wood microstructure induced by rot colonisation.

Clausi M., Crisci G.M., La Russa M.F., Malagodi M., Palermo A., Ruffolo S.A.,

JOURNAL OF CULTURAL HERITAGE, 12, 1, 28-33, MAR 2011, DOI: 10.1016/j.culher.2010.06.002

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Organic patinas on Renaissance and Baroque bronzes-Interpretation of compositions of the original patination by using a set of simulated varnished bronze coupons. Within the frame of a research project dealing with the identification of 'organic patinas' on small bronzes from the collection of the Kunsthistorisches Museum, Vienna, a set of model varnishes on bronze coupons prepared at the Metropolitan Museum of Art, New York, was subjected to GC-MS analyses. The study of model varnishes clarified various uncertainties in the identification and interpretation of natural materials previously detected in the authentic varnishes of Renaissance and Baroque bronze sculptures. For instance, it became apparent that the alterations in the composition of the oil-resinous coatings noted in the authentic varnishes were caused not only by the ageing processes over time but also by the specific method of the preparation and application of the coating by which the varnishes were originally applied on the surface of the bronzes, e.g. that the varnishes were often directly baked on the surface of the statuettes at temperatures exceeding 100 degrees C. Relating the GC-MS results to the compositions of the model coatings helped to better understand some of the difficulties in the detection and identification of original oil-resinous varnish components. In particular, the study allowed the low abundance of the mastic resin in the varnishes to be explained and specific markers distinguishing individual resins within a Pinaceae family have been proposed.

Pitthard V., Stone R., Stanek S., Griesser M., Kryza-Gersch C., Hanzer H.,

JOURNAL OF CULTURAL HERITAGE, 12, 1, 44-53, MAR 2011, DOI: 10.1016/j.culher.2010.09.002

Archaeomagnetic investigation of a metallurgical furnace in Pisa (Italy). An archaeological excavation has been carried out at Pisa (Italy), unearthing an ancient metallurgical workshop. Since archaeological burnt materials provide important records of direction and intensity of the Earth's magnetic field in the past and they can be used to better improve geomagnetic secular variation curves (SVCs), an archaeomagnetic study has been performed. This small copper-alloy furnace presents a circular concave shape covered with a thin layer of mortar, with some traces of heated clay surrounding the feature that confirms the high temperature reached inside it. Archaeological context dating points to the last firing of the furnace between the last quarter of the 13th century and the first quarter of 14th century AD, when then the metallurgical workshop was transformed in a warehouse. Archaeomagnetic sampling has been performed using the modified Thellier method, by collecting several, large and independently oriented aliquots of heated clay, forming the bottom part of the circular wall of the structure. Laboratory treatments have been conducted at the IGG-CNR ARCHEO_LAB (Pisa, Italy) and at St. Maur Palaeomagnetic laboratory (Paris, France). Analytical measurements of the thermo-remanent magnetization index acquired from the samples have been performed using a large cell induction magnetometer for large samples, and the characteristic remanent magnetization (ChRM) has been successfully isolated after an alternate field demagnetization cleaning procedure for each sample. The final mean archaeomagnetic direction has been calculated at sampling site ($D = 6.9$ degrees; $I = 52.8$ degrees; $N = 9$; $k = 305$; $\alpha(95) = 2.6$ degrees) following the Fisher Statistics, and it exhibits a perfect agreement with some coeval already published directions obtained from Mt. Arso lava flows, these latter being an important anchor point in the preliminary Italian secular variation curve. Comparison with the preliminary Italian SVC, the French SVC and the SCHA.DIF.3K archaeomagnetic regional model have permitted to define an archaeomagnetic absolute age confirming the conventional archaeological age, underlining the importance of this result into the Italian archaeomagnetic data set.

Malfatti J., Principe C., Gattiglia G.,

JOURNAL OF CULTURAL HERITAGE, 12, 1, 1-10, MAR 2011, DOI: 10.1016/j.culher.2010.03.005

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Pollution monitoring by dosimetry and passive diffusion sampling for evaluation of environmental conditions for paintings in microclimate frames. Pollutants and their potential degradation of paintings have been measured for the first time in microclimate frames (mc-frames), which are used to protect paintings. The pollutants that were measured include both inorganic pollutants, which originate mainly from external sources, and organic pollutants from mainly internal sources. Those originating from the outdoors enter rooms and subsequently mc-frames at a rate depending on the ventilation rates (air exchange rates) of the mc-frames. The concentration of gaseous pollutants emitted within the mc-frames will depend on net emission rates of the materials used to make the mc-frames, their design, and their ventilation rates. In the EU PROPAIN project measurements of gaseous air pollutants and climatic conditions were performed at various locations both inside and outside different state-of-the-art mc-frames. Diffusive passive pollution gas samplers were used together with different types of dosimeters. Results show that the dosimeters respond to either the photo-oxidizing conditions or the level of volatile organic acids in the environments both in the museums and within the mc-frames. Two dosimeters, the Early Warning Organic (EWO) made from a synthetic polymer and the Resin Mastic coated Piezo electric Quartz Crystals (RM-PQC) respond to photo-oxidation and showed higher values outside than inside the mc-frames. Two other dosimeters, the Glass Slide Dosimeter (GSD) and the Lead coated Piezo electric Quartz Crystals (L-PQC) respond to volatile organic acids and yielded higher values inside than outside the mc-frames. This study emphasizes the need for further work to determine environmental damage functions for paintings, in particular for the effects of organic acids. Such information is essential for the evaluation of the protective effects of mc-frames for paintings. The use of mc-frames is increasing and it is very important to know that this protective measure does not introduce new risks.

Grontoft T., Odlyha M., Mottner P., Dahlin E., Lopez-Aparicio S., Jakiela S., Scharff M.,

Andrade G., Obarzanowski M., Ryhl-Svendsen M., Thickett D., Hackney S., Wadum J.,

JOURNAL OF CULTURAL HERITAGE, 11, 4, 411-419, OCT-DEC 2010

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An Analytical Method for the Determination of the Climatic Distance between Different Microclimates for the Conservation of Wooden Cultural Heritage Objects. This paper describes a statistical methodological approach for the comparison of different microclimates. This method was developed as a tool for choosing a new microclimate for temporary moves. At the present stage of development, this method is not intended to be used for identifying harmful conditions. The proposed method is based on experimental evidence indicating that the sensitivity of wooden objects to environmental fluctuations can differ from object to object, depending on many physical and mechanical parameters. Some objects could be effected by fluctuations that would not be significant for other objects. The parameter adopted in this work is equilibrium moisture content, that is the equilibrium value that a wooden object would tend to maintain under stable temperature and relative humidity values for a long period of time. It must be considered potential because in a fluctuating climate it is never reached. The methodology is based on two parts. The first describes in a mathematically simplified way how climate is perceived by objects with different sensitivities. The second analyzes the climatic distance between different climatic data sets using the mathematical technique of principal components analysis, according to the previously defined object's sensitivity. As a test of the proposed method, four different microclimatic cases studies are analyzed and the results described.

Dionisi-Vici P., De Vincenzi M., Uzielli L.,

STUDIES IN CONSERVATION, 56, 1, 41-57, 2011

Technical Study and Conservation Treatment of a Horse Model by Dr Auzoux. This paper reports on technical investigations and conservation work carried out on a papier mache anatomical model of a horse created in the mid-nineteenth century by Dr Auzoux. The object suffered from a structural unbalance due to the distortion of the internal metal structure, and its painted surface exhibited severe flaking. The treatments mainly entailed surface cleaning and consolidation of the paint layers. A gelatine with a good adhesive power and a high gel strength was chosen as a consolidant. The method developed proved very effective and could be applied in the future on other deteriorated Auzoux models. In order to better understand the flaking process, mock-ups of painted surfaces were prepared and were artificially aged under cycling heat and humidity. This experimental work showed the importance of maintaining optimal and stable climatic conditions for the storage of the model. A scientific examination of the techniques and materials involved in the fabrication of the horse was conducted using historic sources as well as analytical investigation. The findings confirmed previous data published on Auzoux models. It also unveiled further information not reported to date as this type of research on such a large Auzoux model had never been carried out before.

Dumont B., Dupont A.L., Papillon M.C., Jeannel G.F.,
STUDIES IN CONSERVATION, 56, 1, 58-74, 2011,

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Ancient 'gilded' art objects from European cultural heritage: a review on different scales of characterization. This paper is a review on the studies performed through imaging and spectroscopy-based analytical methods on ancient 'gilded' art-objects (9th-19th centuries) from the European cultural heritage. The review takes into consideration the gilded surfaces in polychrome art objects (easel and mural paintings, polychrome wooden objects, gilt leather and parchment), thus meaning the materials and techniques of application of gold or its imitations (silver, copper leaves, other metal alloys) from technical, analytical and conservation points of view. The characterization of artistic gilded objects is important for establishing the compositional, structural, morphological and physical-chemical parameters useful for monitoring the conservation state, behavior and evolution in time of their aging/degradation/deterioration processes, the restoration treatments (cleaning, consolidation, retouching, varnishing) influence on the conservation state of the original materials and also for a rationale choice of methods and materials of intervention, compatible with the original ones. The analytical approach has, as main requirement, to be noninvasive and non-or microdestructive, therefore, sampling is to be avoided or reduced to a minimum. A wide range of imaging and spectroscopy-based techniques is nowadays available from optical microscopy, UV fluorescence photography, IR reflectography, X-radiography, thermography, to scanning/transmission/environmental electron microscopy (SEM/TEM, E-SEM), atomic force microscopy (AFM), FTIR and Raman microscopy (micro-FTIR, micro-Raman), X-ray spectrometry (WDXRF/EDXRF/ TXRF, XPS), Ion Beam Analyses (PIXE/PIGE, RBS, SR), etc. The most reliable and complete information can be obtained from an integrated, complementary and interdisciplinary approach, but microscopy still remains one of the most used and efficient tools in the characterization of gilding materials and their application techniques.

Sandu I.C.A., Helena de Sa, M.H., Pereira, M.C.,
SURFACE AND INTERFACE ANALYSIS, 43, 8, 1134-1151, AUG 2011, DOI: 10.1002/sia.3740.

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The surface behavior of gilding layer imitations on polychrome artefacts of cultural heritage. This paper proposes the first results of a larger study on the behavior of gilded surfaces of polychrome heritage artefacts with the aim to understanding the surface patterns and roughness variations before and after specific treatments (burnishing and varnishing). This study can be useful to trace correlations between the compositional features, manufacturing and applications/elaboration processes of gilding layers and the pattern of the surface topography, and also some insights into the degradation/corrosion mechanisms. The results obtained on imitations of gilded surfaces can be further useful for recognizing fake surfaces in the authentication of artefacts from the antiquity markets. Two types of commercial imitations of gilded surfaces on a wooden support were considered: liquid 'gold' (Cu-Zn powder in a solvent) and 'gold' leaf (Cu-Zn leaf) applied over bole and gesso layers. A combined analytical approach using atomic force microscopy (AFM), optical microscopy (OM) and colorimetry (CIE L*a*b* system) was applied in order to better understand the behavior of the gilded-varnished surface and of the interface between the metal surface and the other preparative layers.

Sandu I.C.A., Busani T., Helena de Sa M.,
SURFACE AND INTERFACE ANALYSIS, 43, 8, 1171-1181, AUG 2011, DOI: 10.1002/sia.3796

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Non-invasive Techniques in the Analysis of Corrosion Crusts Formed on Archaeological Metal Objects. The paper presents experimental results obtained by investigation of copper alloy artifacts from the second and third centuries AD, with multi-analytical non-destructive methods such as optical microscopy (OM), X-ray fluorescence (XRF) and X-ray diffraction (XRD). Studies have sought to determine the characteristics of corrosion crusts (external and internal microstructure of metal alloys, the nature and distribution of chemical compounds, the nature of microstructures and incorporated elements of the archaeological site etc.), that are used in authentication. Corrosion compounds and arrangement of the elements in the upper-coating have contributed to the elaboration of a complex mechanism regarding degradation of the artefacts inside soil, mainly supported by internal, external factors and chemical alteration and physical damage processes.

Sandu I., Mircea O., Sandu A.V., Sarghie I., Sandu I.G., Vasilache V.,
REVISTA DE CHIMIE, 61, 11, 1054-1058, NOV 2010

A new family of high viscosity polymeric dispersions for cleaning easel paintings. The procedures for making and applying a new family of high viscosity aqueous polymeric dispersions based on poly(vinyl alcohol)-borax (PVA-borax) matrices are presented. A specific system of this type has been used to remove an oxidized varnish coating from the surface of "Coronation of the Virgin with Saints", a 15th century egg tempera painting on wood by Neri di Bicci (Florence, 1418-1492). FTIR spectra showed that the oxidized varnish was constituted of highly aged shellac resin. Good cleaning performance was attained when the liquid portion of the dispersion consisted of a mixture of water and acetone. Rheological investigations indicate that the acetone content does not affect the mechanical properties of the polymeric dispersion. Those mechanical properties permit easy removal of the cleaning agent simply by peeling it from the surface by means of a forceps or spatula once it has carried out its cleaning function. Optical microscopic and FTIR investigations show that the cleaning agent is able to remove the oxidized varnish coating from the surface of the Neri di Bicci painting without leaving detectable residues.

Carretti E., Natali I., Matarrese C., Bracco P., Weiss R.G., Baglioni P., Salvini A., Dei L.,

JOURNAL OF CULTURAL HERITAGE, 11, 4, 373-380, OCT-DEC 2010, DOI: 10.1016/j.culher.2010.04.002

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Restoring fragmented marble epistyles: Some critical points. The mechanical behavior of fragmented marble epistyles restored with titanium reinforcing bars is studied numerically using the Finite Element Method. The study is focused to the behavior of restored epistyles subjected to bending under uniform load along the free span of the structural element. The restoration method simulated is the one introduced a few years ago by the scientists working for the conservation of the Parthenon Temple on the Acropolis of Athens and is still under development. Attention is focused to the influence of the geometric features of the reinforcing bars as well as to the role of the cementitious material interposed between the marble and the bar. In addition, the contact properties of the marble-titanium, marble-cement and cement-titanium interfaces are also examined. To achieve the goals of the study, six numerical models are constructed considering centrally fractured prismatic marble epistyles of rectangular cross section restored with a single titanium bar, either cylindrical or threaded. The analysis reveals the critical regions, where the maximum stresses and the strain discontinuities appear and makes clear the influence of the geometrical characteristics of the reinforcing bar. Also, the crucial role of the constitutive law governing the mechanical behavior of the intermediate layer of cementitious material is enlightened.

Kourkoulis S.K., Ganniari-Papageorgiou E.,

JOURNAL OF CULTURAL HERITAGE, 11, 4, 420-429, OCT-DEC 2010, DOI: 10.1016/j.culher.2010.01.002

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A New Method of Determining the Normal Range of Hydric-Equilibrium Variation in Wood, with Multiple Applications. This paper presents a new method for the determination of the normal range of variation of the equilibrium moisture content (Delta EMC) for limewood (lindenwood) on the basis of the variation of the reversible moisture content (RMC) as a result of the isothermal and isobar processes of adsorption/hydration at 100% RH and desorption/dehydration at 10% RH. There have been selected a series of characteristics with archaeometric potentials such as the content of the reversible water and the critical time for the correlation of the two curves and others. On the basis of some preliminary experimental data on limewood, there has been created the premise for the usage of these characteristics for clarifying the mechanism of the adsorption/desorption processes of the reversible water in the impact studies regarding the influence of active preservation treatments. Such aspects as well as their applicability in authentication will be further studied for other wood species in some future papers.

Sandu I., Vasilache V., Sandu I.C.A., Hayashi M.,

REVISTA DE CHIMIE, 61, 12, 1212-1218, DEC 2010