

Original article

The scientific approach to the restoration and monitoring of mural paintings at S. Girolamo Chapel – SS. Annunziata Church in Florence

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Abstract

The scientific approach to the restoration and monitoring of mural paintings, at S. Girolamo Chapel – SS. Annunziata Church in Florence, is reported as a fruitful example of the synergic collaboration between restorers and scientists in the planning and development of conservative interventions. Before restoration, the painting technique and the state of preservation of the pictorial cycle have been investigated firstly by close examination of the painted surfaces and then by optical and/or SEM-EDS microscopy and μ FT-IR spectroscopy on appropriately selected samples. In particular, the original constituent materials and those belonging to subsequent restorations were characterized together with those originating from decay processes. In this mural painting cycle, a peculiar “fresco” technique has been used although an auxiliary binder for pigment distemper has been also employed. The use of this technique, sometimes in an improper way together with uncorrected restoration interventions, are the main responsible of the unsatisfactory state of conservation of many painted areas. Preliminary conservation trials and scientific studies were carried out to design the most convenient restoration intervention and to verify the correctness and non-invasive of the necessary operations. Special attention was devoted to cleaning procedures, continuously monitored by a physico-chemical methodology, mainly based on microinvasive, microscopic and spectroscopic investigations, to evaluate the efficiency, advantages and drawbacks of the proposed cleaning procedures and define the most appropriate ones. Finally, specific decay markers have been recognized, by a comparison of the results obtained from the detached samples with those deriving from artificially aged models, to be used for a correct future monitoring and maintenance of the wall paintings.

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1. Research aim

The painted surfaces were affected by a severe darkening that compromises the satisfactory overview, comprehension and fruition of the paintings inside this chapel. The consequent need of a highly requested intervention gave to the technical and scientific equipe, that is, restorers and scientists, the chance to propose and verify a scientific approach to address correctly the whole restoration procedures and to propose a convincing methodology of general applicability for mural-painting monitoring and maintenance. Starting from the knowledge of the pictorial technique, the state of conservation, the identification of past repaintings and restorations, it was possible to guide the intervention scien-

tifically, solving the raised problems step by step. A remarkable result of these joint efforts is the possibility to see and benefit again from frescoes, in their true chromatism, thanks to the removal of unaesthetic deposits and materials of past interventions, making it possible to perceive the intimate meaning of the different scenes.

2. Introduction

Restorations of the mural paintings have been carried out at San Girolamo Chapel– SS. Annunziata Church in Florence, Italy. This pictorial cycle, executed by Alessandro Allori between 1560 and 1564, is the first relevant work after his study stay in Rome [1].

The frescoes represent The Expulsion from the Garden of Eden on the vault (Fig. 1), Prophets and Sybils on the

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Fig. 1. The paintings on the vault after the restoration.

pendentives, *Christ's Histories*, that is, *Annunciation*, *Nativity*, *Presentation of Christ to the Temple* and *Flight into Egypt*, on the sides, *The Disputation with the Doctors* and the *Expulsion of merchants from the Temple* on the lateral walls. In particular, *The Disputation* contains a gallery of portraits of famous citizens, men of letters, doctors and Allori's friends (i.e., the painters Maso da San Friano, Giovanni Maria Butcheri, Agnolo Bronzino and Jacopo Da Pontormo, the sculpturers Baccio Baldini and Bartolomeo Ammannati, the doctors Alessandro Menchi and Gherardo Quadri, the politicians and scholars Pier Vettori and Vincenzo Borghini) identifiable by the inscriptions on the clothes. *The Four Evangelists* are painted on the sides of the altar, while the altar-piece represents the *Last Judgement*, a clear tribute to Michelangelo and his frescoes at Sistine Chapel in Rome, as attested by the inscription "Alexander Allorius civis Flor. Bronzini Alumnus Inventum Octimi Pictoris Buonarrotae Haec Seculo Pinxit" and by the presence of Buonarroti's portrait in the low figure on the left. Fortunately, Allori's intervention preserved *The vision of Saint Jerome* by Andrea del Castagno, rediscovered in 1899 in consequence of the detachment of Allori's Judgement during the conservation work after the flood of Florence in 1966 [2].

Among the others, two main interventions have been carried out on the paintings: the first operated in 1799 by Santi Pacini as commemorated by a marble slab inserted on the base of the fresco that included extensive repaintings, the second one executed during the thirties of the last century by Amedeo Benini [3].

Integrated physico-chemical measurements were carried out to describe, at molecular, nano- or micrometric scale, the materic complexity of the frescoes and the decay processes of the different materials, addressed to characterize the pictorial technique

and the conservation state of the paintings and to offer the necessary scientific tools for the restoration.

3. Experimental

Before any conservation intervention, the whole painting cycle was carefully and jointly observed by restorers and scientists to detect and macroscopically define the more appropriate areas to be investigated by physico-chemical methodologies. Painting fragments and one powder sample were collected from the selected areas and analyzed as detached and as cross-sections; their macroscopic and microscopic description and properties are reported in Table 1. The optical observations on the cross-section were carried out by an Olympus BX51 microscope, equipped with UV-light source to identify the stratigraphic sequences and the presence of organic material within the layers. The cross-sections were subsequently investigated by SEM-EDS (Philips Model XL 40 LaB₆), after metallization through the deposition of a graphite film. Semi-quantitative elemental analyses were obtained by an EDAX-EDS, Prime X-ray energy dispersive spectrometer equipped with a thin beryllium window, using an accelerating voltage of 25 KeV [4].

By stereomicroscope observation, the different layers of the collected samples have been mechanically separated from each other and the resulting materials studied by μ FT-IR spectroscopy, carried out either on the crushed layers and on their soluble fractions, extracted by appropriate solvents (CH₂Cl₂, H₂O, EtOH, CH₃COCH₃) to identify the binding media of the painting layers. The separated layers and the extracted fractions were flattened on a gold surface and their IR spectra were collected in reflection mode by a Nicolet Magna IR560 FT-IR Spectrometer

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