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THE REDISCOVERY OF RELIGIOUS ART IN FRANCESCO NAGNI DIAGNOSTIC STUDY OF SELECTED ARTEFACTS

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Abstract

This paper summarises the study of the vast artistic production of the sculptor Francesco Nagni (Viterbo 1897/1977), with particular attention to the collection of models and plaster casts preserved in the Museum of Colle del Duomo in Viterbo. Francesco Nagni can be considered as a forgotten artist in his town, even if he contributed significantly to history of art between the two World Wars and also subsequently through religious artworks. Nagni produced several works of art in Italy and abroad, in Canada, Brazil, Philippines and in the Vatican city. This paper aims at outlining an 'excursus' of Nagni artistic production through time, with a specific focus on religious art. The main objectives of the research presented in this paper are: 1) the recognition and dating of artworks; 2) the comparison between models and final artefacts; 3) the diagnostic investigation on selected models preserved in the Museum of Viterbo, by applying non-invasive and micro-invasive techniques, such as ultraviolet fluorescence photography, X-ray fluorescence spectroscopy, Fourier transform infrared spectroscopy and micro-stratigraphic analysis.

Keywords: Francesco Nagni, gypsum models, Colle del Duomo, diagnostics

1. Introduction

Francesco Nagni was born in Viterbo on 7th February 1897. But, his life and artistic production developed almost entirely in Rome where he attended the Academy of Saint Luca.

After the First World War, he worked as assistant to the course of sculpture in the Academy of Fine arts in Rome. In that period, he produced a lot of artworks for the Fascism Regime such as: the *Equestrian sculpture of Marshal Diaz* in Naples, several memorial monuments for the fallen of the First World War, the big travertine sculpture of *Pegasus* at Ostiense station and the

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statue of *Saint Paul* (Figure 1) made for the construction of E42 road in the EUR quarter at Rome [1].

Figure 1. View of Saints Peter and Paul Basilica in the EUR quarter at Rome and detail of Saint Paul statue by Nagni.

Francesco Nagni actively participated to the artist circle at Villa Strohl-Fern in Rome, from the end of the 19th to the first half of the 20th century [2]. After the Second World War and the end of Fascism Regime, Nagni concentrated his artistic production exclusively to religious artworks. In fact, he worked for new churches in Rome, in Vatican and also in Italy and in the World creating artefacts of great relevance in Québec in 1950, in Manila and especially in Brazil where he produced sculptures for the cathedral of São Paulo [3].

Nagni reached artistic success at a very young age being appreciated both by critics and public. This success is demonstrated also by the works commissioned to Nagni by the Popes Pius XII, John XXIII and Paul VI.

He participated with Alessandro Monteleone to the International Competition (1947, under the Pope Pius XII) for the realization of the doors of Saint Peter Basilica. The two sculptors worked to the project for the doors, called 'Faith doors' until 1970, but the project was never carried out and finally they donated the plans to the Vatican Museums in 1973.

In the Saint Peter Basilica, Nagni made the golden bronze urn for preserving the body of Saint Pius X Sarto in 1952 when the Pope received the beatification. As decorative elements in the urn, Nagni used the angels that will characterise his production and may be considered as distinctive of his style.

Nagni created also the bronze monument devoted to Pius XI in 1965 that substituted a previous statue by Pietro Canonica, as required by the Pope Paul VI. The statue of Canonica, executed between 1941 and 1949, was transferred to the Lateran Palace. Pius XI didn't appreciate the statue of Canonica; in fact, since the inauguration in 1949, he criticized the artwork especially due to the

rhetorical gesture of the raised hand and to the liturgical incongruity expressed by the Papal tiara combined with the simple chasuble.

The two models used for the bronze monument of Pius XI are preserved at Castelgandolfo in Rome and at the museum of Colle del Duomo in Viterbo.

In relation to the Museum of Viterbo, the collection of Francesco Nagni, preserved in the Sacred Art section, consists of 34 plaster casts: 29 are exposed, and 5 are stored in warehouses. These works were donated by the artist's family to Monsignor Del Ciuco, director of the Diocesan Museum from 2000 to 2013. They are white plaster or faux bronze casts, made by the artist as preparatory drafts for his final works in travertine, marble and bronze.

Two models in the Museum of Colle del Duomo were used by Nagni for creating the bronze statue of St. Peter and the travertine façade of the Church, both commissioned by the Pontifical North American College in Rome in 1959. The statue of Saint Peter, in particular, was inspired to that of Saint Paul made for the Church of Saints Peter and Paul at EUR quarter in Rome (see Figure 1), exhibiting similar forms and aesthetic characteristics.

Another interesting model by Nagni, preserved in the Museum of Colle del Duomo, is that representing Saint Lucy made for the white marble statue in the homonymous church at Rome. This statue exhibits a completely different style in respect to those of Saint Peter and Saint Paul previously described. Saint Lucy is represented as a young girl, holding a lamp instead of a tray with her eyes, as usually occurs in the common iconography. Her face is turned to Heaven waiting to receive the light of Christ. The model misses the right hand, the flame above the candle, and the halo, but represents a strong and ascetic spirituality.

In general, the art of Nagni is characterized by purity and deep spirituality highlighted mainly in his angels [4] whose models are also preserved in the Museum of Viterbo, specifically the Angel of Music and the Angel of Literature, belonging to the funeral Monument of Don Luigi Sturzo in Caltagirone (Catania, Sicily). The Monument consists of sculptures representing the Assumption Virgin surrounded by six angels that symbolize the arts: Music, Literature, Truth, Faith, Justice and Charity.

Between the models in the Museum of Viterbo, that representing the half bust of Pius XI was investigated. This model was used for the full-length bronze statue in the Pope's tomb located in the Saint Peter Basilica at Vatican City. The model differs from the bronze artwork, as the tiara is more stylised, probably due to design requirements [5]. The plaster model is painted for simulating the false bronze.

In the Museum of Colle del Duomo, during the recognition work, fragments of the model for the bas-relief of Saint Peter's doors were found. These fragments represent the scene 'Nero persecutes Christians' and the decorative motifs that surround it. The reconstruction of the fragments on a Forex panel was possible thanks to the analysis of the photographic archives owned by the Zeri Foundation, which contain the photos of the finalist works

participating to the 1947 competition. Nagni participated with Alessandro Monteleone presenting the 'Splendour Door of the Church' (never realized) [6].

Finally, the collection of Viterbo includes three models representing the Saints Alphonsus, Francis de Sales and Hilary of Poitiers that were created as sketches for the Iconostasis of the Blessed Sacrament in the Cathedral of São Paulo, Brazil [7]. These models were designed to represent the final artworks in bronze that were inserted in the monumental architecture of the Iconostasis. The three saints were proclaimed 'Doctors of the Church' by Pope Pius IX in 1877.

The models in the Museum of Colle del Duomo are very interesting from a technical and material point of view. In fact, even if they were made in gypsum, the surface treatments appear quite different as function of the final effect that the artist would like to obtain. It was a common to artists covering their models and sketches by coloured patinas simulating the materials of the corresponding sculptures, i.e. white for marble, green for bronze, etc. [8].

For this reason, it was decided to carry out a diagnostic campaign aimed at investigating the materials and the execution techniques of the finishing layers and furthermore their state of preservation.

The diagnostic investigations were performed both in situ and in the laboratory on selected samples. The in situ analysis, by video microscope, X-ray fluorescence spectroscopy and UV digital photography, was useful to choose the sampling points for laboratory analysis. This last one was carried out through Fourier transform infrared spectroscopy e micro-stratigraphic study under polarizing microscope.

Part of the study and research was devoted to the a new project for exhibition of Nagni's artworks in the Museum and to the production of 3D printed replicas of some little casts for application in activities related to the Museum [9]. This part of the study is not reported in the present paper but it was widely referred in a thesis specifically devoted to Nagni [9].

2. Experimental

In situ investigation was performed on twelve selected models by means of a Mirazoom MZ 902 portable video microscope with zoom lens ranging from 50 to 200 magnifications. This portable video microscope allows viewing and saving high resolution images and videos directly on laptop using a USB 2.0 connection. A light control setting adjusts 8 white LED lights to capture quality images and video in AVI format [10, 11].

In situ diagnostic campaign was further developed by applying visible and ultraviolet fluorescence (UVF) digital photography [11, 12]. UVF photographs were obtained by irradiating the models with UV lamps (Philips PHLTUV36) and using a Nikon D40 digital camera equipped with filters (Kodak Wratten Gelatin Filter 2B and 85B) to remove the unwanted component of the electromagnetic spectrum.

X-ray fluorescence spectroscopy was performed by the portable equipment Surface Monitor II (Assing™). The measuring conditions were the following: Ag tube operating at 40 kV, current 76 μA, acquisition time 60 s.

After in situ investigation, three artworks were selected for sampling and laboratory analysis. In particular, 2 micro samples were obtained from the model of Pope Pius XI, 2 from Saint Alphonsus and 1 from Saint Hilary of Poitiers.

Samples were preliminary examined under a stereo microscope Olympus SZ60 in order to select sub-samples to be analysed through Fourier transform infrared spectroscopy (FT-IR) and micro-stratigraphy.

Infrared spectra were obtained using a Nicolet Avatar 360 Fourier transform spectrometer. For each sample 256 scans were recorded in the 4000 to 400 cm^{-1} spectral range in diffuse reflection modality (DRIFT) with a resolution of 4 cm^{-1}. Spectral data were collected with OMNIC 8.0 (Thermo Electron Corporation) software. Samples have been ground with spectrophotometric grade KBr (1% sample in KBr) in an agate mortar. As background the spectrum of the KBr powder was used.

Observation and photography of the sample cross-sections embedded in polyester resin was performed by a Zeiss Axioskop polarising microscope equipped with a Zeiss AxioCam digital camera. Cross-sections were studied also under UV lighting using a Mercury Vapour lamp directly connected to the microscope in order to observe fluorescence of the materials.

3. Results and discussion

The study of the surface morphology of the models, through video microscope, allowed obtaining information on the execution technique, on the microscopic characteristics of the surfaces, and on the setting layers. Totally, thirty-six areas were acquired, each at 2 magnifications (50x and 200x). By observing the video microscope acquisition, it was found that the false bronze patinas are covered by a protective painting, which now appears deteriorated and blackened. Other interesting details observed by means of video microscope can be found in the engravings of the Brazilian saints and on the collar of Saint Lucy where detailed manufacture may be seen. This suggests the great care for details used by Nagni for his models and ability in using materials and techniques [9, p. 60-69].

UVF photography, applied on four models, allowed to map the conservation state of the surfaces and to detect original and restoration materials. The artefacts investigated through UVF photography are: the bust of Pius XI and the models of Saint Alphonsus, Saint Hilary of Poitiers and Saint Francis de Sales. The UVF photographs of the four selected models are shown in Figures 2-5.

UVF photography on the bust of Pius XI shows a diffused but spotted yellow fluorescence that can be attributed to wax/siccative oil probably used for the false bronze finishing. The dark areas are probably due to recent restoration materials applied on the surfaces.

Figure 2. Photographs of the model of Pope Pius XI: (a) visible and (b) UVF.

Figure 3. Photographs of the model of Saint Aphonsus: (a) visible and (b) UVF.

The UVF photography on the three models of Saint Alphonsus, Saint Francis of Sales and Saint Hilary of Poitiers revealed the presence of restoration parts, visible in the left hand and on the garment edge of Saint Aphonsus; on the nose and on the mantle (left side) of Saint Francis and on the basement of Saint Hilary. UVF images also highlight an orange fluorescence on the three Saints

that can be associated to shellac often used as finishing and protective layer for models and sculptures [10, 13-14]. On the front side of the models a yellow fluorescence can be observed, probably due to siccative oil or wax.

Figure 4. Photographs of the model of Saint Hilary of Poitiers: (a) visible and (b) UVF.

Figure 5. Photographs of the model of Saint Francis of Sales: (a) visible and (b) UVF.

XRF measurements were performed on two models characterised by a surface patina simulating gilded bronze (Table 1).

Table 1. Results of the XRF analysis expressed as cps (counts per seconds of the X-rays for each detected element).

Point	Description	Ca	Fe	Cu	Zn	Pb	Sr
X1	X1: Pius XI, shoulder on the back	420	331	4993	900	131	298
X2	X2: Pius XI, dark area on the back	346	285	3658	648	152	240
X3	X3: Pius XI green area on the back	806	349	3951	677		506
X4	X4: Pius XI, nose of the Pope	282	294	2942	529		242
X5	X5: Angel of the literature, left hand	119	169	224	315		98
X6	X6: Angel of the literature, left arm	443	431	1141	372		280

The results in Table 1 show the presence of calcium and strontium in all examined points. These elements may be associated to the gypsum used for the models. Copper and zinc were also found in the investigated points suggesting the use of brass powder to simulate a golden surface. Iron was also detected in all points suggesting its association with brass alloy. Traces of lead were also found in points X1 and X2, on the back of the bust of Pius XI in correspondence of blackened areas. This element can be associated to pigments used for retouching.

In order to confirm the hypotheses made on the base of in situ investigations, it was decided to take micro-samples for laboratory analysis. In particular, two micro-samples (SA1 and SA2) from Saint Alphonsus model, one micro-sample from Saint Hilary (SH3) and two micro-samples (SP4 and SP5) from the bust of Pius XI were chosen according to the results of UVF photography. Samples description and photographs are shown in Table 2.

Samples SA1, SA2, SH3 and SP4 were examined through FTIR spectroscopy in order to have information about composition. Interpretation of infrared spectra was made on the base of literature and spectral databases available on the web [15; http://www.irug.org/search-spectral-database] and other databases supplied with the Omnic 8.0 software.

FTIR spectrum of sample SA1 is reported in Figure 6 and absorption assignments in the following Table 3. FTIR analysis on sample SA2 gave similar results in terms of detected compounds but with different relative intensities.

In particular, in sample SA2 main compounds are gypsum and wax, shellac is present in traces. Moreover, in sample SA2 iron oxides are also revealed (absorptions at 525 and 437cm^{-1}).

Table 2. Description and photographs of the sampling points. In the case of sample SP5 the fragment under stereo microscope (magnification 10x) is shown.

Point	Description	Photograph of the sampling point
SA1	Garment of Saint Alphonsus, in correspondence of a zone with orange fluorescence under UV. Sample fragments appear as brown flakes.	
SA2	Near the left hand of Saint Alphonsus, in correspondence of a zone with yellow fluorescence under UV. Sample micro-fragments appear as little white-beige elongated flakes.	
SH3	Base of the statue of Saint Hilary of Poitiers, in correspondence of a brown spot exhibiting orange fluorescence under UV. Micro-fragments of the sample are white with brown flakes.	
SP4	Back of Pius XI bust, in correspondence of a green area with traces of gilding. Sample micro-fragments are covered by a greenish layer with traces of gilding, red colour and waxy material.	
SP5	Back of Pius XI bust, in the same point of sample SP4. Micro-fragment with gilding and evident green material.	

Sample SH3 gave also similar results in terms of infrared absorptions. Gypsum is the main compounds together with wax. Shellac is present with relative intensity similar to that found in sample SA2.

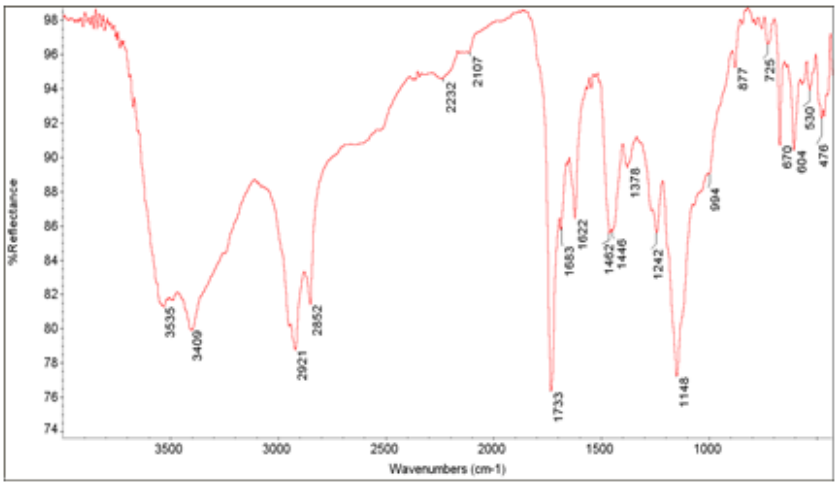

Figure 6. FTIR spectrum of sample SA1 in DRIFT modality.

Table 3. Assignments of the IR absorptions for sample SA1.

IR absorptions (cm^{-1})	Compounds	Relative intensities
3535, 3409, 2232, 2107, 1683, 1622, 1148, 670, 604, 476	Gypsum	+++
2921, 2852, 1733, 1378, 1242, 994	Shellac	++
2921, 2852, 1733, 1462, 725	Wax	+
1446, 877	Calcium carbonate	traces

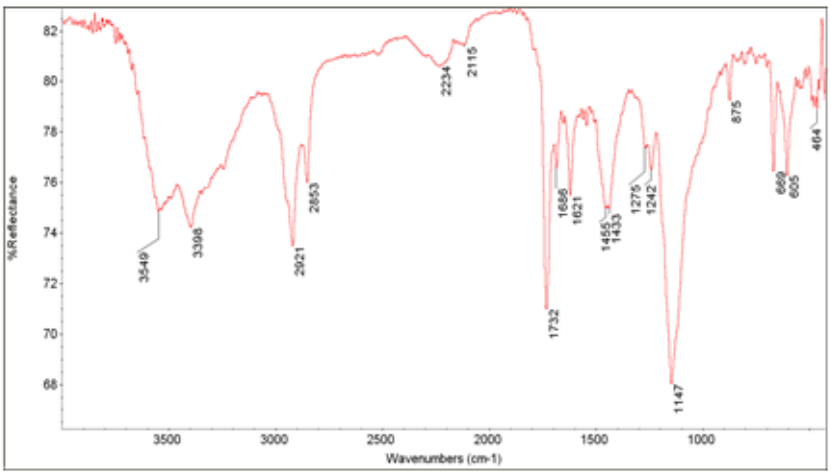

Figure 7. FTIR spectrum of sample SP5 in DRIFT modality.

Concerning the bust of Pius XI, infrared spectrum of sample SP5 is shown in Figure 7 and the relative assignments of IR absorptions are reported in Table 4. FTIR analysis on sample SP4 gave similar results in terms of detected compounds.

Table 4. Assignments of the IR absorptions for sample SP5.

IR absorptions (cm^{-1})	Compounds	Relative intensities
3549, 3398, 2234, 1686, 1621, 1147, 669, 605, 464	Gypsum	+++
2918, 2853, 1732, 1242	Shellac	++
2921, 2853, 1732, 1455	Wax and/or other organics (resinate, synthetic resin)	+
1433, 875	Calcium carbonate	traces

In conclusion, the results obtained by FTIR analysis indicated the presence of shellac in all samples, suggesting its use as original materials for finishing and protection of the models, as found in other examples related to models and plaster casts [13, 14] and in general to *modelli* used by artists as aid to produce artworks [8, 11].

On the base of FTIR results, it may be hypothesized that shellac was used as finishing materials and/or as resins used to isolate the gypsum surface before applying painting, as usually found in similar artworks and models [13, 14].

Wax was probably applied to protect the surface on the occasion of subsequent interventions or it may be also an original material.

Some doubts still remain about the location of the different materials detected though infrared spectroscopy. For this reason, a cross section was obtained by the sample (SP5) taken from Pius XI, taking advantage from the fragment dimensions, suitable for preparing the section.

Microphotographs of cross section under visible and UV fluorescence are shown in Figure 8. Six/seven layers can be observed in the cross section. Starting from the bottom, a thin and discontinuous layer of gypsum may be seen (layer 1). Over this, a yellow layer with black inclusions is visible (layer 2). This layer is characterized by intense yellow/orange fluorescence under UV suggesting the presence of wax and shellac. Moreover, this layer seems to be made of two parts: layer 2 and 3 differentiated under UV. The presence of wax/shellac layer on the gypsum had probably the function to isolate the porous surface of gypsum before applying the green layer and the gilding.

Over this highly fluorescent layer, a green area (without fluorescence) can be observed (layer 3 in visible micro-photograph and layer 4 under UV). The optical characteristics of this transparent green layer suggest the presence of copper resinate that was probably used to simulate the colour of bronze. Over this green layer, Nagni applied gilding, well distinguished under visible light (layer 4), which was made by brass powder, as found by XRF analysis (see Table 1).

A thick layer of un-fluorescent materials is visible in the left part of the cross section. This can be probably associated to restoration protective applied in non-documented interventions.

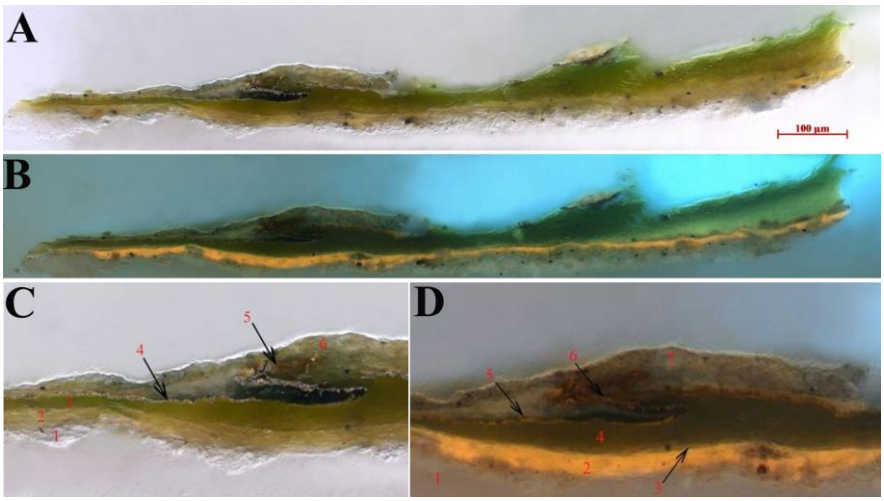

Figure 8. Microphotographs of sample SP5 cross section: (A) visible light; (B) UV fluorescence; (C) detail of (A); (D) detail of (B).

4. Conclusions

The study of the collection of models by Francesco Nagni preserved at the Museum of Colle del Duomo in Viterbo gave the opportunity to deepen the knowledge of the sculptural production of this artist.

The historical studies revealed a widespread production, continuous over fifty years of artistic career, also with a large demand at international level.

Francesco Nagni was an artist always looking for the beauty that could represent the human soul uncorrupted by the modernisms and alterations of avant-garde. Nagni remained always faithful to his style exhibiting an excellent adherence to recurring iconographic subjects, especially concerning the religious artistic production.

In particular, images of the Virgin Mary and the angels represent a constant character of his production, always different and singular in their uniqueness.

The presence of a conspicuous group of models and plasters in the Museum of Colle del Duomo in Viterbo, allowed for carrying out a diagnostic survey with the aim at investigating the materials and technique used by Nagni for surface finishing of his artworks. At the same time, the diagnostic campaign gave information on the conservation state of the models.

It was found that Nagni prepared his models with great care and attention to details. In fact, he applied different finishing layers in order to simulate the materials of the sculpture for which the model was produced. So he used different superimposed layers with different functions: the first, over gypsum for isolating the surface and making able to receive the painting, the second and third layer should simulate bronze, so he applied a copper resinate and brass powder.

In conclusion the research synthesised in this paper, gave the opportunity to re-discover an artist almost forgotten both in his hometown and in art history books. Huge spirituality and humility made Nagni a complete and representative artist of the historical period in which he lived, with a production marked by the transition from the regime's art to religious art.

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