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Revealing and unveiling the polychromy of the Camponeschi Monument in L'Aquila

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***Abstract* – The case-study of the Camponeschi Monument (1432), located in San Giuseppe Artigiano in L'Aquila, raises numerous questions, both in the field of art history and applied diagnostics. The investigation project started in order to document and characterise the polychrome and polymateric aspect of the work, sculpted in local limestone: this polychromy was only understood during the last restoration (2008-2009). It was supposed to cover the sculpture with unusual vitality, as a sign of power of Camponeschi's family, lords of L'Aquila. After the first phase of investigations (UV, IR, IRFC), curated by Ottaviano Caruso, we will proceed with XRF, FT-IR, Raman and LIF scanning, trusting also to elaborate a 3D model with different layers, useful for knowledge, conservation and monitoring of the artefact and its interactions with the environment. Moreover, this case-study places art history and diagnostics in a reciprocal dialogue.**

KEYWORDS

Cultural Heritage; Lategothic; polychromy; pigments; blinders; stone; diagnostics; UV; IR; IRFC; XRF; FT-IR; Raman; LIF; 3D; new technologies.

I. INTRODUCTION AND STATE OF ART

Given the importance of the L'Aquila sepulchral Camponeschi monument, it was chosen in order to better highlight its close relations with the Milan Cathedral building site, and its connection to the activity of the German sculptor Walter Mönich in Abruzzo.

Walter Mönich, also known in Italy as *Gualterius de Alemania,* was active in the milanese cathedral building site from 1399 to 1409 [1], holding a prominent position as Magister in charge of hundreds of stone carvers. It was the sudden death of Gian Galeazzo Visconti in September 1402 that led to a generational change and a rearrangement of the tasks entrusted to the artists of the Cathedral. This probably prompted the German sculptor to move to central Apennines, staying in Orvieto - a year so - and then settling in Abruzzo.

The first monument he created and signed in this region is the *Cantelmo Caldora sepulchral monument* in the Caldora Chapel of the Santo Spirito al Morrone Abbey. We also know about the existence of another monument, with double equestrian representation, dated 1415, sited in the chapel of San Giacomo in the church of San Domenico, in L'Aquila (destroyed in the 1703 earthquake). In this context, the Camponeschi sepulchre - whose authorship was lost over the centuries - has been attributed by some critics [2] to the German sculptor or, in any case, linked to his activity in Abruzzo.

The aesthetic innovation of the Camponeschi Monument (Fig. 1) lies in its *habitus* of opulent semblance, certainly conceived *ab origine* for the sculptural work: this must have determined that «pictorial, vibrant» [3] appearance, which the artwork of local fresco painters would refine in detail. We are in the "golden" years for the city of L'Aquila [4], which followed the victory over Braccio di Montone (1424) and persisted at least until the death of Queen Giovanna II of Anjou (†1435).

The project took a long course, also due to the necessary bureaucratic times, and is still ongoing. Three main phases can be identified: the first one related to the primary documentary research; the second one concerning the scientific and diagnostic campaign's planning and the preliminary imaging investigations; a third one, still ongoing, for the reflection and programming of further scientific surveys, based on the preliminary results. Naturally, the three phases are closely interconnected.

From the very first documentary research on the artwork (first phase), the need to acquire scientific and diagnostic documentation (missing in the recent restoration) clearly emerged and, therefore, the planning of the diagnostic project (second phase) became an integral part of the writer's specialisation thesis [5].

The obtained results in this preliminary diagnostic campaign, presented in this paper, have confirmed the need to proceed with multi-analytical approach, aimed to point out the polychromy, that was originally intended to cover almost the entire monument, and to find information on the hypothesis about eventual polymateric surface finishes (e.g., leather; textiles; leaf metals, such as tin, gilded tin, gold; resins). This third phase will be accomplished thanks to the collaborations between the *Gran Sasso Science Institute* (GSSI) and *Agenzia nazionale per le nuove tecnologie, l'energia e lo sviluppo economico sostenibile* (ENEA).

The project will undergo into further analyses, essential to complete a mapping of constituent materials: X-ray fluorescence (XRF), Fourier transform infrared spectroscopy (FTIR) - with portable instrumentation -, Raman Spectroscopy and Laser-induced fluorescence (LIF) scanning. The possibility of developing new *ad hoc* technologies - thanks to the cooperation between various GSSI and CHNet professionals - is also being considered: this would allow, as will be seen, to deal with the sculptural-architectural specificity of the monument. It is

also trusted that a 3D model of the work can be elaborated, configuring the different surveys on several layers. All this material, together with what has already been acquired, will be useful for an adequate knowledge of the property, for an improvement in its conservation, preservation and monitoring, even of its interactions with the environment. In fact, the sepulchral artwork constitutes an exemplary case study of a work very much marked by interactions with the context, by the effects of the site's strong seismicity, but also due to anthropic risks, such as invasive restoration interventions. Indeed, this case study particularly suited to the intents of the CHANGES Project, whose *focus* is to study, understand and detect the effects of both natural and anthropic risks on cultural heritage.

II. DESCRIPTION

The first phase of the research concerned art historical aspects *strictu sensu*, that is to say, the acquisition of documentary, historical, conservative, contextual and stylistic data.

The aesthetic-formal peculiarities of the Camponeschi sepulchre qualify it as a late Gothic masterpiece in Abruzzo, that combines the Nordic *Schöne Stil* with the German expressiveness and perhaps even with a mature naturalism. It is a complex architectural sculptural apparatus (7.80 m., 2.53 m. and 1.21 m deep), carved in local limestone. The monument consists of an altar table on which two twisted columns develop, "inhabited" by bundles of leaves and flowers. The columns are based on two column-bearing lions, facing the sepulchre: lights and shadows lurk on their mane.

Looking up, on the back wall three small shelves lean on the wall, with the *Prophets* on the sides and a female figure in the centre, perhaps a *Sibyl*, partly mutilated. On the front, the *Coronation of the Virgin* (Nordic theme) dominates the centre, on the sides *Saints and Apostles*, in high relief. On the upper level lies the deceased young Ludovico Camponeschi with the little dog at his feet, as a symbol of fidelity. He is flanked by the two *Thuriferary Angels*, who anchor their polychrome wings to the columns. The recumbent wears warrior clothes and his hands are crossed on his belly, covered with gloves. The equestrian figure of Ludovico the warrior rises up behind the recumbent body. He rides the barded steed and wears full armour, complete with cloak, and perhaps once also with weapon and shield.

The artwork had a troubled conservative history. Some photographs preserved in the Fototeca Zeri's archive, dating back to the twentieth century (Fig. 2), allow to see that the stone surfaces have been widely darkened, due to the sedimentation of particles and greasy dust, denser in correspondence with the concavities. Other photographs show a state of abandonment of the entire church, during the seventies of the last century and up to its reopening in 2005: «con sudiciume sparso per ogni dove e con l'umidità che ha eroso in molti punti il soffitto della chiesa» [6] (Transl.: "with dirt all over the place and with humidity that eroded the church ceiling in many parts").

In addition, there were numerous telluric events in the city, from the 15th century until today: on December 5, 1456; on 26 November 1461 (damage intensity estimated:10th degree, Mercalli scale); others in 1646 and 1672; the most dramatic for the city on February 2, 1703: «rimase questa chiesa totalmente desolata per il tremuoto del 1703 ad eccezione di una nave dove è la sacrestia, onde il Capitolo per ripararla vi contribuì per più di venti anni (…) e la ridusse come oggi si vede» [7] (Transl.: "remained this church [the actual S. Giuseppe Artigiano] totally desolate because of the 1703 quake except for a nave where the sacristy is, so that the Capitolo to repair it contributed for more than twenty years (...) and reduced it as today is seen"). Finally, the damages from the 1915 earthquake also took twenty years to be repaired, mainly of the flooring, walls and central vault. The persistence of the artwork up to our days means the irrefutable proof of its structural excellence.

Before the restoration in 2008, the morphology of the surface abrasions, below the sediments, revealed the previous action of interventions carried out with inappropriate and invasive substances: they demonstrated the poor understanding of its polychromy. The traces of pictorial film presented serious conservation problems: chromatic alterations of the original shades; cohesion and adhesion defects. The original pictorial layers underlying the particle deposit were raised in several points from the support and tended towards dusting. It was even difficult to distinguish the original pictorial finishes, not yet detected in their effective extent and perhaps contaminated with successive painting phases. The particular fragility of the original pictorial layers was recognized, lifted from the support and at risk of detachment: the urgency of the conservative intervention became tangible.

Following the 2008-2009 restoration, realised by G. Capriotti and L. D'Alessandro, the polychromy originally covering almost the entire monument was read and appreciated for the first time. The director of works, dr. Biancamaria Colasacco, even supposed some polymateric surface finishes (e.g., leather; textiles; leaf metals, such as gilded tin, gold; resins).

All of this, given the absence of previous diagnostic documentation on the ark, encouraged the elaboration of the investigation diagnostic plan, which hinged on the questions that the monument poses: about the international style typical of the late Gothic period, about the unusual execution technique, about the causes of such a loss of the surface layer. This is how the second phase of this work began, i.e., the planning of a diagnostic project, based on the historical-artistic and conservative peculiarities of the artwork.

The core intention of the research is to document and to record the fragments of polychromy and residues of eventual polymateric elements, of which chemical-physical traces can still be found on the surface; this, through the analysis and detection:

- of the surface behaviour on the entire monument;
- of details bearing important information, e.g., the painted inscription along the moulding at the base of the sarcophagus; the angels on the sides of the

lying corpse; mordant residues on the horseman and steed;
- of the residual polychromy on the high reliefs of the central sarcophagus, which best preserve evidence of the original pigmentation, for a characterization of the pigments used.

The first step of surveys, per imaging, preliminary to the next ones, has been carried out by Dr. Ottaviano Caruso in UV fluorescence (Fig. 3), in infrared (IR) radiation and in IR in false colour. It employed MADATEC's 360 nm (350) UV LED Sources for Cultural Heritage, cameras both Medium Format and Full Frame of full range type and thus prepared for multispectral surveys. It provided a great amount of information, but also opened up many further questions, some of them unexpected. The firsts questions raised by the monument were: the attribution; the execution technique; the overall style. However, if these remain open, imaging investigation has mostly given information about the conservation history, restoration additions and it allowed the behaviour of the surfaces to be clearly differentiated (Fig. 3). Regarding the monument's pictorial and multi-material decoration, clear information has not yet been revealed, up to this stage of analysis.

III. RESULTS

Regarding the artwork's conservative background: the top part of the Monument must have been destroyed in one of the great earthquakes that marked the city (1461 or 1703); the front and pinnacles, observed under UV fluorescence, show in how many and which fragments the upper order had to be reduced into, with the loss of some of its portions (Fig. 3). The face of the left *Angel* is extremely deteriorated (Fig.4): it is considered that diffuse humidity (cf. Fig. 2) has caused a kind of "black crust," starting in the mid-twentieth century, leading to an irreversible degradation of the stone material: in fact, moist acid deposition increases the solubility of calcium carbonate (main constituent of limestone), risking its transformation into the more soluble bicarbonate. In addition, it is presumed that this portion has been treated with noxious and/or aggressive substances: the need for adequate monitoring becomes evident.

Another surface behaviour in UV that stands out is the fluorescing of the constituent material: the stone. It is certainly a local lithotype, but the fluorescence of the parts given in UV is essentially different: we can combine, on one side, the twisted *columns*, the *lion stylophore* and the upper portion of the sepulchre (*angels*, *columns*, *capitals*, *pediment*), by a bright whitish fluorescence; on the other side, the *memorial plaque*, the *relief sarcophagus* and the *horse* give a weak yellow/brown fluorescence. Now, if fluorescence may be given by the intrinsic qualities of the material, but also by the presence of film-forming substances, this aspect opens up some hypotheses: most probable, the Monument is composed of two different lithotypes, two distinct petrographic essences, chosen by the magister himself according to the structural or decorative function of each piece. an alternative possibility is that the surfaces of underwent different treatments and that only some (second group) were coated with an oil-resinous substance, for the finishing; otherwise, there was used a protein-based compound, perhaps animal glue, as in other examples of painted stone, such as the exterior lunettes of the Parma Baptistery by Benedetto Antelami [8].

Anyway, despite a particularly clever construction technique, the pictorial one applied on stone appears less complex. The technique used does not seem to correspond to a standardised practice: probably local in its character, the executive technique seems to consist of applying pigment on the bare stone. With regard to the polychrome parts, the aesthetic-stylistic choices of the sculptor and his team could be better differentiated. It is difficult to establish whether the white fluorescence given by the UV fluorescence images relates to the stone *talis qualis* or to material superimposed during the original execution or even during a restoration phase; for example, the white fluorescence of the face of the angel on the right (Fig. 3) would suggest the appearance of the "naked" stone, devoid of any gelling veil.

With regard to the pigments, thanks to the combination of VIS, UV, IR and IR false-colour, we can see that the blue residue behind the small curtain-bearing angels of the central *formella* is the same one used for the *Virgin*'s mantle (Fig. 5) and for the background of the reliefs on the sides: observing its grain size and intense blue colour in the visible, its low fluorescence in UV and its purplish response in false-colour IR, we do not have an answer that allows to uniquely identify the pigment: it may be azurite or lapis lazuli (to be verified by XRF and FT-IR) [9].

The hypothesis of metal foils used for the knight's armour and for other details, to be verified with complementary scientific surveys, does not remain excluded: the bluish fluorescence given on certain points of the knight's armour keeps this possibility open, in the hypothesis that there is a trace of film-forming materials.

This excellent sculptural and architectural artefact was conceived as an assembly of modular parts, as was the case with the polyptychs of the great workshops. This would explain how the monument could have been moved to a later period and corroborate the hypothesis that in the 15th-century layout of the church - of a different orientation - it could have been located in the apsidal area of the previous structure. To identify the execution technique, we have to employ that multi-analytical approach that allows a reliable and well-founded interpretation of data.

Moreover, a mixed technique inevitably corresponds to the difficulty of choosing the most appropriate method of analysis for its identification, so since the project is ongoing, the contribution remains open to suggestions that colleagues wish to propose. This would also provide in understanding the communicative/propagandistic aims of the Camponeschi's commission: indeed, it is precisely in the last decades that the lively polychrome face of the Middle Ages [8] [10], which reiterating tastes for a 'bleached' classicism had wrongly concealed, is once again being appreciated and detected.

Fig. 1. Camponeschi monument, 1432.

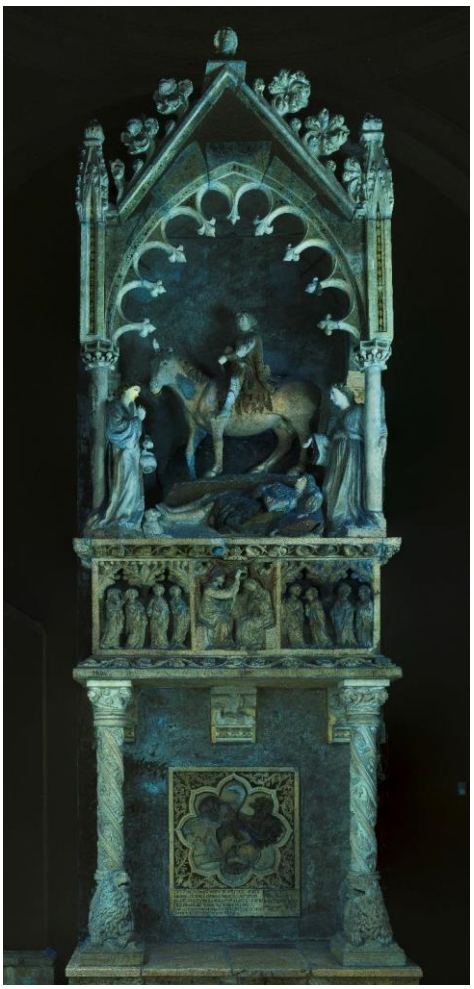

Fig. 3. Photograph of the monument in UV.

Fig. 2. Left angel, state of conservation in 1940-1970. Fototeca Zeri, inv. 145477.

Fig. 4. Left Angel, detail, in UV.

Fig. 5. Virgin's mantle, detail, in IRFC.

IV. FUTURE APPLICABILITY

These results will make it possible to elaborate the work plan for the next phase of investigations, trying to complete the mapping of the monument by means of complementary techniques to those already carried out: the punctual analysis (XRF and FT-IR *in situ* with portable instruments) will be applied on the artefact in order to complete the scientific documentation and to univocally identify the pigments employed in the artistic technique; to document any additional minimal residual pigmentation it will be used the Laser-induced fluorescence (LIF) scanning, used according to an integrated survey approach involving several tools, as suggested by ENEA in the wake of the most recent studies conducted with this technique [11]; in CHANGES project we are working on making possible an XRF investigation based on the use of a scanner, as developed by INFN-CHNet for *in situ* analysis, useful for mapping elements on the surface [12]; finally, a combined use of microscopic techniques, Raman micro-spectroscopy and, hopefully, of gas chromatography coupled with mass spectrometry could enable to identify inorganic and organic components of the artwork.

All of this is always for the purposes of a deep and documented knowledge of the artefact, for its correct safeguarding (cf. art. 3, par. 1, Cultural Heritage and Landscape Code) and its appropriate monitoring. This case study may become even exemplary for other monuments and sculptural architectural artworks in the historical city of L'Aquila, especially if parts of that *facies* of its ancient glory that lies between the late Middle Ages and the early modern age.

With regard to the applicability of this type of research, many new opportunities could be envisaged. First of all, the development of the field of new technologies applicable to cultural heritage always allows a new impetus for research in the respective territory. In fact, the development of the project was based on the conviction that technologies for the chemical-physical reading of artefacts can provide scientific materials - and sometimes answers - to art history, which documentary sources often cannot provide. Likewise, the same kind of investigation could be applied, for instance, to the portals of L'Aquila main churches, often painted in the top lunette and decorated (e.g., on the façade of the churches of San Domenico and Santa Giusta) with architectural sculptures in the splays and arches, which still await a careful decodification and scientific and art historical identification.

Certainly, the case of the Camponeschi tomb can be taken as a real case study. Precisely by virtue of its formal, dimensional, aesthetic and multi-disciplinary peculiarities (it implies architectural volumes, sculpture, painting, perhaps even local craftsmanship and manufacture) it necessarily requires a multi-technical and interdisciplinary approach, and makes essentially indispensable the dialogue and the intersection of data from different disciplines. Here the analysed monument offers an emblematic example of the need for diagnostic studies, because of its execution technique, but also because of its complex conservation history. It constitutes an example of strong interaction between the cultural heritage and its environment, having suffered natural damage, such as earthquakes, humidity, atmospheric particles, but also anthropic damage, such as invasive interventions and alterations of the original nature: issues that are at the core of the CHANGES Project, that promotes and fosters new technologies in an approach of enduring sustainability, among the most virtuous auspices of the National Recovery and Resilience Plan.

V. CONCLUSIONS

The results obtained make it possible to identify and diversify the major conservation problems in the history of the work, those due to mechanical damages and those related to inappropriate human activity. In addition to the loss of portions due to church collapses, over time, the sepulchre has undergone chromatic alterations of the original hues, due to the overlay of foreign substances; cohesion and adhesion defects have caused the loss of much of the original polychromy. Invasive interventions, for example in the case of the left Angel (Fig. 4), have even caused an alteration of the stone, as evident from the UV. As far as the stone is concerned, studies conducted so far allow us to distinguish at least two different lithotypes, used according to their function, static or decorative: this proves a refined projectuality behind the conception of the work.

With regard to polychromy, we need to better understand which chemical elements are present on the surface, as imaging analyses do not allow us to univocally identify the pigment used, but only to make hypotheses. For blues, we can only keep open the hypothesis discussed above.

In the entire monument, we still have to intercept the possible presence of traces of gilding: bolo, conchiglia and mordant. In the decoration of the right angel's hair, it is still possible to differentiate whether it is gold leaf applied on a layer of bole or whether it is a pigment simulating the effect of gold. The decoration of the steed and its knight still needs to be characterised: the hypothesis is that to simulate the knight's armour a mordant layer was applied, followed by a layer of tin leaf.

Thus, after the first and second phases, starting from the results emerged, it is possible to program the next one, to be carried out in the coming months. This will be possible in the frame of CHANGES project (PNRR), where this research was welcomed, thanks to the interest and support of Speranza Falciano and Adriano Di Giovanni of the Gran Sasso Science Institute. In order to characterise the few fragments of original pigment remaining on the surface, the need for other complementary analyses is evident: in addition to XRF, FT-IR, micro-Raman spectroscopy and LIF scanning, could also be useful, for an elementary mapping and to better understand the execution technique. In this regard, the comparative study of other case studies of polichromy on stone [8] [10] will be fundamental, together with the sharing of colleagues in this valuable opportunity of debate.

A second issue to be resolved, however, will be logistical

in the context of the *in situ* execution of punctual analyses: the monument consists of high relief areas and three-dimensional bodies, even small ones. This makes it difficult to approach the polychrome backgrounds (which often retained more of the original polychromy to be detected) with due and proper precautions.
For this reason and also given the historical and artistic significance of the monument, the GSSI team is planning to create a 'site-specific' technology for point analysis, equipped with a mechanical arm, that could solve the difficulties caused by the work's height, and to design and develop a well-suited measuring head.
The third and final issue, essentially of an art-historical nature, is the total lack of response - till now - to the area of the inscription running along the moulding under the sarcophagus: it almost certainly contained the artist's signature, the date of execution, or at least further data on the commissioning of the work. The dating of the Camponeschi Monument has caused much debate among critics: it is questionable whether perhaps physics can find an answer to this question, still open, through its methods of investigation applied on cultural heritage. Finding a methodological answer to intercept the inscription, would be the most virtuous of examples through which physics and diagnostics applied to a work of art, can solve age-old questions. Lastly, within the CHANGES - PNRR project, a 3D model of the sculptural-architectural artpiece could be formulated: through different layers, the model could be a transversal tool, both for preservation agencies and for further in-depth investigations, and a multimedia device for new forms of its valorisation and accessibility.
The case study could also become a pioneer, in view of an implementation in the Gran Sasso Science Institute of the sector of technologies applied to cultural heritage. That becomes particularly significant in a context such as that of L'Aquila which has suffered a lot, because of natural disasters, known to all. As an art historian, I immediately recognised the potential of a fruitful exchange between different professions (which was also the reason for the thesis project itself), since the process of knowing a cultural asset is necessarily interdisciplinary; and archaeometry provides material - now irreplaceable - to the art historian/archaeologist, but also to the restorer, through the characterisation of constituent materials.

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