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A hidden splendor: the color of medieval cloisters in the 12th and 13th century Catalonia

Um esplendor escondido: a cor dos claustros medievais na Catalunha dos séculos XII e XIII

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Abstract

The identification of polychromy in medieval imagery during restoration campaigns has significantly advanced the iconographic and formal interpretation of monumental sculpture. This integration of image and color provides a fresh perspective, offering deeper insights into how the Church explicitly conveyed its dogma. Consequently, the polychrome image emerges as a pivotal medium of expression for 12th and 13th century society. The limited availability of case studies on monumental sculptural color presents a major challenge in contemporary medieval art research. Within this context, Catalonia stands out as a remarkable example on the Iberian Peninsula, owing to the chromatic remnants preserved in various sculptural and architectural ecclesiastical elements. This study focuses on Catalan medieval cloisters, proposing novel approaches to understanding the role of polychromy in its environment, and the interplay between sculpture and liturgical practices. It proposes that color was not merely aesthetic but served a wide array of symbolic meanings and functional contexts.

KEYWORDS

Polychrome monumental sculpture
Polychrome Romanesque sculpture
Catalan Romanesque art
Romanesque cloister
Color techniques
Catalan Counties

Resumo

A observação de policromia na imaginária medieval durante as campanhas de restauro tem impulsionado a interpretação iconográfica e formal da escultura monumental. Esta combinação de imagem e cor oferece uma nova perspetiva, proporcionando uma visão mais profunda de como a Igreja transmitia o seu dogma. Consequentemente, a imaginária policromada surge como um veículo de expressão crucial para a sociedade dos séculos XII e XIII. A escassez de estudos de caso sobre a cor na escultura monumental representa um desafio na investigação da arte medieval contemporânea. A Catalunha destaca-se enquanto exemplo notável na Península Ibérica, devido aos vestígios de policromia preservados em diversos elementos escultóricos e arquitetónicos eclesiásticos. Este estudo centrado nos claustros medievais catalães pretende compreender o papel da policromia no seu ambiente, bem como a interacção entre a escultura e as práticas litúrgicas. Propõe-se que a cor não seria apenas estética, mas servia uma vasta gama de significados simbólicos e contextos funcionais.

PALAVRAS-CHAVE

Escultura monumental policromada
Escultura românica policromada
Arte românica catalã
Claustro românico
Técnicas de cor
Condados catalães

Introduction

The investigation of polychromy in Romanesque art represents a pivotal challenge within contemporary historiography [1-3]. Recent advancements in this domain have been catalyzed by findings from restoration projects and innovative analytical methodologies focused on medieval polychromy [3-8]. These developments compel a critical reassessment of established paradigms concerning the function of color, its interplay with monumental sculpture, and its reception by historical audiences. Central to this discourse are questions regarding the influence of polychromy on the iconographic and iconological configuration of these works, how it was perceived by contemporary viewers, and the extent to which it contributed to the articulation and dissemination of doctrinal messages.

While celebrated examples such as the Portico de la Gloria [9] have received considerable scholarly attention, it is imperative to extend the scope of inquiry to encompass other notable instances of monumental sculpture and their distinctive features across the diverse territories of the Hispanic Kingdoms. A systematic and comparative analysis of extant polychrome vestiges is indispensable for achieving a comprehensive understanding of the techniques employed in the application of color and its perceptual and symbolic dimensions within these artistic productions.

In this context, the Catalan counties serve as a paradigmatic example of the use of color in twelfth and thirteenth century sculpture and architecture [10]. The region's polychrome remnants constitute a unique case within the Iberian Peninsula, as it preserves a significant number of chromatic vestiges available for study. Currently, approximately 85 examples of medieval sculpture (such as portals, capitals of the cloisters, reliefs, and other sculptural decorations in church architecture) retaining their original polychromy have been identified across various territories that formed part of the Crown of Aragon during the Middle Ages [11].

Several factors influenced the development and preservation of polychromy in this region. Geography played a pivotal role, with the Pyrenees serving as a strategic source of specific minerals, such as aerinite, azurite, and malachite [12-13]. Additionally, the trans-Pyrenean exchange of pigments, facilitated by interactions with southern France, along with the itinerant nature of workshops, significantly contributed to the dissemination of polychromy [14, pp. 245-246]. Preservation of the polychrome remnants was further aided by their location. Notably, colors tend to be better conserved in the most sheltered areas of sculptures or in elements that have been less exposed to climatic conditions and the effects of time.

Within the context of Catalan monumental sculpture, two notable case studies stand out: the porticoes of Ripoll and Agramunt (Figure 1) [15]. These examples are exceptional both for the volume and for the quality and diversity of the preserved polychromy, prompting compelling questions regarding the reception and symbolic dimensions of color [16].

However, this study focuses on a different yet equally significant and underexplored aspect of polychromy in monumental sculpture, the medieval Catalan cloisters that retain polychrome remnants.

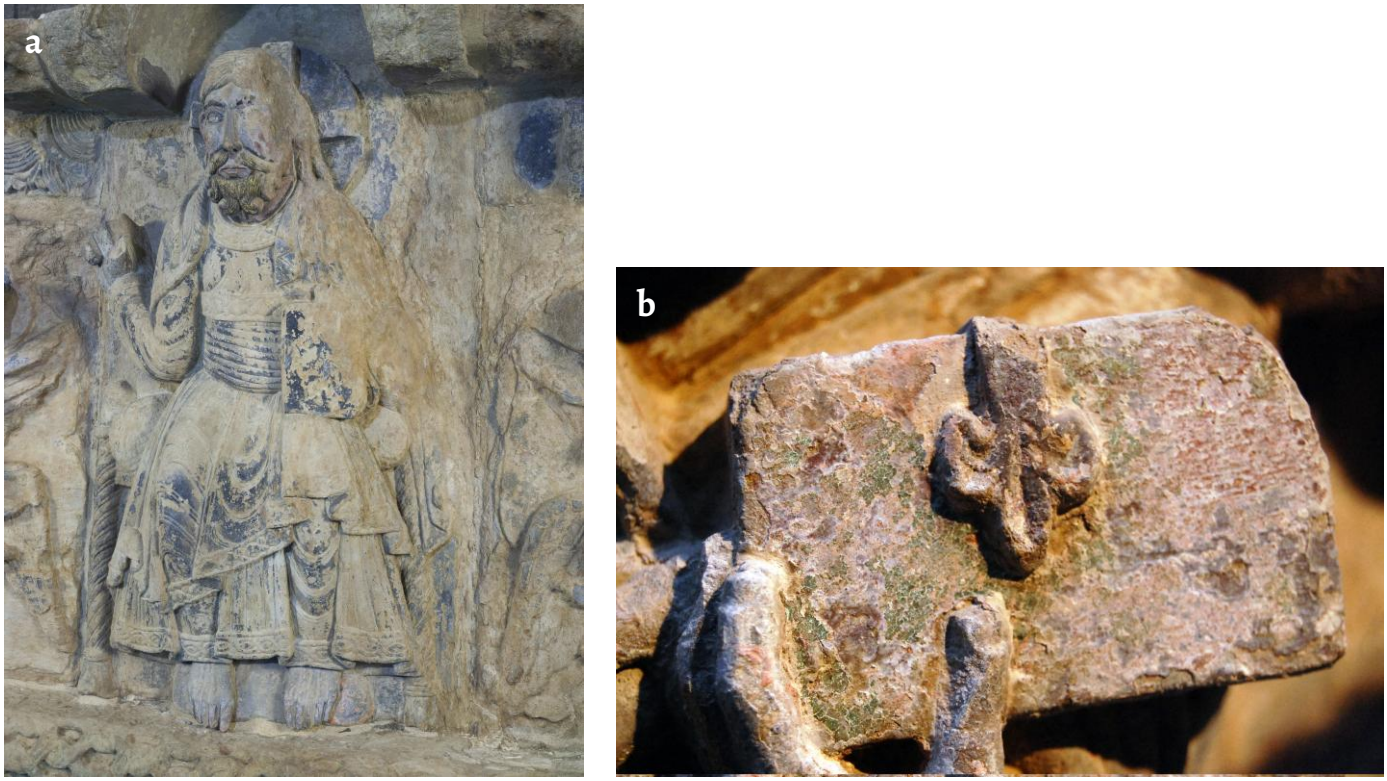

Figure 1. Portal case studies: *a)* Monastery of Santa Maria de Ripoll, Ripollès, Catalonia, c. 1140 (photograph: Centre de Restauració de Béns Mobles de Catalunya – CRBMC); *b)* church of Santa Maria d'Agramunt, Urgell, Catalonia, 1283 (photograph: Arcovaleno Restauro S.L.).

The color of the medieval Catalan cloisters: features and case studies

The current understanding of color in medieval Catalan cloisters is derived from the polychrome remnants that have survived to the present day. It is essential to acknowledge that the hypotheses and interpretations regarding this polychromy are shaped by the condition in which these colors have been preserved and the manner in which they are presented today. Such factors can skew our perception of the original appearance and the splendor these monumental ensembles would have conveyed in their historical context.

Additionally, this study was inherently constrained by the data obtainable through direct examination using digital microscopy and the information available from restoration reports. Chemical analyses are limited to elements that have undergone restoration, as exemplified by certain capitals in the cloister of Sant Cugat del Vallès (c.1190, Figure 2) [17]. This reliance on selective evidence underscores the challenges of reconstructing the original chromatic schemes of these medieval structures.

Despite these limitations, it is possible to identify recurring features in the polychrome capitals of cloisters within the Catalan counties. My research has identified a total of eight cloisters preserving polychrome vestiges on their capitals. In all cases, the study of color and its characteristics relied on direct observation and examination using a digital microscope. The only cloister for which detailed restoration information on the polychrome layers is available is Sant Cugat, which will be discussed in greater detail below.

Figure 2. The capital 129 polychromy (Museum of the Monastery of Sant Cugat del Vallès): *a)* original; *b)* reconstruction [17].

Based on visual observation, a predominant characteristic is the prevalence of red, ochre (mainly reddish, yellowish and brownish ochres), and black pigments. These colors might have been better preserved due to the chemical stability of their pigments, enabling them to withstand the effects of time more effectively. These colors are typically visible on the general surface of the capitals, whereas other hues, such as blues and greens, are often found in more protected areas. The latter have undergone changes in their shades as they are generally more prone to physicochemical processes. The predominance of red, ochre, and black, attributed to the chemical resilience of the pigments used, is not unique to polychrome sculpture but is also a notable feature in Catalan mural painting (especially *secco* techniques) [6, 18-19].

Unlike the application of polychromy in the large porticoes, where more saturated and bright pigments or imported from other territories were used and were observed by a wider public, which influenced their dogmatic and didactic function [6], in the Catalan polychrome cloisters mostly local or common pigments were used. For example, the color black vine used to be obtained by calcination of selected woods or fruits and seeds, known in Catalan as *negre vinya* and in medieval artistic manuals as *nigrum optimum*. This type of black could probably be the same as seen in various Catalan cloister assemblages such as Sant Cugat del Vallès (Figure 3) and perhaps also, although we do not yet analytical data, in Sant Pere de Galligants (c. 1170-1185) and Sant Joan de les Abadesses (twelfth century).

Figure 3. Color black found at *E* Romanesque gallery, cloister of the Monastery of Sant Cugat del Vallès, Vallès Occidental, Catalonia, c. 1190.

Figure 4. Color red, like cinnabar and clays present in: a) E Romanesque gallery, cloister of the Monastery of Sant Cugat del Vallès, Vallès Occidental, Catalonia, c. 1190; b) W-S Romanesque gallery, cloister of the Cathedral of Santa Maria de Girona, Gironès, Catalonia, second half of the 12th century; c) N Romanesque gallery, cloister of the Monastery of Santa Maria de Lluçà, Lluçanès, Catalonia, c. 1172–1206; d) Capital from the old romanesque cloister of the Monastery of Sant Pere de Camprodon, Ripollès, Catalonia, 1150–1200 (photograph: Museu d'Art de Girona, núm. reg. MDG0034. Fons del Bisbat de Girona. Rafel Bosch).

For red, cinnabar (or vermilion), clays, and minium were commonly employed in portals, cloisters and other sculptoric reliefs. It should be noted that cinnabar and clays seem to be the pigments that predominate in the preparation layers, as can be seen – through optical microscopy – in the examples of Sant Cugat (Figure 4a), Santa Maria de Girona (second half of the twelfth century, Figure 4b), Santa Maria de Lluçà (c. 1172-1206, Figure 4c) and a capital of the disappeared cloister of the Monastery of Sant Pere de Camprodon (twelfth century, now exhibit in the Museu d'Art de Girona, Figure 4d).

Figure 5. Red color in the carnations and drapery at S Romanesque gallery, cloister of the Monastery of Sant Cugat del Vallès, Vallès Occidental, Catalonia, c. 1190.

The widespread application of red in the carnations and drapery (Figure 5) suggests that the remnants of red may have served as a preliminary base for the subsequent application of rich tonal nuances and additional pictorial layers [6]. It seems unlikely that the red in this instance corresponds to traces of red bole (commonly used in the preparation and application of gold and other metal leaves), as it is distributed extensively across the entirety of the figure [20, book I, rec. I-XIII, XIV]. Nevertheless, we cannot exclude the possibility that gold or other metal leaves were applied to certain areas of the figures, although no such traces have been preserved.

These procedures highlight the technical complexity involved in the application of color and the expertise required by the polychrome craftsmen of monumental sculpture. One could conceive of their mastery as a process of gradual learning, akin to the process described by Cennino Cennini in his treatise *Il Libro dell'Arte*.:

> *Capitolo CIII – Come dal muro pervieni a colorire in tavola: […] E tieni bene a mente, che chi imparasse a lavorare prima in muro e poi in tavola, non viene così perfetto maestro nell'arte, come perviene a imparare prima in tavola e poi in muro.* [21, cap. CIII]
>
> *Capitolo CIV – In che modo dèi pervenire a stare all'arte del lavorare in tavola: Sappi che non vorrebbe essere men tempo a imparare: come, prima studiare da piccino un anno a usare il disegno della tavoletta; poi stare con maestro a bottega, che sapesse lavorare di tutti i membri che appartiene di nostra arte; e stare e incominciare a triare de' colori; e imparare a cuocere delle colle, e triar de' gessi; e pigliare la pratica dell'ingessare le ancone, e rilevarle, e raderle; mettere d'oro; granare bene; per tempo di sei anni. E poi, in praticare a colorire, ad ornare di mordenti, far drappi d'oro, usare di lavorare di muro, per altri sei anni, sempre disegnando, non abbandonando mai nè in dì di festa, nè in dì di lavorare. E così la natura per grande uso si convertisce in buona pratica. Altrimenti, pigliando altri ordini, non sperare mai che vegnino a buona perfezione […].* [21, cap. CIV]

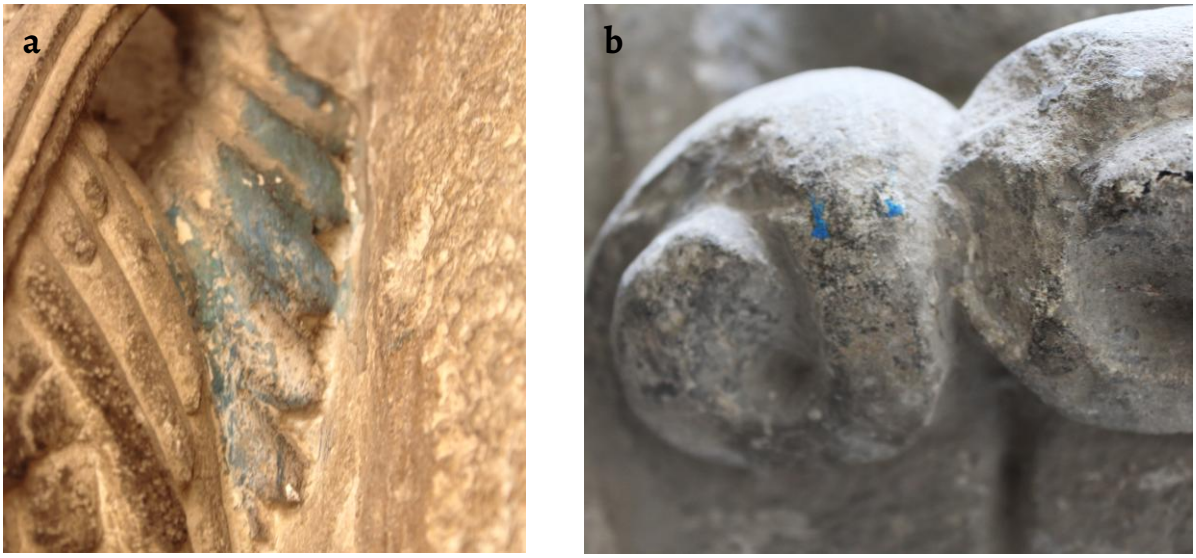

Figure 6. Blue color present in: a) S Romanesque gallery, cloister of the Monastery of Sant Cugat del Vallès, Vallès Occidental, Catalonia, c. 1190; b) Capital from the Romanesque gallery, cloister of the Cathedral of Santa Maria de la Seu d'Urgell, Alt Urgell, Catalonia, end of the 12th century / beginning of the 13th century.

Continuing the investigation into the colors and materials employed in polychromy, particular attention should be given to two notable capitals that have retained a blue color. One is located in the cloister of the Monastery of Sant Cugat del Vallès (Figure 6a), and the other in the cloister of the Cathedral of La Seu d'Urgell (late twelfth century to early thirteenth century, Figure 6b). Although chemical analyses are not available for the latter, capital 129 from Sant Cugat has undergone restoration, yielding valuable samples that reveal a complex composition [17, pp. 198-199].

Analysis of samples taken from the garments indicates the presence of a white base (preparation layer) of lead white and calcium carbonate in a proteinaceous binding medium, over which a bluish top layer was applied. This blue hue was achieved with either lime blue (the origin of the term *lime blue* probably lies with the production of the synthetic copper carbonate hydroxide pigment known as blue verditer. In addition, lime blue was a then-current term for a "variety of ultramarine") or verdigris [22, pp. 245-246]. The purpose behind this bluish color is particularly noteworthy; restorers have suggested that it may have been intended to emulate the ultramarine blue derived from lapis lazuli [17, pp. 198-199].

Additionally, other blue particles have been identified in samples from the eyebrows and pupils, accompanied by black vine and calcium carbonate. These elements form a *ueneda*, a term referenced in treatises such as those by Theophilus and Cennini, which describes a preparation layer used both as a base for applying blue pigments and for detailing features such as pupils and eyebrows [20, book I, rec. VI, XIII, XV; 23, pp. xxxvi, xxviii].

Moreover, the discovery of *tapaporos* (porosity sealer, previous to preparation layers) on several capitals of Sant Cugat provides further insight into the methods employed in the preservation of polychromy. These *tapaporos*, composed of calcium carbonate and iron ochre with added lead white, underscore the meticulous efforts to ensure the long-term durability of the painted surfaces. The primary function of these *tapaporos* was to create an initial priming layer for the stone, effectively sealing it to minimize the impact of moisture on the overlying pictorial layers.

This discovery highlights the dual significance of polychromy in medieval monumental sculpture. On a technical level, the careful preservation of color was essential to maintaining the visual integrity of the artwork over time, ensuring that its intended appearance would endure despite environmental challenges. However, this technical aspect was inseparable from the symbolic and communicative function of polychromy.

The vibrancy and clarity of color were integral to the sculpture's role as a didactic and spiritual medium, conveying theological messages and reinforcing Church dogmas. By safeguarding the pigments and their brilliance, craftsmen ensured that the artwork's communicative power remained intact, enabling it to effectively engage and educate its audience across generations. However, we must exercise caution when interpreting these colors today, as the oxidation process of most pigments (primarily those of a green hue) can result in a perception that differs from the original intention.

So far, we've only mentioned the black, red, and blue colors. However, we must assume that the original polychromy of the medieval Catalan cloisters would have encompassed the entire range of primary colors, including those that we have not yet mentioned (the range of primary colours it can also be observed in Catalan Romanesque panel painting, which shares many technical and material similarities with sculptural polychromy) [24-25].

A particularly noteworthy case is the use of white, which did not primarily function as an independent color but served as a preparatory base to enhance the saturation and brilliance of other pigments. As such, white is commonly observed in the preparatory layers of stratigraphy, often in combination with red layer. The most frequently employed materials for this purpose included lead white, as well as, to a lesser extent, lime, calcium carbonate, and gypsum [12, 18, 24-25].

Similarly, the analysis of yellow and green pigments in cloister ensembles offers intriguing insights, as these colors are notably scarce or almost absent from the chromatic palette applied.

In the case of yellow, current evidence does not indicate the presence of orpiment or gold leaf on the sculptural surfaces of any cloisters within the Catalan counties. While the original material used for yellow remains uncertain, the color is most likely derived from ochres. These natural pigments provided a wide tonal range, from yellows to oranges and reds, and were both highly versatile and readily available in the region. This accessibility suggests that ochres were the primary material used for yellow hues in the cloisters under study.

The analysis of green pigments, the least prevalent color in preserved polychrome cloisters, reveals their scarcity probably as a consequence of the chemical instability associated with green pigments, particularly those containing copper [6, pp. 173-175]. While the green color was often produced with likely synthetic copper greens, such as verdigris, more stable alternatives, like green earth pigments (e.g., celadonite and glauconite), were also utilized.

Among the cloisters examined, only those of Girona Cathedral and Sant Cugat del Vallès exhibit evidence of greenish patinas. However, in the case of Girona Cathedral, the observed green coloration does not appear to be directly related to the original polychromy. Instead, it seems to result from environmental factors, such as humidity, which promote the growth of mold or fungi. A definitive determination of its origin would require further analysis.

Conversely, in the cloister of Sant Cugat, the use of green pigments has been confirmed in specific overpainted areas on capitals 129 (representation of a dance, Figure 2) and 139 (Annunciation, Figure 3) [17, p. 195]. These pigments comprise ochres and green earth, the latter being mentioned in medieval art treatises by authors such as Theophilus and Cennini, who describe it as an ideal pigment for depicting human faces – a practice also observed in Byzantine traditions [26-27]. Known as *prasinus* in medieval treatises, green earth was frequently mixed with white to produce lighter tones. This technique is evident in the present study [17, p. 195], where the pigment was combined with a calcium carbonate layer and, in another instance, with white lead [20, book I, rec. II; 23, p. xxxvi].

It is important to point out certain differences in terms of the material and technique used in the polychromy of Catalan medieval monumental sculpture, especially between

the large porticoes and the cloisters. These examples illustrate how the application of sculptural polychromy was influenced by the function and use of these spaces [6].

It is widely recognized that the Gregorian Reformation (c. 1050-1125) found in monumental sculpture and its polychromy a means of spreading the dogmatic principles of the Church [28]. The sculpted porticoes became a *mise-en-scène* of liturgical life carried out within the sacred space. The Romanesque portals, therefore, became a speaking face [29-33; 34, p. 29], a resource through which the Church established a connection with the viewer, capturing their attention through the abundance of richly painted images. Consequently, the porticoes required a bright and saturated polychromy, intended to attract the attention of the faithful, and consequently higher quality pigments and materials were used [6].

On the other hand, I think that the cloisters, spaces characterized by their more reserved character and intended for the privacy of the religious community, were only accessible to those who resided in the monastic complexes. Therefore, it was not imperative to use luxury or high-quality pigments, but rather those that were readily available in the region or cheaper to acquire. Likewise, we must also consider the option that monastic complexes would use expensive pigments in the production or decoration of other arts, such as in the production of books and illuminations. These dissimilarities were reflected in the use of colors such as yellow, blue and green: in the cloisters, ochre, black vine or lime blue were used, as well as green earths; while, for example, in the portico of Agramunt (1283), the same colors were applied with higher quality pigments, such as orpiment, indigo blue and malachite (Figure 1b) [35-36]. These distinctions in the application of polychromy and its materials in monumental sculpture not only reflect the symbology of color, but also act as an indicator of the uniqueness of these spaces and the disparities in their functions and uses.

Color parallels: the polychrome work in its environment and other cross-border examples

The study of sculptural polychromy not only gives us the opportunity to analyze the techniques employed by the artificers, but also to identify color-related and material similarities with other artistic ensembles both inside and outside the territory, allowing us to make meaningful comparisons.

These comparisons can be made in artistic ensembles from different places, but from the same territory, or in different works that are part of a single building. For example, in the Monastery of Santa Maria de Ripoll, we find several relevant examples of sculptural polychromy [37]. This complex houses its paradigmatic Romanesque portico (c. 1140, Figure 1a), polychrome and repainted [38-40]; the Romanesque north-western wing (c. 1160-1170, Figure 7a) and the Gothic south-western wing (c. 1390-1400, Figure 7b) of the cloister with traces of color in several of its capitals [41]; the polychrome image of the *Maiestas Mariae* (mid thirteenth century, Figure 7c) in the southern wing of the cloister [42]; and the bases of the old stone canopy (c. 1150), now exhibited in the Museu Nacional d'Art de Catalunya (MNAC), which underwent a restoration treatment during which the original colors were studied [43]. All of them create a polychrome program for the monumental sculpture of the monastery, presumably with the aim of creating a sense of aesthetic unity and evoking the colorful Heavenly Jerusalem [44]. In addition, there is a coherence in the use of materials, particularly in the use of red obtained from clays and iron oxides, present in the polychromy of all these works of the monastic complex, as well as in the Romanesque mural painting of the eleventh century that is hidden behind the stone portico of the twelfth century [40, p. 178; 45-46].

Figure 7. Examples of sculptural polychromy from Monastery of Santa Maria of Ripoll: *a) N-O* Romanesque gallery of the cloister, c. 1160 – 1170; *b) S-W* gothic gallery of the cloister, c. 1390 – 1400; *c)* image of the Maiestas Mariae in the cloister, mid-13th century.

Another type of comparison that can be examined through the use of color and its materials in nearby territories is through the material craftsmanship of the works. For example, the similarity in the use of the color red (referring to the use of the same pigment or very similar and the use related to specific areas and figures) in the capitals of Ripoll, Sant Joan de les Abadesses and Lluçà suggests a possible connection with the so-called *Ripoll Sculptural Workshop* [47-49], which is believed to have been not only the material architect of the capitals of these cloistered complexes, but also that of the portal of the Monastery in the same town of Ripoll.

We also have another relevant case such as that of the figure of Arnau Cadell [50], architect and sculptor who left a record of his self-portrait and signature in his sculptural work in the cloister of Sant Cugat del Vallès. This monastery shares a marked similarity in iconography and in the application of polychromy with another cloister designed by the same architect, that of the Cathedral of Girona. It can be observed, for example, in the same generalized application of red in the figures of the capitals as a possible preparation layer.

It is plausible to consider that, similarly to the existence of workshops or masters in charge of sculpture in a territory, there were also artisans specialized in the polychromy of these sculptures. It is likely that both professionals formed a collaborative binomial that allowed them to work together to enrich the artistic expression of the ensembles, both in their formal and chromatic aspects, while maintaining their role and professional status independently. A fact that in Gothic monumental sculpture is evidenced by clearly documented examples, such as the famous *Well of Moses* (1395-1404) in the Carthusian monastery of Champmol in Dijon, a collaborative commission between the sculptor Claus Sluter and his nephew Claus de Werve with the painter Jean Malouel, who was the best-paid painter of the Burgundian court at the time [51-52].

The parallels in the use of color, particularly red, transcend contemporary territorial boundaries, illustrating a shared artistic practice within the former domains of the Crown of Aragon. These similarities are not only evident in the visual effects of the color but also in the application techniques and the choice of pigments, which appear to be strikingly similar due to their chemical and physical properties. The red hues applied in these sculptural ensembles exhibit common features in both technique and composition, suggesting that the same or closely related pigments were used across various regions. Notably, this phenomenon is observed in the cloister of the Monastery of San Juan de la Peña (second half of the twelfth century, Figure 8), the Collegiate Church of Santa María de Alquézar (c. 1150), and the Monastery of San Pedro el Viejo in Huesca (thirteenth century) [53].

Figure 8. *S-W* Romanesque gallery, cloister of the Monastery of San Juan de la Peña, Botaya, Aragón, Spain, second half of the 12th century.

The application of red in these areas follows a consistent pattern, with the pigment being applied in similar layers and techniques, such as in underpainting or as a foundational base, to achieve specific tonal effects. This is also reflected in the specific red pigments used, which likely include cinnabar or vermilion, common in this period due to their stability and vivid hue. Such uniformity in the pigment composition and application is evident across different regions once under the Crown of Aragon, highlighting the interconnectedness of these areas in both artistic and technical practices.

A comparable pattern can be seen in southern France, which was also part of the Crown of Aragon, where the use of red in polychromy appears to follow similar principles. This is observable in the capitals of the Cathedral of Elna (end of the twelfth century, Figure 9), the Monastery of Sant Martí del Canigó (late twelfth to early thirteenth century), and the Priorat of Serrabona (mid- twelfth century) [53].

These cross-border similarities, particularly in the application and material composition of red pigments, underscore a cultural and stylistic connection within the Crown of Aragon. The movement of workshops and the exchange of technical knowledge, materials, and methods, likely facilitated by pilgrimage and trade routes, played a crucial role in the preservation and continuity of polychrome techniques across these territories, ensuring a cohesive artistic identity throughout the region [6].

Figure 9. Details from S Romanesque gallery, cloister of the Cathédrale d'Elne, Pyrénées-Orientales, Occitanie, France, end of the 12th century: *a)* figure from the scene of the Conversion of Paul, carved on the southeast pillar; *b)* pair of capitals from the south gallery featuring four lions and a central motif with a four human faces.

Topography of polychromy in a cloister: Santa Maria de Lluçà and Sant Cugat del Vallès

I would like to conclude this analysis of the chromatic splendor of the medieval cloisters of the Catalan counties, with a special mention of the cloisters of Sant Cugat del Vallès and Santa Maria de Lluçà, previously mentioned. These two cloisters not only show a similar appearance characterized by the widespread presence of red on the surface of the capitals, but also share similarities in terms of the distribution of polychromy in their cloistered wings and their visible wear on different capitals. I will refer to it as the "topography of polychromy" in the cloister (Figure 10).

On the one hand, it can be seen how, in both cases, the north wing (N) is the one that retains the least polychromy in its capitals, unlike the eastern (E) and southern (S) wings that house more polychrome capitals. On the other hand, it is striking that also, in both cases, there is a more noticeable wear of the polychromy in the capitals located in front of the door that connects the church with the cloister. This phenomenon could be linked to the performance of specific liturgical rites and blessings, such as those performed on Palm Sunday. The act of sprinkling holy water, which often contained salts, may have accelerated the process of degradation of the capitals and, therefore, of their polychromy [53].

In addition, in the case of Sant Cugat, his Costume and Cartulary [54] details the use of torches to illuminate the entire cloister, a fact that may also have influenced the wear and tear of certain capitals and the deterioration of their polychromy, mainly in those closest to the corners of the cloistered wings.

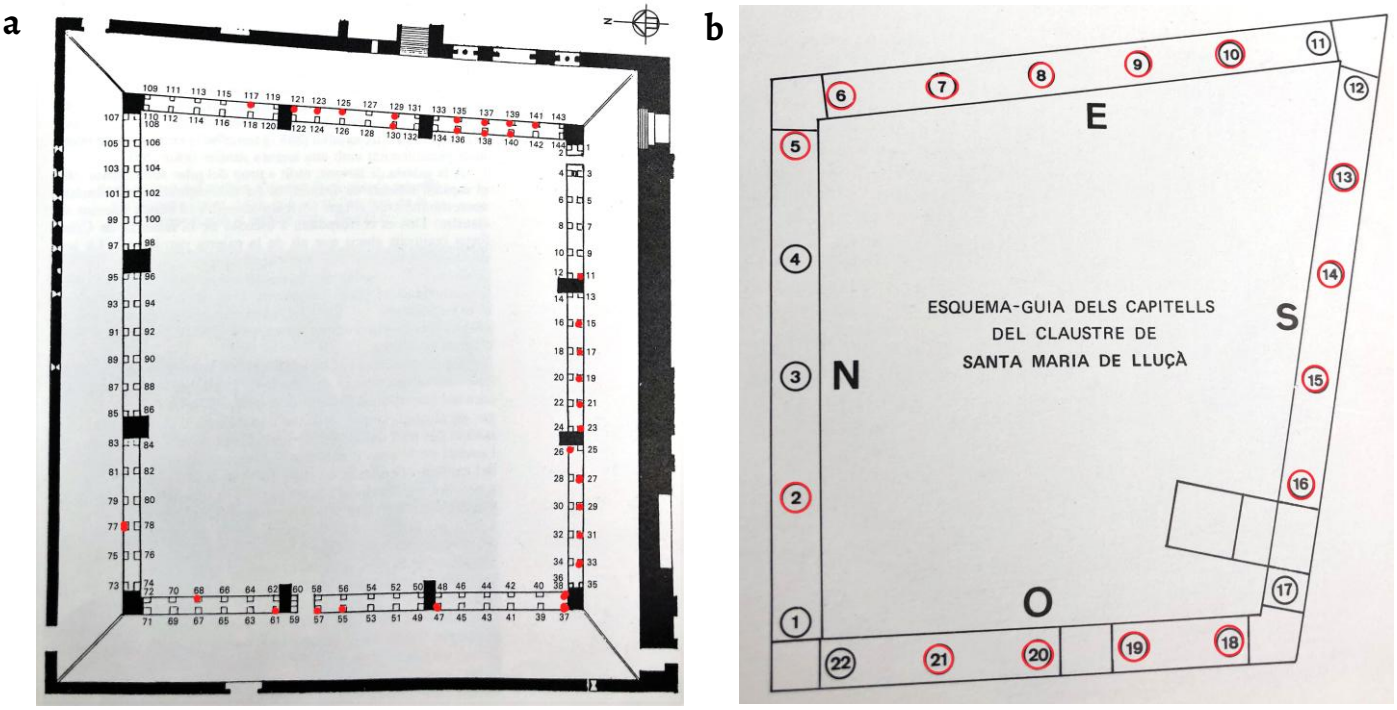

Figure 10. Map of the Monastery cloisters showing the topography of polychromy: *a)* Sant Cugat del Vallès, Vallès Occidental, Catalonia, c.1190; *b)* Santa Maria de Lluçà, Lluçanès, Catalonia, c. 1172–1206.

Localized degradation in certain capitals of the cloisters is a factor that should be taken into greater consideration, as it is a key factor in understanding the use and functions of these spaces and the relationship of polychromy with its immediate surroundings.

Conclusions

Based on the collected testimonies, it can be asserted that polychromy in medieval sculpture extends beyond its mere technical execution and practical application. The polychromy of these cloisters should be understood in relation to both their environment and the iconography of their figures. The application of color not only contributed to the stylistic richness of the sculptures but also enhanced their visual impact, making their meanings more accessible and comprehensible.

This phenomenon calls for interdisciplinary research that investigates the interconnections between color and various fields of study. From a symbolic perspective, color served as an intermediary, representing concepts such as the distinction between good and evil or the power of specific figures. From a liturgical standpoint, it is crucial to understand the role of these spaces in daily rituals and how their use may have influenced the preservation of the polychromatic surfaces. Additionally, the role of the painter – how they worked within a cloistered setting and collaborated with sculptors – deserves closer examination. Finally, the "polychrome cross-border parallels" highlight the significance of color in monumental sculpture across regions, underscoring the role of itinerant workshops and the cross-border trade of pigments and materials.

The chemical analysis of materials, study of pictorial stratigraphy, and investigation of possible repaintings would further illuminate and enrich these ideas, which can already be partially discerned through the surviving pictorial remnants.

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