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Visible materials, invisible meanings: colour-based hierarchies in the Middle Ages

Materiais visíveis, significados invisíveis: hierarquias baseadas na cor na Idade Média

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Abstract

The decision that oversaw the choices of pigments used in medieval artworks was based on multiple criteria. Among these was their economic value, often linked to the greater rarity of the raw material from which the pigments were derived, or to the lower availability on the market. Alongside the economic value, there was also the symbolic value attributed to materials and pigments from a symbolism often rooted in references found in the Holy Scriptures, in exegetical, theological, encyclopedic, or other texts. The case studies presented in this paper, based on works created with different media whose pigments underwent specific archaeometric analyses, show that throughout the Middle Ages, sometimes precise hierarchies were employed in the choice of pigments, and the most precious ones were reserved for the most important figures or the most significant details.

Resumo

A escolha dos pigmentos utilizados nas obras de arte medievais baseou-se em múltiplos critérios. Um deles, era o seu valor económico, muitas vezes ligado à raridade da matéria-prima de onde os pigmentos provinham, ou à menor disponibilidade no mercado. A par do valor económico, existia também o valor simbólico atribuído aos materiais e aos pigmentos, a partir de um simbolismo muitas vezes enraizado em referências encontradas nas Sagradas Escrituras, em textos exegéticos, teológicos, enciclopédicos ou outros. Os estudos de caso apresentados neste artigo, baseados em obras realizadas com diferentes suportes e cujos pigmentos foram submetidos a análises arqueométricas específicas, evidenciam que, ao longo da Idade Média, por vezes foram empregues hierarquias precisas na escolha dos pigmentos, sendo os mais preciosos reservados para as figuras mais importantes ou para os pormenores mais significativos.

Introduction

Unlike later periods of art history whose artworks strive to imitate the appearance of other things, and the materials employed deliberately vanish from sight, medieval artworks prominently display the materials used in their making, by emphasizing the physicality of its constituent materials, as exemplified by typical medieval media such as mosaic, stained glass or enamel. To quote the opening words of Herbert L. Kessler's much-celebrated book, *Seeing Medieval Art*, "Overt materiality is a distinguishing characteristic of medieval art" [1].

This assertion is rooted in the so-called "material turn" that has characterized Medieval studies over the last 30 years [2-6]. Among the strategies that medieval artists employed to accentuate the material aspects of their works, there is also the combination of two or more materials, independent either by nature or expressive capabilities, meant to address a significant effect on the perception of artworks, especially in sculptures, be they in stone, wood, metal or other materials.

According to a recent proposal formulated by Fachechi [7], we can detect four different ways by which this polymateric effect was achieved, considering the way different materials were combined: "by superimposition", that is when one or more materials are hidden or at least obscured by others, "by insertion", when the various materials are in full view but none of them is essential for the understanding of the iconography, "by juxtaposition", when all materials are also in full view, but each of them plays a specific role in image description. Finally, a fourth category combines in one object all the three kinds of multi-material effect previously listed.

Reasons behind mixed media objects were many: the desire to dignify an object by using precious materials, sometimes even re-using and hoarding ancient objects, the need to confer objects an aura of sacredness, the varied interaction of different materials with natural light or candlelight [8], just to mention a few.

The richness of the materials employed could increase the effectiveness of images with high devotional content, according to widespread medieval beliefs. The Church's use of precious stones and metals was also linked to its self-promotion in the eyes of the faithful, being a clear sign of its economic and political power. The iconology of materials can supply useful tools to interpret these kinds of objects and reconnect them with their peculiar iconography.

According to Bernard of Clairvaux's *Sermones in vigilia nativitatis domini* [9], God's actions were characterized precisely by *admirabiles mixturae* (wonderful mixtures). Bernard observed that God wanted to mix and combine things different from each other so that his work was astonishing and disturbing but also inducing deep reflection [10-11].

Multi-materiality (and polychromy which often followed) satisfied several other needs, such as *varietas* – one of the pillars of medieval aesthetics [12-13] –, the emphasis on specific shapes and details that the artist sought to highlight (sometimes to achieve realistic effects) and, above all, the attribution of symbolic meanings to the images through the iconology of materials and colours. Coloured materials conveyed specific meanings [14]. The multiple symbolic meanings of colours were never unique but also depended on their context of use. These meanings overlapped, layered on top of those intrinsically possessed by the materials to which colours are added, as demonstrated by the studies in the iconology of materials [15-17]. From gold, likened to the divine because it is incorruptible, to silver, traced back to the eloquence of the divine word and the brilliance of the Lord's words; from parchment, often traced back to Christ's Incarnation and Passion because of its being "skin" and being often dyed with purple (as in *Codices purpurei* such as the famous *Codex Rossanensis*), to bronze, employed on several occasions by medieval popes and emperors because of its stability and durability, to visually express their concept of authority [18-19]. Vitreous arts such as stained glass and enamel – crafted from sand, pigments, and metal under intense heat – implied in the realization process itself a metamorphosis that "that mimicked the process of finding redolent Christian meaning in the literal Jewish accounts represented on them" [20].

The spiritual value ascribed to the materials from which works of art were made was often found in the raw materials used for the painter's pigments, in a combination of symbolic meanings upon which the meanings of matters and the meanings of colours layered. Such symbolic meanings added to the economic value of materials and pigments, which were deemed valuable because of their intrinsic qualities (like certain precious metals), rarity (like certain precious stones), or both.

Iconology of matter and colours: the case of lapis lazuli

A case that well exemplifies this layering of meanings is offered by lapis lazuli, a precious stone, renowned and employed since the times of Ancient Egypt. It is a mineral agglomerate of lazurite, which is responsible for the blue colour, calcite, and pyrite that gives the stone the characteristic gold-like sparkles. From the processing of lapis lazuli, in a very laborious and costly process, the pigment known as 'natural ultramarine' was made. The etymology of 'ultramarine', as it is well known, does not derive from a specification of its peculiar colour shade. Still, it comes from its distant eastern trans-Mediterranean origin (that is, ultramarine means "a mineral coming from very far, from lands beyond the sea"). Lapis lazuli, in fact, in ancient and medieval times was mined solely from the mines of Sar-e-Sang in the province of Badakhshan, in today's Afghanistan, and the stone was transported along the Silk Road to Persia, where it underwent initial processing, only to be traded from there, via the merchants' network, throughout the Mediterranean and Europe. This makes the lapis lazuli's rarity and, consequently, one of the reasons for its preciousness [21-22].

Ancient and medieval sources (scientific treatises, encyclopedias, lapidaries) and modern gemological studies agree that since Antiquity and at least until the thirteenth century the lapis lazuli's name was *saphirus*, in Latin, *σάπφειρος* in ancient Greek, and *sappir̄* (סַפִּיר) in Biblical Hebrew (and it was similar in many other ancient languages).

Despite the similarity with the transparent blue gem that today we call "sapphire", the word *saphirus*, instead, indicated a different stone, lapis lazuli. The shift in meanings occurred sometime around the mid-thirteenth century when written sources such as Albert the Great's treatise on stones, *De mineralibus*, started to associate the word *saphirus* to a blue transparent stone, likely the blue corundum or modern sapphire, a stone that before that date was probably called *hyacinthus*. Gems' names, as we can see, have an intricated history, often very difficult to disentangle [23].

In the descriptions of the stone called *saphirus*, ancient and medieval authors refer to its extraordinary blue colour compared to that of a serene sky, its golden glow, its opacity as well as its distant origin, often connected with the land of the Medes.

However, before ancient treatises on precious stones or Medieval lapidaries, *saphirus* also has a long list of Biblical occurrences which help clarify its symbolism. In the Book of Exodus *saphirus* is mentioned several times. We find it twice, together with many other gems, in the description of the breastplate of Aaron: the first time in Exodus 28: "*Ponesque in eo quatuor ordines lapidum: in primo versu erit lapis sardius, et topazius, et smaragdus; in secundo carbunculus, sapphirus, et jaspis; in tertio ligurius, achates, et amethystus; in quarto chrysolithus, onychinus, et beryllus. Inclusi auro erunt per ordines suos*" ("Then mount four rows of precious stones on it. The first row shall be carnelian, chrysolite and beryl; the second row shall be turquoise, lapis lazuli and emerald; the third row shall be jacinth, agate and amethyst; the fourth row shall be topaz, onyx and jasper. Mount them in gold filigree settings", Ex 28, 17-20); the second time in Exodus 39: "*Et posuit in eo gemmarum ordines quatuor. In primo versu erat sardius, topazius, smaragdus. In secundo, carbunculus, sapphirus, et jaspis. In tertio, ligurius, achates, et amethystus. In quarto, chrysolithus, onychinus, et beryllus, circumdati et inclusi auro per ordines suos*" ("Then they mounted four rows of precious stones on it. The first row was carnelian, chrysolite and beryl; the second row was

turquoise, lapis lazuli and emerald; the third row was jacinth, agate and amethyst; the fourth row was topaz, onyx and jasper", Ex 39, 10-13).

The floor on which the Lord rests his feet is *opus lapidis sapphirini*: "*Ascenderuntque Moyses et Aaron, Nadab et Abiu et septuaginta de senioribus Israel. Et viderunt Deum Israel, et sub pedibus eius quasi opus lapidis sapphirini et quasi caelum, cum serenum est*" ("Moses and Aaron, Nadab and Abihu, and the seventy elders of Israel went up and saw the God of Israel. Under his feet was something like a pavement made of lapis lazuli, as bright blue as the sky", Ex 24, 9-10). A similar parallel between a stone named *saphirus* and the heavenly vault also recurs in Ezekiel's vision describing the throne on which the Lord sits as "*aspectus lapidis sapphirini similitudo throni*", ("a throne of lapis lazuli", Ez 1, 26). It occurs similarly in Ez 10, 1, "*Et vidi: et ecce in firmamento quod erat super caput cherubim, quasi lapis sapphirus, quasi species similitudinis solii, apparuit super ea*" ("And I looked, and there in the firmament that was above the head of the cherubim, there appeared something like a stone of lapis lazuli, having the appearance of the likeness of a throne"). Furthermore, in Ezekiel 28,13 *saphirus* is mentioned together with other gems, and in the Song of Songs, the bridegroom, later interpreted as Christ, is described with these words: "*Manus illius tornatiles, aureae, plenae hyacinthis; venter eius eburneus, distinctum sapphiris*" ("His arms are rods of gold set with topaz. His body is like polished ivory decorated with lapis lazuli", Song of Sg. 5, 14). In Isaiah 54, 11, in a prophecy on the future of Israel, *saphirus* is again mentioned in the foundations of the New Jerusalem: "*Paupercula, tempestate convulsa absque ulla consolatione, ecce ego sternam per ordinem lapides tuos, et fundabo te in sapphiris*", ("Afflicted city, lashed by storms and not comforted, I will rebuild you with stones of turquoise, your foundations with lapis lazuli"). The Old Testament tradition thus establishes a parallel between the colour blue, consistently traced back to *saphirus* and the concepts of durability and eternity.

Finally, in the New Testament, the description of the walls of the Heavenly Jerusalem in Revelation 21 places *saphirus* among the stones that dot the foundations of the Heavenly City: "*Et fundamenta muri civitatis omni lapide pretioso ornata. Fundamentum primum, iaspis, secundum sapphirus, tertium chalcedonius, quartum smaragdus*" ("The foundations of the city walls were decorated with every kind of precious stone. The first foundation was jasper, the second sapphire, the third agate, the fourth emerald", Rev 21, 19).

A long-lasting medieval tradition rooted the properties of precious stones especially in this biblical passage and set the importance of stones based on it. The Heavenly Jerusalem was a model for the earthly churches which ideally aspired to imitate the celestial model also by reproducing or imitating the same materials. In Christian Medieval art, the continuous search, through stained-glass windows, for a translucent polychrome decoration in which glass imitated coloured precious stones should be interpreted in exactly this sense.

Not only the Bible, but also Medieval exegesis expanded the meaning of lapis lazuli: early Christian commentators, such as Origen and Saint Jerome, explored the symbolism of the sapphire and its connection with the colour of the Heavens, making it one of the signs of Heavenly Life promised by God, in conformity with the contents of St. Paul's letter to the Philippians (Phil 3, 20).

In early Medieval Anglo-Saxon Britain, Bede the Venerable, writing a *Commentary on Revelation* glossed over the passage in the Book of Revelation insisting on the parallel between the stone, its colour, and the heaven, when clear: "the second, sapphire; Moses explained the colour along with the symbolic meaning of this stone, for in his description of the appearance of God he said: «under his feet as it were a work of sapphire stone, and as the heaven, when clear. Ezekiel also says that the place in which the throne of God stands looks like a sapphire», and that the glory of the Lord resides in this colour, which bears a likeness to the supercelestial realm. Even so, he who is like this can say with the Apostle: «But our conversation is in heaven. [The sapphire] when it is struck by the sun, emits from itself a blazing» flash" [24]. In the ninth century, Rabanus Maurus, in his *De Universo* (On the Universe) [25], took up the same interpretation of Bede, which he quoted verbatim.

Therefore, the colour of the *saphirus* stone, likened to the colour of the heaven when serene, based on Exodus 24, represented the glory of the Lord throughout all the early Middle Ages up to the twelfth century. Written around 1096, Marbode of Renne's lapidary, *De lapidibus* (*On stones*) described *saphirus* as a stone that defeats envy, appeases all fears, is apt to bring reconciliation and peace, propitiates divine responses, and, finally, makes it impossible for anyone who wears it to be deceived [26].

In the twelfth century, Hugh of St. Victor, in the *Didascalicon*, reiterated the parallel between the *saphirus* and by reversing the Old Testament metaphor handed down from the early medieval exegetical tradition: "What is more delightful to see in the sky when it is clear, which shines like a *saphirus*?" [27].

To sum up, Biblical exegesis and medieval lapidaries connected specific symbolic meanings to *saphirus*, which were influenced by the role it had in the Bible, where it is mentioned several times in connection with a variety of theological notions: sky, God, the Heavenly Jerusalem. All these connections became permanent iconographic attributes of the stone [14, 28-31]. The properties of lapis lazuli were also assumed by extension by the pigment obtained from the processing of lazurite, a component of lapis lazuli, i.e., ultramarine blue.

The case of lapis lazuli, which has been investigated in detail here, shows how the symbolic meanings attributed to materials, often rooted in Sacred Scriptures and imbued with theological interpretations, were then transferred to the pigments obtained from those materials, and by extension, to the colours made with certain pigments. The case of the colour blue-sapphire, here linked to the gemstone of the same name (sapphire/lapis lazuli), proves to be similar to that of other precious materials and pigments derived from these materials, such as the case of natural purple, used both as a dye for fabrics and as a pigment (for example in parchment), and the colours purple and pink, closely related to this pigment [32-33].

The analysis of other case studies drawn from medieval artworks created on various media (polychrome sculpture, illuminated manuscripts, mural painting, and panel painting), selected from works which underwent in the past years to scientific analyses that have provided valuable information on the pigments used, allows for the extension to other pigments and colours of what has so far been hypothesized for lapis lazuli and ultramarine blue, as will be shown in the following section.

Hierarchy of materials and pigments

In addition to biblical and exegetical references, the value of materials was also based on market value. Therefore, rare and less available materials, such as lapis lazuli and gold, were considered spiritually more valuable also because they were economically more valuable.

In complex buildings, for example, among the various marbles [34-35], the more precious ones emphasized the more sacred spots. It was the case of the Byzantine church of Hagia Sophia in Istanbul. The study of the piers and architraves of the doors of the Great Church has shown how sophisticated the choice of materials was, the preciousness of which increases as one enters the building. So, one can see Proconnesian marble in the portals of the exonarthex and in the western doors of the narthex, while in the nine doors leading from the narthex into the naos it is possible to recognize a ternary scheme with three portals in Pavonazzo marble (Pavonazzetto or Docimaean marble) at the ends and in the center two portals in verd antique (*marmor thessalicum* or ophite) framing the large bronze-covered portal below the mosaic of the lunette with Christ enthroned [36].

An interesting topic to focus on is about materials of the same colour. It is rather likely that less expensive and more available materials were considered spiritually less valuable than precious materials of the same colour, and yet, when they were used as their cheaper substitutes, they had to absorb their intrinsic meanings. This does not mean that sometimes artists use marbles, metals, stones, and pigments according to their tone rather than their

value; it happens, for instance, when two materials are used in chromatic combination rather than as alternatives. In contrast, it is possible that some hierarchical scheme was applied when two or more materials of the same colour were contextually used in the same work of art [37]. The focus is not on the hierarchy based on colours, here, that is a visual hierarchy, the principle of arranging elements to show their order of importance or to organize and emphasize them, an aspect pretty explored by scholars [38-39], but rather the hierarchy of the materials and, consequently, the hierarchy of pigments which they are made from. Scientific investigations prove fundamental to addressing this topic.

Scientific investigations to identify the pigments employed in medieval artifacts and different media have recently greatly boosted thanks to perceptive studies carried out by Raman microscopy. These important investigations provide art historians with a unique opportunity to reflect on the reasons behind the choice of two or more different pigments of the same (or similar) colour in the same artwork, painted in the same time, revealing hierarchical schemes where more precious materials were used for the most important characters (or related details of them), while ordinary, cheaper materials were used for less important details or secondary characters. These hierarchical schemes seem to be applied across time, place, and media boundaries; in the Middle Ages, one can prove this both in the early and late periods in the Eastern and Western artworks.

Figure 1. *Saint Barbara and Saint John the Baptist*, Lluís Borrassà, Harvard Art Museums, Cambridge (MA).

Rather often, contracts indicated exactly the pigments the artists committed to use. Some of these pigments were local, others were imported, generally at a much higher price. Contracts reflect on the brightness and durability of different pigments, specifying with detail the colours that were to be used. The recently restored painting by the fifteenth-century Barcelona workshop of Lluís Borrassà, *Saint Barbara and Saint John the Baptist* at Harvard Art Museums, is a clear example (Figure 1). Here three blue inorganic pigments have been found through technical examination: basic copper carbonate of different qualities (natural azurite), ultramarine of low and medium quality (manufactured from lapis lazuli mineral), artificial basic copper carbonate (artificial azurite) [40]. There is a hierarchy in the distribution of the analyzed pigments that certainly matches with specifications in contracts: both ultramarine and azurite have been detected in robes of Christ, the Virgin, and the figures of saints, while only low-quality azurite (probably artificial, from copper plates) was identified in structures of altarpieces. The backgrounds of the altarpieces are painted instead with a dull blue, a basic copper carbonate applied usually in a single layer. While still to be completely identified, lower quality pigments were used in those areas, probably artificial azurite with a different, lower visual quality than the pigments used in robes [40].

In the Scrovegni Chapel, Giotto used four different materials for the halos of Christ (which is a gold leaf), the Apostles (gilded silver leaf, now blackened because of the oxidization, except for Judas, who has a black halo) (Figure 2), the angels closer to God (gilded copper), and those who are more distant (yellow ochre) (Figure 3) [41].

Figure 2. *The Last Supper*, Giotto, Scrovegni Chapel, Padua.

Figure 3. *The Last Judgment* (detail), Giotto, Scrovegni Chapel, Padua.

The hierarchical use of pigments of the same colour can be found in many other paintings, for example, on the wall paintings in the Church of Sts. Cosmas and Damian at Basconcillos del Tozo, Castile and León, Spain, they found the selective use of the precious cinnabar for the most important biblical figures (Figure 4) [42]; and also in illuminated manuscripts. We can refer, for example, to the decoration of a fifteenth century parchment folio kept at the Archivio di Stato in Milan, originally commissioned by Francesco Sforza. The work is attributed to the Italian artist Michelino dei Molinari (Michelino da Besozzo). Here, following a traditional medieval practice, a hierarchy in the use of colours was found; regarding the blues, for example, to the Virgin's cloak and the Sforza's 'Biscione' were reserved the brushstrokes of the extremely valuable natural ultramarine blue; in contrast, for the initial capital letters in the text the less costly azurite was used [43].
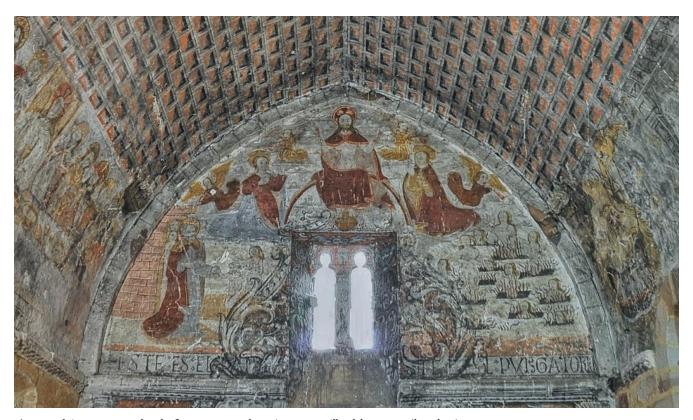
Figure 4. *Christ Pantocrator*, Church of Sts. Cosmas and Damian, Basconcillos del Tozo, Castile and León.

In insular illuminated manuscripts of the early Middle Ages, namely in the Book of Kells, exceptional for the richness of the palette [44], for example, the precious *aurum pigmentum* (orpiment) was used only for the veil of the Virgin and the hair of Christ and the angels, to stress the relevance of the characters who deserve the most precious material (Figure 5); in contrast, for the evangelists the cheaper yellow ochre was used [45-46] (Figure 6). In the late medieval *Book of Hours* of Antoine de Lonhy (Figure 7), red lead (minium) was used throughout the manuscript for most of the images, except for the detail of Jesus' blood [47] trickling from his hands and chest in the *Crucifixion* scene (Figure 7h). Here, to emphasize the holiness of this detail, the illuminator employed the more precious vermillion (cinnabar), that back then vermillion was sold for about four times the price of red lead [46].

The hierarchical use of pigments of the same, or similar colour, can be found also in sculpture. In In the stucco figures of the ciborium's tympanum in St. Ambrose in Milano, for instance, the original polychromy beneath the actual one shows that the precious vermillion was employed only to paint the mantle of Christ; at the same time, red ochre was used for the decoration [48]. In the cloister of Sant Cugat del Vallès, cinnabar was used only for the figurative representations of characters, almost all taken from biblical scenes, and in capital 109 with the self-portrait of the sculptor and architect of the cloister, Arnau Cadell, where in his leg the same cinnabar red was analyzed; for the rest of the animals, monsters or mythological characters, lower-quality materials would be used [49]. The analyses of other medieval stone sculptures [50], revealed in the same artifact and the same (or supposedly so) painting campaign the use of both ultramarine and azurite, another mineral blue pigment, far less expensive and valuable than lapis lazuli; in fact, there was a vast difference in price between lapis lazuli and azurite [21, 46]. That is the case of the choir screen of the Cathedral of Modena (Figure 8). Here, the Apostles' background and their clothes are painted in azurite, while the mantle of Christ is painted in lapis lazuli [51]. Another interesting case is about the Cathedral of Genoa. Here, even though the polychromy of the lunette of the central portal of the church is now almost entirely lost, we know for sure that the background of the entire surface was covered by azurite; in contrast, the background of the Mandorla, with Christ in Majesty, was painted in lapis lazuli [52].

Figure 5. *Christ enthroned*, Book of Kells, ms. 58, f. 32v, Trinity College, Dublin.

Figure 6. *St. John the Evangelist*, Book of Kells, ms. 58, f. 291v, Trinity College, Dublin.

Figure 7. *Book of Hours, Antoine de Lonhy Torino, Museo Civico di Arte Antica a Palazzo Madama: a) Annunciation (f. 1r); b) Visitation (f. 15r); c) Nativity (f. 24r); d) Angel announcing the Nativity to the shepherds (f. 28v); e) Adoration of the Magi (f. 31v); f) Holy Family in the run to Egypt (f. 36v); g) God the Father and Jesus crowning the Virgin (f. 42r); h) Crucifixion, with the Virgin and St. John the Evangelist (f. 46r); i) Pentecost (f. 49v); j) Burial service (f. 71v).*

Figure 8. *The Last Supper, Campionesi Masters, Choir screen, Cathedral of Modena.*

Figure 9. *Majestas Domini*, Ratchis Altar, Museo Cristiano, Cividale del Friuli.

Some hierarchical schemes also operate in the pigment application technique. In the Langobard altar of Ratchis in Cividale del Friuli, for example, while the back side reveals the use of a very cheap blue pigment, the more elaborate front side shows three different hues of blue, all three made of indigo mixed with other components [53]. But only for the robe of Christ and the angels' wings the more precious azurite (more precious than indigo blue) [46] was used (Figure 9). Similarly, pure vermillion (since Antiquity, it was considered a very precious and valuable pigment connected with sacred meanings) was used only for the lips of Christ [28], while all the other red pigments are mixtures of vermillion and red lead, and gold leaf only for the halo of Christ while the rest of the yellow pigments are made of yellow ochre. The halo was likely encrusted and ennobled with precious stones, maybe blue stones.

Conclusions

The quality of the materials result from the stratification of multiple meanings attributed to them over time, depending on their occurrence and importance in various texts, their market value, and their colour, which in turn had its own cultural and spiritual meanings. It goes without saying that pigments made from certain materials borrowed their meanings from the materials they were made from, as it is easily demonstrated with lapis lazuli and ultramarine.

Consequently, the more valuable the material, the more valuable the pigment. This may explain why pigments of different origins and values but of the same colour, are sometimes used in the same work of art, as scientific studies of sculptures, paintings, and illuminated manuscripts have shown. What is of interest here is not when they are used in chromatic combinations, but as alternatives. The choice of two or more pigments of different origin and value but of the same colour (e.g., orpiment and yellow ochre, cinnabar and red lead, lapis lazuli and azurite, azurite and indigo, natural azurite and artificial azurite etc.) was never accidental but deliberate, as an analysis of the relationship between the pigments used and the

iconography can demonstrate. In the cases presented here, pigments of greater economic and spiritual value were used for the most important figures in the scene, and this cannot be random. It can therefore conclude that there was a kind of taxonomy of the materials of the same colour and, consequently, a hierarchical classification of the pigments. In other words, it seems that when artists had the possibility to make a choice, a hierarchical pattern lay the choice and use of specific pigments, responding to communicative and significant strategies. This does not mean, of course, that this was the rule, since many other reasons are behind the choice of specific pigments. Sometimes, however, this choice appears not merely bound to technical or aesthetic reasons; the idea is that, among the various criteria used by patrons/artists to choose a particular pigment, there was also a hierarchical classification of materials of the same colour.

This is the focus of the present research, which is still ongoing. Its goal is to trace, over a long period covering the whole of the Middle Ages, and considering different media and colours, the existence of a hierarchical scheme which determined the choice of pigments (and especially the choice of raw materials underlying the pigments) based on the value scale of figures and scenes. We do not know how much of all this the observer could perceive, but certainly patrons and artists were aware of the material and spiritual worth of the pigments used. Although interest in this type of analysis has grown recently, and there seems to be an increasing number of studies exploring the relationship between the nature of pigments, iconography, and the symbolism of colour, the field of investigation needs more case studies to be better defined and framed, to demonstrate the existence of colour-based value criteria and, in particular, material-based value criteria.

Author contributions
Alberto Virdis is the author of the sections "Introduction" and "Iconology of matter and colours: the case of lapis lazuli"; Grazia Maria Fachechi is the author of the sections "Hierarchy of materials and pigments" and "Conclusions".

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