Process and Product: The Artist's Relationship with Venerated Pigments in the 13th, 14th and 15th Centuries

Over the course of their careers, many artists become intimately familiar with their materials; they learn what temperature they prefer, how they react to different treatments, and under which circumstances they look their best. In the latter portion of the middle ages (here defined as the 13th, 14th and 15th centuries), painters developed a particularly close relationship with the colors that brought their dazzling panels and manuscripts to life. The late medieval period saw the popularization of vivid, expensive colors and the reintroduction of "lost" philosophical theories that imbued them with renewed significance. Artists synthesized, ground, and mixed their own pigments, often from rare, costly, and dangerous substances. In the process, they established a relationship with each pigment based on its unique characteristics and symbolism. Some, ~~for example,~~ had to be ground finely, while others, if pulverized with too much vigor, lost their hue entirely. Some would discolor over time or even eat through the very parchment they decorated. Phillip Ball speaks to the dialogue between artist and pigment in *Bright Earth*:

> How is your desire for blue affected if you have just paid more for it than for the equivalent weight in gold? That yellow looks glorious, but what if traces of it on your fingertips could poison you at your supper table? This orange tempts like distilled sunlight, but how do you know that it will not have faded to dirty brown by next year? What, in short, is your relationship with the materials?[1]

Comment [JWG1]: For no particular good reason other than convention, Middle Ages gets capitalized. Not medieval, though.

Comment [JWG2]: Why the mystery quotes? I mean, I know why…but generally you want to avoid those. Say, rather, something like, forgotten. It's more accurate, and doesn't leave your reader wondering what you're doing with your quotation marks.

[1] Philip Ball, *Bright Earth: Art and the Invention of Color*, 1st American ed. (New York: Farrar, Straus and Giroux, 2002), 6.

I devote the following pages to an exploration of that final question: how did painters in the late middle ages view and interact with their colorful media?[2] I will specifically explore three hues that Ball calls "the glories of the medieval palette": vermillion red, ultramarine blue, and gold yellow.[3] The pigments supplied the three primary colors, and the medieval painter interacted with them through the lenses of alchemy, religion, and culture. I will argue that artists had a distinctly intimate relationship with vermillion, ultramarine, and gold that stemmed from the process of obtaining the raw materials, refining them, and applying the color. I will present each pigment as a case study: I will explore its source, its use in manuscript painting, and its associated symbolism. Along the way, I hope to make clear the relationship between a color's origin and its value to the artist in the 13th, 14th and 15th centuries. My approach echoes that of art conservator Spike Bucklow, who wrote that "in the medieval world, products and the processes that made them were inextricably linked."[4]

Comment [JWG3]: It might have been a good idea to start a new paragraph here…as it stands your intro paragraph is something like 1.5 pages long, which is a long time to ask your reader to go. I know there's the block quote that breaks things up, but making a new paragraph gives you separate platform to make your actual thesis argument.

Comment [JWG4]: Good…this is a helpful note.

Comment [JWG5]: This is a much clearer thesis than the one in your draft.

Vermillion

Red has merited a special place in the artist's palette ever since an early hominid stumbled across some ochre and smeared it across a cave wall. Medieval painters applied the visceral hue to the garments of powerful people and associated it with blood and fire. The pigment discussed here, vermillion, also occupied a notable place in the alchemical rainbow. In the late middle ages, art and alchemy overlapped; color (and especially color changes) underpinned alchemical practice,

[2] I will refer to illuminators as "painters" throughout my argument, with the understanding that, in the late middle ages, guilds technically drew a distinction between painters – who colored panels, decorated walls, etc. – and illuminators, who strictly worked around the written word. Both professions employed the pigments discussed herein, although to different extents. I will primarily draw from illuminated manuscripts throughout my argument because they usually provide the most well-preserved examples of medieval pigment use.
[3] Ball, *Bright Earth*, 235.
[4] Spike Bucklow, *The Alchemy of Paint: Art, Science and Secrets from the Middle Ages* (London: Marion Boyars, 2009), 27.

while artists adopted the alchemists' proto-chemistry to synthesize their pigments. In *Bright Earth*, Phillip Ball even posited that red was "the primary hue of both medieval chemistry and art."[5] Alchemists regarded it as a sacred color, the final hue in a progression leading to the synthesis of the Philosopher's Stone. Medieval painters synthesized vermillion, one of the most brilliant reds, from recipes with alchemical roots and likely understood its mystical significance. For alchemists and artists alike, vermillion manufacture represented not just a series of practical steps, but a marriage between principle elements.

It was relatively simple to create vermillion. The artist only had to procure mercury and sulfur, mix them, and heat the two elements in a crucible. The resulting crust would appear black, but pulverizing it developed the color. "If you ground it every day for twenty years," wrote the fifteenth-century painter Cennino Cennini, "the color would still become finer and more handsome."[6] The alchemical basis for vermillion manufacture stemmed from hylomorphism, a paradigm initially formalized by Aristotle and rediscovered in the West in the 12th century. Hylomorphism was based on the belief that everything in the universe existed through interactions between the principles of "form" and "matter." Like the eastern yin and yang, the two essences joined to create a mystical balance. As Bucklow explains, "...the universe came into being as a result of form's wish to be materialized and matter's longing to be re-formed" and "Each fulfills the other's desires."[7] In alchemical belief, vermillion represented the marriage between two such complementary substances. The hylomorphic connection between sulfur and mercury dated back to the eighth century, when the Islamic alchemist Jābir ibn Hayyān (also called Geber) developed

Comment [JWG6]: This is a nice, compact explanation for why we need to be thinking about art and alchemy together

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Comment [JWG7]: The citation for this book should also include the translator (I'm assuming there is one).

Comment [JWG8]: It's important to note that you are discussing theory here, so maybe something like, "The alchemical theory underlying the process of vermillion manufacture…"

[5] Ball, *Bright Earth*, 79.
[6] Cennino Cennini, *The Craftsman's Handbook* (New York: Dover Publications, 1954), 24.
[7] Bucklow, *The Alchemy of Paint*, 80.

the 'Sulphur-Mercury' theory[8]. Jabir's (capitalized) Sulphur and Mercury were not earthly substances but idealized manifestations of form and matter. In the late middle ages, Vermillion held special significance because it resulted from the combination of their mundane proxies. As Thompson notes, "...the marrying of mercury to sulfur, the manufacture of vermillion, the marvelous re-synthesis of those elements into the likeness of the cinnabar from which the mercury was extracted, was a consummation greatly admired and devoutly practiced."[9] In *The Alchemy of Paint*, Spike Bucklow argues that artists, while not alchemists *per se*, nonetheless understood vermillion's alchemical significance and treated it with corresponding reverence.

The main indication that artists knew about vermillion's mystical value stems from the fact that, as Bucklow notes, "nobody needed to make it at all."[10] The naturally-occurring mineral cinnabar yielded a nearly identical pigment, but artists insisted on synthesizing vermillion anyway; possibly to imbue the pigment, and subsequently the painting, with added meaning. Furthermore, artists recorded procedures for synthesizing vermillion that contained inconsistencies best explained through alchemical belief. Typical recipes for vermillion dictated a two parts mercury to one part sulfur ratio. This proportion, however, would leave sulfur in visible excess. Bucklow suggests that the ratio was purely symbolic; alchemical principles dictated that elemental water (mercury) was approximately twice as heavy as fire (sulfur) so the 2:1 ratio approximated a balanced one-to-one mixture. Even though the extra sulfur would have been obvious, the necessity for cosmological balance transcended practicality. Bucklow argues

Comment [JWG9]: So you don't put quotation marks around "lost" in this note, even though you're talking about the same phenomenon of historical forgetting. Be consistent in your choices about presentation and demarcation (consistent and correct is an even better choice).

As an aside, I'd note that it's not just that Islamic philosophers weaved Aristotelean ideas into their worldview, but also that they added a tradition of Islamic commentary as well. The Aristotle that came back to Europe through Spain was filtered through 400 years of commentary and consideration. Thomas Aquinas philosophy rested on a tradition of Islamic Aristotelianism.

Comment [JWG10]: Is this capitalized because of Jabir's writing, or is it a typo?

Comment [JWG11]: citation

Comment [JWG12]: How identical is it? Are its properties beyond color the same – things like its luminescence, how well it lasts on a page, etc. I wonder if there are reasons beyond the mystical.

Comment [JWG13]: That's a nice turn of phrase that finds broader applicability in the world than just describing color alchemy

[8] The bulk of Aristotle's work was lost to the West until the late middle ages, but it was not so in the Muslim world. Islamic conquerors of the Mediterranean fell heir to the philosopher's enormous body of work, translated it into Arabic and applied his ideas to their philosophical discipline between the ninth and twelfth centuries.
[9] Daniel Varney Thompson, *The Materials and Techniques of Medieval Painting* (New York: Dover Publications, 1956), 103.
[10] Bucklow, *The Alchemy of Paint*, 87.

(and I agree) that medieval artists' insistence on creating vermillion despite its availability in the form of cinnabar (and its health risks) suggests that they were aware of sulfur and mercury's philosophical significance.[11]

Vermillion's rich symbolism extended to Christian iconography, where artists applied it liberally. Early versions of the bible contained few words for color, but the book became increasingly vivid over the course of Latin translations. Illuminators expanded on the biblical rainbow in their work and developed systematic (and, at times, formulaic) approaches to color symbolism. They regarded red, especially the brilliant hue that vermillion offered, as a particularly powerful color. Michel Pastoureau, the author of *Red; The History of a Color*, writes that in medieval Christian thought red occupied a twofold axis on which artists considered the principal earthly manifestations of the color - blood and fire - in their positive and negative forms.[12] When evil, fire represented hell's flames and typically decorated demons, apocalyptic dragons, and the Devil. As a positive manifestation of fire, vermillion red colored the burning bush, divine columns of flame and other representations of God's ardent love. Blood could be negative – as when associated with "all discourse on violence and impurity," (including murder and women's menstruation) – but the most sacrosanct red of all

Figure 1. Detail of an early 14th century miniature depicting an angel in red robes expelling Adam and Eve from paradise. Courtesy of the British Library Catalogue of illuminated Manuscripts, Royal 19 D II.

Comment [JWG14]: A better way to phrase this would be something like, "Bucklow argues convincingly that…"

Comment [JWG15]: This comes out of nowhere a bit…I understand that playing around with mercury is unhealthy, but you haven't discussed this at all, so introducing it parenthetically feels strange.

Comment [JWG16]: Not sure what this means. That there aren't words like "yellow" in the bible, or that earlier bibles seem to have been less heavily colored?

Comment [JWG17]: Again, not quite sure what this means. Are we talking about Jerome's *Vulgate* here, or are we talking about later copies of the text?

Comment [JWG18]: What are the differences between systematic and formulaic (he asked pedantically)?

Comment [JWG19]: You want to use an em dash (–), rather than a hyphen (-), here. In Word, if you put two hyphens back-to-back and go on typing it will convert them into an em dash. Some other platforms do this as well, but if not then two hyphens I (--) will do.

Comment [JWG20]: Good…far clearer here than in the draft that you are talking about the evil/good qualities of the thing pictured, rather than the color itself

[11] Ibid.
[12] Michel Pastoureau, *Red: The History of a Color* (Princeton, New Jersey: Princeton University Press, 2017), 58.

flowed from Christ's wounds on the cross.[13] It and the blood of martyrs merited particularly fine hues. Some authors even claimed that Jesus's blood was lighter and clearer than an ordinary person's, and medieval painters went to great lengths to realistically portray it streaming from his wounds.[14] Around the turn of the fourteenth century, artists even imitated dried blood by dripping pigment across the painting surface.[15] Bold vermillion also graced imperial robes as a symbol of power, showed up on judges' garments to denote justice and clothed the angel that cast Adam and Eve out of paradise (fig. 1). Michel Pastoureau calls red "the favorite color" in the Middle Ages, and it certainly merited a special place on the artist's palette, both for its relative ease of manufacture and symbolic weight.[16]

Comment [JWG21]: I know you're relying on Pastoureau here, but don't settle for "some authors." Tell your reader which ones…it might mean tracing someone else's footnotes (here Pastoureau's) to see how they are pulling their own information together.

I still left to wonder here, as in your draft, what a lighter and clearer blood looks like, and why a rich hue like vermillion would be appropriate for that.

Ultramarine

Medieval artists may have favored red, but Victoria Finlay, the author of *The Brilliant History of Color in Art,* writes that ultramarine blue was "the most prized color in Christendom."[17] Ultramarine's popularity in the 13th, 14th, and 15th centuries reflected the late medieval and (and ultimately Renaissance) preoccupation with a pigment's monetary worth. Ultramarine certainly had symbolic connotations but, unlike vermillion, its extraordinary value derived primarily from the money, time and labor required to produce it.

Virtually the sole source of the raw material for ultramarine, the mineral lapis lazuli, was the Badakhshan mines, in modern-day Afghanistan. Once they had acquired some of the

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[13] Ibid., 61.
[14] Ibid., 64.
[15] Beate Fricke, "A Liquid History: Blood and Animation in Late Medieval Art," *Res: Anthropology and Aesthetics* 63–64 (2013): 54.
[16] Pastoureau, *Red*, 55.
[17] Victoria Finlay, *The Brilliant History of Color in Art* (Los Angeles: J. Paul Getty Museum, 2014), 46.

precious stone, medieval artists couldn't simply grind it to make blue pigment. Lapis lazuli, even the highest quality kind, contains minerals such as white calcite and gold pyrite that would dirty the color to a disappointing gray. Until the thirteenth century, few Europeans knew how to extract the pure color, so they imported ultramarine ready-made from, as the name suggests, "across the seas." A multistep process, ultramarine preparation required time, dedication, and care. Cennini dedicated several pages to the process in *The Craftsman's Handbook*. He wrote that the artist would powder the stone in a covered mortar so as not to lose any of the precious dust and mix it with oil, wax, and resin to make a paste. Over the course of at least three days, he would periodically work the mixture with his hands coated in linseed oil. When he wished to extract the dye, the artist would prepare two wooden rods, "neither too thick nor too thin" and use them to knead the paste in a vat of lye.[18] When the liquid was saturated with blue, he would draw it off and add a new portion of alkaline liquid. Each successive batch would be of lower quality, with the last two "worse than ashes" and fit only for oil glaze.[19] Cennini recommended that his pupils "weigh the question of how many grades of blue you want" and combine batches accordingly.[20] Finally, the preparer would set the liquid out to settle and draw a clear layer of lye off each day until only the precious pigment remained. Only then could the artist use it in his work, and such a fine color could adorn only the finest devotional images.

Comment [JWG22]: I love this detail.

"Ultramarine blue," rhapsodized Cennini, "is a color illustrious, beautiful, and most perfect, beyond all other colors; one could not say anything about it, or do anything with it, that its quality would not still surpass."[21] Only the finest and most expensive works contained the

[18] Cennini, *The Craftsman's Handbook*, 37.
[19] Ibid., 38.
[20] Ibid.
[21] Ibid., 36.

glowing pigment. As Ball notes, "to use ultramarine was not only to display wealth but - more important in the sacred works of the Middle Ages - to confer virtue on the painting."[22] In the early middle ages, when painting was primarily a devotional activity, its presence spoke to a monastery's success but, as lay professionals took over the painting trade, it came to reflect the patron's wealth and piety. In the late Middle Ages, patrons would specify not only the design of the paintings they ordered, but would also contractually bind the painter into using specific pigments and might even designate the supplier, to ensure that the artist did not cut corners.[23] Painters' guilds also introduced regulations that prohibited artists from using particularly rare pigments, ultramarine included, to color mundane objects.[24] Under such restrictions, artists employed vermillion to color holy people's vestments, especially the Virgin's flowing robes (fig. 2).

Figure 2. 14th century historiated initial "G" with the Assumption of the Virgin. Note Mary's ultramarine robe. Courtesy of the British Library Catalogue of Illuminated Manuscripts, Add. 32058.

Until the eleventh century, artists clothed Mary in nearly any color, so long as it was a "color of affliction" – a severe hue intended to communicate Mary's pain at her son's crucifixion.[25] In the late middle ages, however, artists restricted their palette to ultramarine's luminous, saturated blues. The hue likely alluded to Mary's role as queen of heaven, but Ball warns against attributing its use completely to symbolism. "Colour theory risks overlooking the obvious," he

[22] Ball, *Bright Earth*, 239.
[23] Ibid., 87.
[24] Ibid.
[25] Pastoureau, *Red*, 86.

Comment [JWG23]: Here, again…em dashes.

Comment [JWG24]: Ambiguous…you mean the color, but the direct antecedent here is painting (or, by a more tortured reading, devotional activity).

Comment [JWG25]: Ibid.

Comment [JWG26]: Interesting.

Comment [JWG27]: Do you mean boring/quotidian here, or earthly? Given the conversation I'm not sure, and mundane has both meanings.

Comment [JWG28]: Ultramarine?

Comment [JWG29]: Is the background of the initial also done in ultramarine, or just Mary's robes? If they are both ultramarine, then this raises questions about your claims re: its restricted use. If they're different it would be worth pointing out in support of your claims. Keep in mind when you use images in your writing that your reader won't only pay attention to the thing you tell them too. Be sure to think about what possible issues the image might introduce into your essay, and how you might preempt questions like the one I just asked.

Comment [JWG30]: Thanks for the clarification from your draft…but what were those colors?

Do you know why there was a shift away from colors that symbolized Mary's suffering?

argues, "if it does not embrace the substance of color."[26] Ultramarine's economic value alone may have merited its use on the Holy Virgin's clothes. After all, in the late Middle Ages and Renaissance, a viewer was just as likely to look at part of a painting and remark on the section's cost as to note its beauty.[27] However, Pastoureau concludes that theological and ideological shifts leading to blue's acceptance as a status symbol preceded its economic boom.[28] He writes of a "blue revolution" in the twelfth and thirteenth centuries and even argues that Mary contributed to the color's advancement by "appearing" in blue.[29] The search for the origin of the color's value has a "chicken or egg?" quality to it that does nothing to change the fact that, by the late middle ages, the use of ultramarine explicitly advertised both the commissioner's wealth and piety.

While a patron's motive for requesting ultramarine in his painting is well recorded, the artist's relationship with the color remains slightly more enigmatic. Such an extraordinarily expensive pigment must have been nerve-racking to work with, but its unsurpassed beauty may also have imparted a certain thrill. Ball even recounts a story about an artist who, vexed that his patron constantly peered over his shoulder, pretended to run out of ultramarine so that he could hoard the valuable pigment for his own use.[30] Late medieval artists likely viewed ultramarine with a mixture of awe at its beauty and nervousness at its value. After investing money in lapis stone and laboriously preparing the ultramarine pigment, a painter would certainly have felt pressured to ensure that all his effort didn't go to waste.

Comment [JWG31]: Tone shift…less formal feeling than the rest of the essay

Comment [JWG32]: w/c…Value? Importance? Boom isn't quite right.

Comment [JWG33]: This has the feel of a tautological argument…blue became an accepted color for Mary because Mary was pictured wearing blue? Or do you mean that she appeared in visions and such while wearing blue?

Comment [JWG34]: It would probably be worth making a bit more clear here that the argument doesn't need to be zero-sum...that blue could be advertising *both* wealth and piety at the same time. Which itself leads down a bit of a theological rabbit hole…if more expensive items signal better, more authentic, piety, then is wealth itself a prerequisite for perfect faith?

Comment [JWG35]: This reads as if there is only one specific patron you are talking about.

Comment [JWG36]: Good…this paragraph/argument needed to be here to bring the point back to your thesis.

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[26] Ball, *Bright Earth*, 239.
[27] Finlay, *The Brilliant History of Color in Art*, 44.
[28] Pastoureau, *Red*, 86.
[29] Ibid., 88.
[30] Ball, *Bright Earth*, 240.

Gold

The third primary color in the medieval palette after ultramarine blue and vermillion red was not yellow, *per se*, but the hue afforded by gold itself. Medieval artists certainly had yellow pigments but, as Ball notes, "…of all their uses, perhaps the least important was to represent yellow things."[31] Most yellows paled in comparison to real gold, so painters largely used them to modify other colors and, paradoxically, to imitate gold itself. European sources of natural gold were few and far between, so artists and craftsmen typically created gold leaf from ducats that professional goldbeaters hammered into thin sheets. The delicate leaf would adhere to the slightest trace of moisture, so beaters would layer it between pieces of fine parchment. Thompson even noted that "for beating the very thinnest leaf, a special kind of parchment is required, made not from skins but from internal membranes, called goldbeaters' skin."[32] Artists employed a range of water- and oil-based mordants to paste the leaf onto their work, and typically burnished it afterward to recover its smooth sheen.

Comment [JWG37]: People are crazy.

Medieval painters also used gold as a powdered pigment, although not without difficulty. The ductile metal tended to weld together in a mortar rather than break into fine granules. Artists circumvented the problem by dissolving the gold in liquid mercury and then carefully vaporizing it under heat to leave behind a gold powder (an incredibly dangerous process).[33] Other recipes called for grinding the gold with honey or sugar to prevent the grains from adhering to each other.[34] Cennino even suggested that his readers mix gold leaf with beaten egg whites and combine the result with a trace of green pigment "to make a tree look like one of the trees of

Comment [JWG38]: Is this only long-term unhealthy, or is there also the potential for more immediate, traumatic problems?

[31] Ibid., 174.
[32] Thompson, *The Materials and Techniques of Medieval Painting*, 195.
[33] Ball, *Bright Earth*, 99.
[34] Thompson, *The Materials and Techniques of Medieval Painting*, 192.

paradise."[35] Painting in gold – chrysography – created stunning effects. When left unburnished, gold's luminous yellow typically represented light playing on hair, leaves, and garments. The effect was particularly striking under candlelight. Finlay tells how a man begged his friend, a gallery owner, to allow him to visit the medieval illuminated artworks at night. Gazing at the paintings under candlelight, he found that the flickering rays made the images "shift and dance as if they were animated."[36]

While goldbeaters hammered leaf from ducats, alchemists labored to make the metal in their laboratories. Bucklow writes that recipes for gold typically fell into three categories: for coloring it, for purifying it, and for synthesizing it from scratch.[37] The latter type typically called for the same ingredients used to make vermillion – sulfur and mercury – along with various salts, pigments and ores. However, artists concerned themselves mainly with the first two. Painters and illuminators hammered, powdered and burnished gold to transfer its remarkable luster and incorruptibility onto parchment. The metal even carried a measure of intrinsic credibility. Some twelfth-century manuscripts opened their dedications with 'Aurea testator,' or 'it is witnessed in gold.'[38] In many instances, Gold's value took precedence over realism. Until at least the fourteenth century, artists placed their holy figures not in the sky or among foliage but instead framed them with a

Figure 2. 14th century historiated initial "S" of Christ blessing with a gold-leaf background. Courtesy of the British Library Catalogue of Illuminated Manuscripts, Add. 18196.

Comment [JWG39]: Ambiguous. The first two recipe categories, or the first to ingredients (sulfur and mercury)?

Comment [JWG40]: ?

[35] Cennini, *The Craftsman's Handbook*, 102.
[36] Finlay, *The Brilliant History of Color in Art*, 38.
[37] Bucklow, *The Alchemy of Paint*, 188.
[38] Christopher De Hamel, *A History of Illuminated Manuscripts*, 2nd ed., and with new ill. (London: Phaidon Press, 1994), 71.

glowing golden field (fig. 3). Christ, his family and his followers deserved nothing less than the metal whose resistance to fire and tarnishing led medieval artists to see it as "a physical trace of the immortal in the realm of mortality."[39]

Comment [JWG41]: this is labeled as Fig. 2 under the image.

Comment [JWG42]: I'm assuming that you've left this space for the reader to have appropriate time to regather their thoughts after having pondered the mysteries suggested by a gold-adorned Christ. But it's not necessary.

Phillip Ball dubbed vermillion, ultramarine and gold "the venerated trinity" – a divine collection of pigments that raised the bar for painting in the late middle ages (see fig. 4 for an example of all three in concert). The artists who employed the three brilliant colors did so with an acute awareness of their philosophical, religious and economic value. Entrusted with such important hues, a painter was under pressure to satisfy his patron, his own artistic sensibility, and, in the case of devotional images, God himself. "The Middle Ages," wrote Thompson, "loved with a deep love anything which was at the same time good to look upon, honourable in motive, and intrinsically valuable."[40] Christ's dripping vermillion blood, the Virgin's glowing ultramarine robes, and the lustrous gold background to a saint's martyrdom fulfilled all three criteria. As he ground, smelted, fired, mixed and sifted, an artist working in the three centuries leading up to the Renaissance imbued his pigments with philosophical, religious and economic worth.

Figure 4. Miniature demonstrating the late medieval use of vermillion (coloring the kings' robes), ultramarine (on the Virgin Mary's cloak) and gold (the background and clothing Christ child's smock). Adoration of the Magi, last quarter of the 13th century. Courtesy of the British Library Catalogue of Illuminated Manuscripts, Harley 928.

[39] Bucklow, *The Alchemy of Paint*, 204.
[40] Thompson, *The Materials and Techniques of Medieval Painting*, 199.

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This is a much improved essay from the draft you sent me previously, and that wasn't in bad shape to start with. I enjoyed this a great deal. You've done a good job of providing clarity in terms of your argument, and in terms of the timeframe involved. You have also nicely separated out the question of artist from that of consumer, which helps to keep the essay in line with the thesis. In a longer essay I would suggest working to more explicitly connect the artists' phenomenological engagement with the pigments to their creative output -- there were some nice sections where you draw these connections, but there were also points where it felt like you had forgotten about the thesis a bit. That said, you were trying to get across quite a lot of information in a fairly short space, and one has to make authorial choices. In all, it's a nicely done and interesting essay. I hope that you enjoyed writing it (or, at least, enjoyed researching the materials and having written the essay (most people I know -- including myself -- don't much enjoy the actual writing process itself)).

I've very much enjoyed having you in class this semester. In the future, if I can be of any help to you at all, please don't hesitate to ask. I'm happy to provide a reference or write an outstanding letter on your behalf.

Have a great summer.