

“MEDIEVAL ARTISTS ONLY HAD A LIMITED NUMBER OF
COLORS TO WORK WITH.”

BUSTED!!

I have heard people say this as a reason they don't want to use historically accurate materials on scribal works. I've never understood thinking that you can't reproduce what they did in period with what they used in period. That's like saying you can't make a blue velvet dress because they didn't have blue rayon velvet.

The disconnect is not in the materials, but the methods that the medieval painter used. A medieval illuminator mixed most of his shades from his basic colors, rather than purchasing all the shades he needed. Medieval artists were very aware of color theory and the use of opposite colors to provide contrast or shading, and they heavily used local plant dyes to supplement their palette.

In the *Mappae Clavicula*⁶, an 8th century treatise on various medieval arts, the author felt it important to describe in detail how to use colors for darkening and highlighting. An excerpted example:

“Darken pure vermillion with brown or dragonsblood, lighten with orpiment. Mix vermillion with white lead, and make the pigment that is called rose; darken with vermillion, lighten with white lead.”

The treatise also provided careful instruction on which pigments were not compatible with each other, demonstrating a sophisticated awareness of chemical interaction. For example, verdigris, which is a very acidic pigment, the author of the *Mappae Clavicula* specifically describes as being incompatible with folium, which is a pH sensitive pigment. He also warns against using orpiment with folium, green, red lead or white lead. Orpiment cannot be used with any lead oxide or verdigris, as it can react in a destructive and toxic fashion.

Theophilus' *De Diversis Artibus*⁵ written four centuries later gives directions for mixing over a hundred distinct and separate shades for painting. Thirty alone are used to describe shades used to paint figures, while another fifteen or sixteen are used to describe painting robes. He clearly describes mixing a green color with red to create a brown with which to outline faces and figures, and also the judicious use of vegetable lakes to add red, blue, or yellow tints to various colors, as well as the addition of white or black to create lighter or darker shades. Theophilus provides recipes for a few main colors like white, vermillion, verdigris, and yellow and red lead oxides, but he also mentions multiple vegetable and animal pigments like kermes, saffron,

cabbage, elderberry juice, indigo, folium, madder, leek green, iris green, sap green, and buckthorn yellow, while providing instructions on how to treat pH sensitive pigment like folium to shift them from bluish purple to bright red. Interestingly, he does not provide instructions on how to extract the dye materials from the plants, indicating that this was either something not done in monasteries, or that it was common enough practice to not require precious page space, given his excessive attention to detail in his instructions otherwise.

We should not also limit ourselves to “known” dyes. If a plant was available in period, and is known to stain, it’s entirely possible that it could have been used as a pigment. The medieval artist was constantly on the lookout for local plant dyes to use for his work. An example is rhubarb, discovered in use as a red lake during a recent analysis of a 15th century German manuscript¹⁰, possibly identifying the “gorma” plant mentioned in the 14th century “Liber de Coloribus illuminatorum sive pictorum”, which is described as being a sort of plant with a purple cast.

Cennini⁷ likewise provides multiple recipes for mixing colors, like adding saffron, brazilwood, madder, and kermes to various colors in order to brighten or darken them, and demonstrates similar instruction and knowledge to that of Theophilus regarding color theory and material chemistry. However, in his treatise he also gives instruction on how to purchase good quality colors, rather than manufacturing them, due to the labor shift of pigments being prepared by the shopkeeper rather than the artist that occurred throughout the 14th and 15th centuries. It is worth noting his instructions on extracting ultramarine from lazurite specify that all of the various shades of ultramarine are valuable for use, including the ultramarine ash, which is the last and poorest extraction, rather than just the best blue color, like that found in our paint tubes today.

We don’t have to rely only upon the instructive treatises to tell us whether or not medieval artists actually did mix their pigments. A recent Raman spectrographic study of Jean Bourdichon’s, (a 15th century French illuminator of great note and reknown) illuminations throughout different points of his career show that he rarely used pure pigment. He mixed lead-tin yellow I (massicot) with his greens to create different tonalities, used ultramarine and azurite to create cool flesh tones, and his blues are various proportions of ultramarine, azurite, malachite and lead white. He also mixed lakes with his blue pigments to create various purples, and vermillion with red and white lead for his reds and pinks. Also on his palette for shading were carbon black, yellow ochre which was most often mixed with gold, such as that used on Bathsheba’s hair in *Bathsheba Bathing*, Hours of Louis XII, 1498-99, and bismuth black, which is a metallic grey used to provide cool tones.

The medieval artist also made careful use of the opacity or translucent quality of the pigments he was working with. They rarely used transparent pigments on their own without mixing in an opacifier like chalk, gypsum, bone, or lead white, but they would also often mix the transparent pigments into opaque ones like minium, orpiment, or lead white in order to shift their colors. Ochres, possessed of a moderate level of transparency, were used similarly to lakes in order to provide shades of color, (Terre vert is most commonly used for this rather than as a stand-alone color.) or as grounds underneath other pigments to alter the shade.

In oil painting, we see the skill and use of translucence and opacity brought to its height. A recent analysis of a 15th century oil painting by Botticelli⁸ found multiple extremely thin layers of paint, (used with both gum and egg binders) laid on in a specific order to create the illusion of depth and three-dimensionality caused by light being reflected back through all of the layers. A sample from a rose leaf showed that a black layer had been laid down, with a lapis, malachite, and lead-tin yellow mix over top. The black was purposely put down over a white gypsum base in order to provide light reflection for behind the green paint, as it does not appear behind other areas. On a flesh tone sample, we find a base layer of lead and yellow ochre (goethite), topped with several layers of lead mixed with varying amounts of vermilion, massicot and ochre, and a final top layer of a red lake laid thinly over top. The transparent red lake would allow the colors laid below to reflect light through the top layer, causing a sense of depth that is characteristic of 15th and 16th century oil painting, and is often found used similarly in manuscript painting.

In summary, the medieval artist had access to numerous pigments and colors, including mineral, vegetable, animal, and artificially manufactured (such as yellow and red lead, verdigris, and vermilion) pigments, but more importantly, they used color theory, complex mixtures of multiple shades and hues of colors, as well as some basic chemistry in order to create their masterpieces. The medieval artist was not limited by their palette, but only by their imagination.

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