

Note from the Making and Knowing Project:

This essay was written for “The Art Technological Source,” an 8-week graduate course at the University of Amsterdam offered by Dr. Marjolijn Bol in 2015 and 2016 to students enrolled in an MA program in either Technical Art History or Conservation and Restoration. Students worked on various recipes from BnF Ms. Fr. 640 on the following five topics: 1) tracing and painting on glass, 2) yellow dyes and their applications, 3) dragon’s blood, 4) painters’ varnishes, and 5) sieves.

This is an un-edited student paper that relies on an earlier state of the Making and Knowing Project’s transcription and translation of Ms. Fr. 640. For an updated version of the text, see:

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Using wine to temper *laque*

An examination of the role of wine in creating paint in BnF Ms. Fr. 640

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1. Introduction

In the context of the course *The Art Technological Source* students of the master Conservation and Restoration of Cultural Heritage, at the University of Amsterdam, have reconstructed several recipes from a late sixteenth century, French manuscript. The reconstruction of recipes in this specific manuscript, referred to as BnF Ms. Fr. 640, is part of *The Making and Knowing Project* at Columbia University.¹ The manuscript is written by an unknown craftsman in the region of Toulouse.² It comprises a wide variety of art technological and medicinal recipes, instructions for magic tricks and much more technical writings on various topics.

A group of six students have reconstructed the recipe ‘*Vernis pour destrempe*’ on folio 56r.³ As the title indicates it is a recipe for a varnish for distemper paintings.⁴ Included in this recipe is an instruction on how to make an imitation marble on which the varnish can be applied. Three students focused on the reconstruction of this imitation marble, which consists of three layers (including the varnish):

The author-practitioner writes that for the second layer *laque* needs to be tempered with wine because tempered with glue it will become dull (‘*mourir*’) and black (‘*noircir*’). Thus, the wine seems to have been used as a binding medium for *laque*. During this reconstruction questions arose (among others) concerning this layer. Why would the author-practitioner recommend wine specifically and no other aqueous binding media instead of glue? How much wine in relation to *laque* is needed? How can wine function as a binding medium for *laque*?

The focus of this annotation will lie on the role of wine in the creation of paint in BnF Ms. Fr. 640. To my knowledge, no extensive research has been done into the use of wine in paint making.⁵ Yet it is important to understand how wine could have functioned as a binding medium because for one thing this can tell something about the aesthetic intentions an artist could have had with such a layer. In addition, during this research it became clear that by investigating the

¹ The manuscript is present in the Bibliothèque Nationale de France in Paris.

² Smith, Pamela H. and Tony Beentjes, “Nature and Art, Making and Knowing: Reconstructing Sixteenth-Century Life-Casting Techniques”, *Renaissance Quarterly* 63 (2010): 133.

³ Translation of the recipe is executed during Middle French Paleography Workshops at Columbia University.

⁴ With distemper is meant an aqueous binding medium, such as egg, glue or vegetable gums.

⁵ During this research it became clear that wine is sometimes mentioned in recipes concerning tempering pigments for manuscript illumination. The consulted secondary literature concerning illumination materials and techniques often focus on the most common aqueous binding media (glue, egg (white) and vegetable gums). In addition, the focus lies mainly on the examination of the used pigments and less on the used binding media. See for example: Wallert, Arie, “Kookboeken en Koorboeken” (PhD diss. Rijksuniversiteit Groningen, 1991), Lawson, Margaret, “Technical Observations: Materials, Techniques and Conservation of the *Belles Heures* Manuscript,” in *The Art of Illumination, The Limbourg Brothers and the Belles Heures of Jean de France, Duc de Berry*, ed. John P. O’Neill (New York: The Metropolitan Museum of Art, 2010) and Szafran, Yvonne and Nancy Turner, “Techniques of Pacino di Bonaguada, Illuminator and Panel Painter,” in *Florence at the Dawn of the Renaissance, Painting and Illumination, 1300-1350*, ed. Christine Sciacca (Los Angeles: Getty Publication, 2012).

function of one material in a recipe, new ideas and possible interpretations of other materials in the recipe arise.

It will be investigated whether the manuscript contains other recipes in which wine is used in a similar manner to see if these recipes can give an indication of the function of the wine in paint preparation. In the same line of inquiry, recipes in other art technological manuscripts will be investigated.⁶ As will be clear below, new questions arose during this research, which lead to small experiments regarding these questions and finally a re-evaluation of the nature of the *laque* that is to be tempered with wine.

2. Tempering pigments with wine in BnF Ms. Fr. 640 and in other manuscripts

To paint the tempera marble the author-practitioner describes two colored layers. The first layer is to be painted with *laque* or *rose de Gand* and chalk. Initially, the word *laque* was interpreted as a red lake, possibly lac lake or brazilwood lake.⁷ It was noticed that *laque* is translated to English with ‘lacquer’ and not with ‘lake’ (see page 1) but it was also noticed that in the rest of the manuscript ‘lacquer’ is sometimes used for the translation of a red lake.⁸ For the second layer two materials are specified: *laque* and wine. Because the artist writes *laque* for both the first and the second layer, it seemed logical at first sight that this refers to the same material (a red lake) and this is what was used for the reconstruction. The type of wine is not specified in the recipe. However, where wine is mentioned, the author-practitioner either writes *vin* or *vin blanc*, while “*vin rouge*”, or something in that order, never occurs. It seems therefore that if the author-practitioner meant white wine, he would have specified this with *vin blanc*.

There appears to be no other recipe in the manuscript in which *vin* is used for tempering pigments. However, in one other recipe *vin blanc* appears to be used for tempering colors (‘*couluers*’). On folio 52v the author-practitioner writes that for preserving colors one can put the colors in a bottle with the whitest and clearest wine that can be found, some tragacanth gum and some white earth. He continues by stating that white wine mixed with some spring water can be

⁶ For this annotation I focused mainly on sixteenth century or earlier texts. I started the search with a limited set of translated or transcribed manuscripts. I have made use of Mary P. Merrifield’s *Original treatise*, the translation of the *Liber diversarum arcium* by Mark Clarke, the translation of the Cennino Cennini’s *Il Libro dell’Arte* by Daniel V. Thompson and the translation of Theophilus’ *De Diversis Artibus* by John G. Hawthorne and Cyril Stanley Smith. These translations subsequently directed my search for relevant recipes in primary sources.

⁷ The word *laque* brought us to think that it might be a red lake pigment from the red dye originating from the lac insect (*Kerria lacca* Kerr). The word ‘rose’ brought us, via some steps, to think that the author-practitioner might have meant a red lake pigment made from brazilwood. See: Kirby, Jo, Susie Nash and Joanna Cannon, eds., “Glossary,” in *Trade in Artists’ Materials: Markets and Commerce in Europe to 1700*, ed. Kirby, Jo, Susie Nash and Joanna Cannon (London: Archetype, 2010), 451, 455.

⁸ It was noticed, for example, that in two different recipes, both for the painting of skin in oil paint, the author-practitioner writes about *laque de Florence* to make the red tones. In one recipe this is translated as ‘Florence lake’ and in the other as ‘Florence lacquer’. Considering the content of the recipes, *laque de Florence* appears to be a red lake pigment.

used for tempering colors (he uses the verb *destremper*, just as in the recipe in question). According to the author-practitioner these tempered colors will be beautiful for manuscript illumination (*‘et ells se monstrent fort belles en oeuvre denlumineure’*). The nature of these *couleurs* is not specified and it is unclear whether he means the white wine mixed with tragacanth gum and white earth or just white wine. Still, it is an interesting recipe in this context because recipes in other manuscripts can be found in which wine is recommended for tempering pigments for illumination. Most of these recipes are specifically for the tempering of verdigris.⁹ A late thirteenth or early fourteenth century recipe is present in the manuscript *De Coloribus Faciendis* of Pietro de Sancto Audemaro, which specifies that Spanish green (verdigris¹⁰) can only be tempered with wine for painting in books.¹¹

Searching further in the context of tempering pigments for illumination it was noted that vinegar, which is basically wine that has been exposed to oxygen for a certain amount of time, was also recommended for tempering verdigris.¹² An interesting recipe to make green ‘without substance or body’ with verdigris and vinegar can be found in the late fourteenth century manuscript *De Diversis Coloribus* by Jehan Alcherius.¹³

⁹ Lawson, Margaret, “Technical Observations,” 326. Margaret Lawson also writes that for tempering verdigris wine or vinegar were, besides egg yolk, recommended for tempering verdigris.

¹⁰ Kirby, Nash and Cannon, “Glossary,” 458.

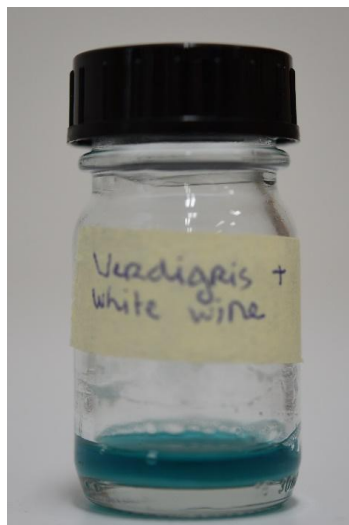
¹¹ The manuscript of Pietro de Sancto Audemaro is copied by Jehan le Begue in the fifteenth century. The manuscript of Jehan le Begue is translated by Mary Merrifield. For the recipe in question see: Merrifield, Mary, *Original Treatises...* (London: Murray, 1849), 156 [nr. 197]: ‘Temperando colores in libris ponendos fac temperamentum ex gummi arabico lucidissimo et aqua ut supra et tempera omnes colores excepto viridi et cerusa et minio et carminio ; viride salsum non valet in libro, viride hispanicum temperabis vino et si volueris umbras facere adde modicum succi gladioli vel caulis vel porri ; minium et cerusam et carminium temperabis claro ovi’. The original manuscript of Jehan le Begue is present in the Bibliothèque Nationale de France in Paris (Ms. Lat. 6741). The recipe in question can be found on folio 62v.

A very similar recipe can be found in the first book of *De Diversis Artibus*. See: Theophilus, *On Divers Arts, The Foremost Medieval Treatise on Painting, Glassmaking and Metalwork*, transl. John G. Hawthorne and Cyril Stanley Smith (New York: Dover, 1979), 38. Another recipe for tempering verdigris with wine was found in *Liber diversarum arcium*. See: Clarke, Marc, ed., *Medieval Painters’ Materials and Techniques, The Montpellier Liber Diversum Arcium* (London: Archetype, 2011), 115 (§ 1.16.27).

¹² BnF Ms. Fr. 640 as well contains some recipes in which vinegar is used in combination with verdigris. A nice example of this is on folio 129r, in which the author-practitioner writes how verdigris can be ground with vinegar to create the natural colour of a snake.

¹³ The manuscript of Jehan Alcherius is copied by Jehan le Begue, which is translated by Merrifield. For the recipe in question see: Merrifield, *Original Treatise*, 284 [nr. 300]: A faciendum viride in substantia clarum et non corpulentum id est substantiam non habentem, ut verbi gratia clarus atque sine substantia est color safran, i. e. croci qui non cooperit alios colores pro ejus subtilitate claritate et raritate, qua alii colores apparent per medium ipsum, et ex hoc ipse pro raritate sua ut et dictus color viridis remanet obfuscates, et nil vel minimum apparet, neque multum apparere potest super alios colores. [...] Accipe viride aeris et modicum de faece vini sicca, quae dicitur in latino tartarus et in gallico *gravella*, et subtilia

Verdigris is a copper acetate pigment and dissolves in acidic solutions, such as wine and vinegar.¹⁴ The difference in refractive indices between the pigments and the wine would usually make the liquid opaque but when the pigments are dissolved a translucent, colored liquid is formed.¹⁵ A small test with verdigris and wine confirmed that this is indeed the case. ‘Home-made’ verdigris was tempered with white wine and indeed, the pigments dissolved and a translucent, blue-green liquid was obtained (fig. 1).¹⁶ In this context it is interesting to note that in the recipe in BnF Ms. Fr. 640 the author-practitioner uses the term *glacer* (*‘glacer de laque destre[mpée] en vin’*). This term suggests that the second layer of the tempera marble is a translucent layer.¹⁷ The author-practitioner’s remark that the light and dark colors will appear as they should after the application of the varnish also suggest this. It seems likely that the light and dark colors originate from the first layer with chalk and *laque* or *rose de Gand* and that the second layer is a uniform red, translucent layer. This raised the question whether the wine was used to dissolve the *laque* and in that way a colored, translucent layer was made (just as can be done with verdigris and wine). A lake, which is simply put a dyestuff precipitated onto a substrate (often aluminum hydroxide)¹⁸, is generally insoluble but in theory the complexes can be broken down if the pH is low enough.¹⁹



et tere super lapidem durum et planum insimul quae dicto sunt cum aceto. Postea omnia quae in carta et in papiro protrahere vis’. The original manuscript of Jehan le Begue is present in the Bibliothèque Nationale de France in Paris (Ms. Lat. 6741). The recipe in question can be found on folio 88r-88v.

¹⁴ Kühn, Hermann, “Verdigris and Copper Resinate,” in *Artists’ Pigments, A handbook of their History and Characteristics*, vol. 2, ed. Ashok Roy (New York: Oxford University Press, 1993), 133.

¹⁵ The refractive index of modern, red wine lies around the 1.34. This is lower than the refractive index of verdigris (1.53), which is already lower than lake pigments. See: Peiponen, Kai-Erik, Risto Myllylä and Alexander V. Priezzhev, *Optical Measurement Techniques, Innovations for Industry and the Life Sciences* (Berlin: Springer, 2009), 10. Kühn, “Verdigris,” 133.

¹⁶ The verdigris was made Indra Kneepkens, art historian who is currently working on her PhD at the University of Amsterdam on late medieval recipes for the modification of linseed oil. She exposed copper plates to vinegar for several weeks and subsequently scraped off the obtained pigments.

¹⁷ This is actually a term that one would expect in a context of oil painting techniques, in which pigments with a refractive index that is similar to the refractive index of oil, such as lake pigments, are used. Interestingly, it appears that the author-practitioner more frequently uses the term *glasser* for this. On folio 65v he writes that pigments *‘qui non point de corps’* such as lakes and verdigris can be used for *glasser*. Could it be that in the context of this manuscript the term *glacer* refers to a similar optical effect as *glasser*, namely a translucent layer, but obtained by a different method?

¹⁸ For a clear explanation of the making of lake pigments, see: Kirby, Jo, Maarten van Bommel and André Verheken, *Natural Colorants for Dyeing and Lake Pigments: Practical Recipes and their Historical Sources* (London: Archtype, 2014) 24-26.

¹⁹ In the consulted literature for this annotation the insolubility of a dye precipitated on a substrate is often mentioned. See for example: Kirby, Van Bommel and Verheken, *Natural Colorants*, 24. According to

3. Red lakes and the dissolving power of wine

In the first attempt to make this ‘wine glaze’ two types of red lake pigments, *lac-dye*²⁰ and *carmine naccarat*²¹, were mixed with the wine without grinding. The choice of these pigments was partially lead by our assumption of the used red lake (in the case of lac-dye) and partially by the availability of these materials (in the case of cochineal).²² The result was indeed a translucent, red layer through which the painted layer underneath stayed visible. However, this was probably due to the fact that the ratio pigment to wine was kept quite low, rather than dissolution of the pigments. When this layer was dry the pigment particles did not adhere well to the surface and could easily be rubbed off (fig. 2). It should be noted that this changed when the varnish was applied on top (the pigments were, so to say, consolidated by the varnish).



Because grinding the pigments increases the total surface of the pigment particles and thus influences interaction with the wine it was decided to set up an experiment to test if the pigments could be dissolved with aid of the mechanical action of grinding. The two types of red lake were first ground with red wine and subsequently tempered with some more of the same wine.²³ It is interesting to note here that in general, most European wines in the sixteenth century were not suitable to keep for a long time (in contrast to current times in which many wines can be stored and ‘aged’ before consumption). The now widely known round, corked, bottles in which wine is stored and aged came into use in the seventeenth century. In the sixteenth century the wines could be preserved for only a few months after which they turned sour – in other words, it turned into vinegar.²⁴ Since it is unknown how old the wine could have been, and thus

Art Ness Proaño Gaibor, chemical analyst at the RCE, it is possible that lake pigments dissolve in (very) acidic solutions. See also: Wallert, “Kookboeken en Koorboeken,” 144.

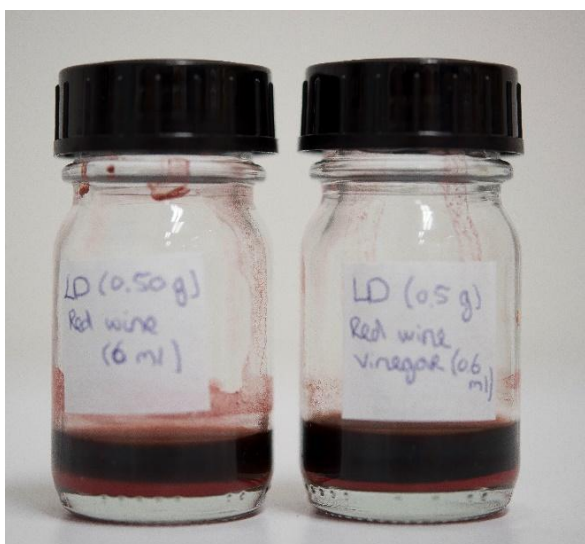
²⁰ Red lake made from lac dye precipitated on aluminum hydroxide. Supplier: *Verfmolen “De Kat”*. Color index: NR 25. 75450. *Lac dye* is a confusing name since it is not a dye but a lake, see: “The Color of Art Pigment Database, Natural Red - Color Index Name: NR,” last modified 2013, accessed March 23, 2016, <http://artiscreation.com/red.html#NR25>.

²¹ Red lake pigment made from cochineal dye precipitated on aluminum hydroxide. Supplier: *Kremer Pigmente*. Color Index: NR 4:1.75470.

²² We would have liked to use brazilwood lake as well, but this pigment could not be obtained since it is hardly made nowadays. See: Cardon, Dominique, *Natural Dyes, Sources, Tradition, Technology and Science* (London: Archetype, 2007), 275.

²³ *Sustainable Cabernet Sauvignon*, no sulphur added. Supplier: Gall & Gall, pH: 3.

²⁴ Robinson, Jancis, ed., *The Oxford Companion to Wine* (Oxford: Oxford University Press, 1994), 7.



how far the wine was in the process of becoming vinegar, it was decided to do the same procedure with red wine vinegar. In both cases, the lakes were ground well and the obtained liquids were at first strongly red colored liquids (fig. 3-4). However, it became clear that the lakes did not easily dissolve in both the wine and the vinegar.²⁵ The red color of the wine and vinegar made it difficult to assess whether the pigments went into solution, but when the liquids were left to stand for a while it could be seen that in all cases red particles sunk to the bottom (fig. 5-6). For the *lac-dye* mixed with vinegar it was noticed that the color of the liquid was



darker than the initial color of the vinegar. This suggested that some of the pigments did dissolve, that the red dye was dissociated from its substrate. A portion of *lac-dye* was therefore subsequently ground and tempered in the same manner but now with white wine (that had the same pH as the red wine), which would made it easier to judge the color change of the wine. The white wine indeed turned red, which presumably means that the same happed in red wine only it was less noticeable due to its color. Still, the pigments did not dissolve completely as red particles sunk to the bottom.

²⁵ Noa Kollaard, 29-02-16, "Experiment #1 Red lake pigments and the dissolving power of wine," in *Experiments Dissolving Power of Wine*, p. 2-6.

The fact that the pigments did not dissolve or only partially dissolved in (quite acidic²⁶) wine raised question marks concerning the nature of *laque*. Did the author-practitioner meant a red dye precipitated on a substrate that is hardly soluble or could it be that he meant something else by *laque*?

4. Re-evaluation of the nature of *laque*

The word *laque* occurs quite often in BnF Ms Fr. 640 and the meaning is not always straightforward. This is reflected in the English translation, where it is sometimes translated as ‘lake’, sometimes as ‘lacquer’ (as is the case in recipe in question) and sometimes it is not translated but transcribed. However, *laque* could also be translated as ‘lac’. According Daniel V. Thompson the term lac (in Italian *lacca*) is a source of terminological confusion. *Lacca* can refer to the red dye extracted from sticklac, a red-brown, resinous material. It can also refer to the lake pigment made from *lacca*. In addition, *lacca* could be used in the context of the wider term ‘lake’: a pigment made of any dye (not just lac dye) precipitated onto a substrate. The term ‘lake’ actually originally signified the color of lac dye but gradually took on the wider term that is used today.²⁷ Finally, as can be read in the glossary of *Trade in artists’ materials* by Kirby, Nash and Cannon the term *lacca* can also refer to the above mentioned sticklac.²⁸

This same confusion applies to the French term *laque*.²⁹ Thus, rather than any lake or lac lake specifically, *laque* could also mean the raw material from which lac lake is made, sticklac, or to the lac dye extracted from this. Going back to our recipe it is interesting to look at the author-practitioner’s remark on the blackening of *laque* when it is tempered with glue. This remark could suggest that the author-practitioner did not mean a red lake but a red dye or a material that contains a red dye (such as sticklac). The used glue would have been animal glue, which is composed of collagen containing material such as skin and bones that was soaked and diluted with water. If spring water was used for this purpose, it would have contained minerals. These minerals could act as a substrate onto which the dyestuff precipitates, forming a dark

²⁶ The pH of the used wines was 3. Generally, a pH below 3.3 can be called low for wine. See: Hornsey, Ian S., *The Chemistry and Biology of Winemaking* (Cambridge: The Royal Society of Chemistry, 2007), 171.

²⁷ Cennini, Cennino, *The Craftsman Handbook*, “*Il Libro dell’Arte*,” transl. Daniel V. Thompson (New York: Dover, 1960), 26. See also Clarke, Mark, *The Art of All Colours, Medieval Recipe Books for Painters and Illuminators* (London: Archetype, 2001), 30.

²⁸ Kirby, Nash and Cannon, “Glossary,” 451. See also: Kirby, Van Bommel and Verheeken, *Natural Colorants*, 70.

²⁹ This is reflected for example in a recipe in the manuscript compiled by Jehan le Begue. According to Merrifield’s translation, the term *laque* is both used as lake and as lac lake. See: Merrifield, *Original Treatise*, 294-295 [nr. 309]. See also the comment of Lorraine Delaverpilliere in the English translation of BnF Ms. Fr. 640 of the recipe ‘Greasy Colours’ on folio 65r.

colored material.³⁰ Since the mineral content of wine is lower than water, the blackening effect could indeed have been absent in wine.³¹

Sticklac is excreted by the *Kerris lacca* Kerr insects that live on trees in India.³² It is a complex mixture of various resin molecules and a small quantity of the red dyestuff.³³ The dye was used to colour fabrics, to make lac lake and for this purpose sticklac was exported from India to Europe from the thirteenth century until the eighteenth century.³⁴ Judging purely on the recipe it seemed possible that sticklac was used to make the ‘wine-glaze’. Because of its resinous nature, sticklac could be soluble in an alcoholic solution such as wine. Such a mixture might result in a translucent and more coherent layer in contrast to a mixture of wine with poorly soluble pigments. The combination of a red colored resin and an alcoholic liquid is also found in other recipes in BnF Ms. Fr. 640. On 40v for example the author-practitioner writes how to temper (he also uses the verb *destrempe*) dragon’s blood (a red resin produced by a variety of plants from the *Daemonorops* and *Dracaena* genuses³⁵) with *eau de vye* (distilled wine). However, in contrast to dragon’s blood it seems that sticklac was not commonly used in this way. According to Mary Merrifield the material was primarily used for the dye (to make lac lake) that was extracted from it. The remaining resin appears to have been considered useless in the sixteenth century.³⁶ In the manuscripts consulted for this annotation the recipes concerning ‘lac’ indeed explain how to make the lac lake pigment or when to paint with the pigment. No recipes have been found in which the sticklac was directly used for painting or dyeing. Still, before drawing conclusions from this it might be better to first test the above mentioned presumption, that sticklac could dissolve in wine.

Another experiment was therefore set up. Sticklac was not ready available. As an

³⁰ The fact that the color of the substrate with which the dye is precipitated determines the color of the dye-substrate complex is explained in: Kirby, Jo, Marika Spring and Catherine Higgitt “The Technology of Red Lake Pigment Manufacture: Study of the Dyestuff Substrate,” *National Gallery Technical Bulletin* 26 (2005), 71-87.

³¹ This hypothesis came from Art Ness Proaño Gaibor, specialist at the RCE who was kind enough to help me with questions about dyes and the precipitation of dyes onto different substrates. The conversation took place on March the 3rd, 2016.

³² Cardon, *Natural Dyes*, 656.

³³ For the chemical composition see: Mills, John S., Raymond White, *The Organic Chemistry of Museum Objects*, 2nd edition (London: Routledge, 1994), 115-117.

³⁴ Cardon, *Natural Dyes*, 661-666. Merrifield, *Original treatise*, cclx. Kirby, Spring and Higgitt, “Technology of Red Lake Pigment Manufacture,” 72.

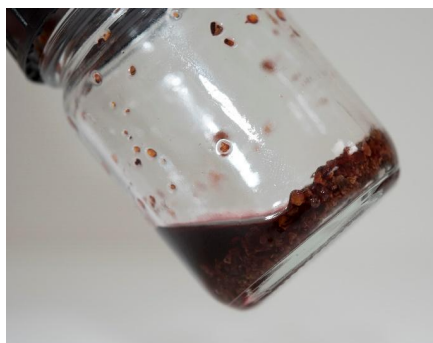
³⁵ Easthaugh, Nicholas et al., *Pigment Compendium, A Dictionary and Optical Microscopy of Historical Pigments* (Oxford: Butterworth-Heinemann, 2008), 148.

³⁶ Merrifield, *Original Treatise*, cclx. In a purified form seedlac came to known as shellac. From the seventeenth century onwards shellac gradually came into use for varnish making. Kirby, Nash and Cannon, “Glossary,” 451.

alternative, seedlac was used (fig. 7). Seedlac is sticklac from which the lac dye is washed out.³⁷ Since the resinous material is still present in seedlac, it can be useful for determining whether it is soluble in wine. Thus it was decided to perform the experiment with seedlac and it turned out that it was not soluble in wine. Even after grinding the material to a fine powder, the particles did not dissolve but sunk to the bottom. The result was not a coherent, translucent liquid (fig. 8-9).³⁸ For comparison the same experiment was performed with pure ethanol.



This was a different story: the seedlac slowly but surely dissolved (it is presumably no coincidence that the above mentioned recipe concerning dragon's blood prescribes *eau de vie*, which would have been higher in alcoholic content than wine). However, dark colored impurities that were present in the seedlac did not dissolve. The result was a viscous, orange-yellow liquid with dark particles floating in it (fig. 10-11).



³⁷ Washing out the dye was done by placing the sticklac in water or a slightly alkaline solution. See: Thornton, Jonathan, "The Use of Dyes and Colored Varnishes in Wood Polychromy," in *Painted wood: history and conservation. Proceedings from symposium organized by the Wooden Artifacts Group of the American Institute for Conservation of Historic and Artistic Works, November 1994*, ed. Valerie Dorge and F. Carey Howlett (Los Angeles: The Getty Conservation Institute, 1998), 238. Mills and White, *Organic Chemistry*, 144. Kirby, Spring and Higgitt, "Technology of Red Lake Pigment Manufacture," 75.

³⁸ Noa Kollaard, 11-03-16, "Experiment #4 Seedlac and the dissolving power of wine," in *Experiments Dissolving Power of Wine*, p. 11-14.

5. Conclusion and further research

In this annotation an attempt has been made to determine the role of wine in the making of paint in BnF Ms. Fr. 640 and in particular in the recipe *Vernis pour destrempe* on folio 56r. During this search it became clear that in order to understand the role of wine it is important to know the nature of *laque*. This turned out not to be as straightforward as initially thought. It is a confusing term since it can refer to different materials: lake, lac lake, lac dye and sticklac. This exposes a key feature in making reconstructions of historical recipes: the historical terminology can be different from the current terminology and can be interpreted in different ways. By attempting to reconstruct a recipe you are confronted with this and at the same time making a reconstruction is maybe the only way to get clarification on the terminology.

No final answer has been found yet to the question of the nature of *laque* and the role of wine in the recipe in question. However, on the basis of the performed reconstruction and experiments and a critical reading of the recipe the following can be said about the second layer of the tempera marble:

- The author-practitioner uses the term *glacer* for this layer and this suggest that the layer was translucent.
- If *laque* refers to lake pigments and if these were used without grinding the ratio pigment to wine had to be kept low in order to obtain a translucent layer (since the refractive index of wine and the pigment particles is not the same).
- Recipes have been found in other manuscripts in which wine was used to create a colored, translucent liquid by dissolving pigments (mainly verdigris). Therefore, it seems likely that the wine in the recipe in BnF Ms Fr. 640 functioned to dissolve the *laque* (the difference in refractive indices does not play a role anymore in this case).
- If *laque* refers to a lake it can be said that the pigments had to be ground quite thoroughly and that the wine had to be quite acidic. Experiments pointed out that lac lake partially dissolved in wine in this way.
- However, if the wine indeed had a dissolving function it could be argued that it is not likely that *laque* refers to lac lake. After all, it did not dissolve fully in wine. From a terminological point of view *laque* could also refer to sticklac. Although drawing conclusions from the experiments with seedlac might be premature since it was not sticklac itself that was tested, the results suggest that it was not sticklac that was used for the ‘wine-glaze’. It can be said that at least a part of the sticklac (that part that is present in seedlac) is not soluble in wine. Furthermore, the material contains dark impurities that are not dissolvable in either wine or ethanol and one might question whether this was desired for a red ‘wine-glaze’ for the marble.

The experiments discussed in this annotation should be considered as first steps to a more elaborate research into the role of wine to make a colored liquid or a paint in BnF Ms. Fr. 640

and in particular in this recipe. It would be interesting to reconstruct the tempera marble again with the red liquid obtained by grinding lac lake in wine to test how strong the coloring power is of this liquid and to observe the interaction between the layers below and above. What might be interesting as well is to test both red wine and in white wine to observe the difference in color. Furthermore, since *laque* can also be translated as lac dye it is suggested to continue the research in the direction of this material in relation to wine. Especially because the use of a dye could give a possible explanation why the author-practitioner mentions that glue should not be used (the present minerals in glue could cause a precipitation of the dye to a dark material). Finally, what has become clear is that no truly comparable recipe has yet been found in the manuscripts consulted for this annotation. It would be interesting to search in more (art) technological sources for recipes in which wine is used to temper *laque*.

6. Literature

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