
17TH AND 18TH CENTURY DISTEMPER DECORATIVE PAINT IN WOODEN CHURCHES IN NORWAY PAINTING TECHNIQUE, MATERIALS AND ALTERATION

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Abstract

This paper introduces 17th and 18th century distemper decorative paintings in Norwegian churches, and it discusses the painting technique and the painting materials used. Distemper decorative paintings from these periods are found in many countries, but seem to be less valued than oil based decorative paintings. The object of this paper is to raise awareness of the importance of these paintings and the fact that what we are looking at today differs from what the artist originally painted. The distemper paintings in Old Stordal church illustrate the importance of understanding altered paintings. A disappeared blue colour was detected in some of the decorative components in the wall paintings. This is believed to originally have been a green colour which would totally change the appearance of the paintings in Old Stordal church.

Keywords: distemper paint, wooden churches, pigments, colour alteration

1. Introduction

Distemper decorative paintings from the 17th and 18th century are preserved in the interiors of 69 wooden churches in Norway [1-2]. 17 of these paintings are found in the stave churches, where also additional distemper paintings dating back to the 13th century are in their original place in seven of the stave churches. This paper will deal with distemper decorative paintings in church interiors dating from the 17th and 18th century, and in particular Old Stordal Church, the 'Rose Church'. The paintings are in general vivid, often rich in colour and usually cover all surfaces in the interior of the church. They may be figurative, but are typically decorative with tendrils, plants and fruit based ornaments. In certain cases landscape and buildings are portrayed, both in the 17th and 18th century paintings, but in general the tendrils dominate the impression of the paintings on the upper part of the wall or in the ceiling. On the lower part of the wall the medieval custom of covering walls with hung

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materials and draperies, continued into painted draperies which are found in almost all the painted interiors [3]. These paintings are often regarded as a kind of ecclesiastical folk art. In the 17th and 18th century oil paint was well established as a painting technique, and oil might have been chosen as the binding media. There are several possible reasons for the use of distemper paint in wall paintings; glue as a binding media is cheaper, easier available and dries faster than oil.

Decorative distemper paintings in interiors are described by art historians in Norway in the beginning of the 20th century, but seem to be a forgotten topic by more recent art historians [4-7]. An exception is the art historians who, in the period mid-1950 till mid-2000, did research for *Norges Kirker*, a publication which provides a systematic and comprehensive description of Norwegian churches [*Norges Kirker* (Norwegian Churches), <http://www.norgeskirker.no/wiki/Hovedside>, accessed 24.09.2016]. Since the beginning of the 20th century, it seems the conservators in Norway have been more concerned with these paintings than the art historians. This is possibly due to the challenges connected with the conservation of these distemper paintings.

A limited amount of organised research has been carried out on the paintings which can give information on the painting techniques employed [8, 9]. Conservators at The Norwegian Institute for Cultural Heritage Research (NIKU) have since the 1990s collected information on distemper painting techniques as part of the conservation work done on such paintings in churches. What we know is based on literature, analyses of pigment and binding media, and the informed conservator's visual examination of the paintings [10-12]. Distemper decorative paintings are important parts of the cultural heritage in Norway. Examinations of some of the paintings demonstrate that the once so colourful paintings are today only a faded version with a limited number of colours preserved. This paper aims to raise the awareness of the importance these paintings, to discuss how they were made, and to start the discussion on what they originally looked like - are we able to understand what the artist painted?

2. The painting technique and materials used in distemper decorations

2.1. What is distemper decorative painting?

Distemper paint in this paper is defined as water-soluble paint with a matt and dry appearance, made from pigment and a glue-based binder. Analyses [13] have shown that additions like oil, egg or casein to the glue have been used to modify the binding media and possibly add to the durability of the paint. (To analyse natural protein based binding media seems to be a challenge. Several conservation scientists have done analyses for NIKU, and to get an undisputable result seems to be difficult. The additives, except for the oil, are not confirmed with several analyses.) The additives have probably depended on availability and cost. Analyses detected casein and glue used for the isolation layer [13].

The ratio of binding media to pigment had to be correct to avoid dripping and to avoid a too transparent paint. The strength of the glue had to be adjusted to the use. If the mix of glue is too concentrated the paint would cause problems in the long run - as we also have seen in the paintings. The ratio of binding media to pigment has also varied with the various colours applied. The contemporary manuals describe how to paint with distemper and advice to use warm paint [14], but only in a few cases are air bubbles, which might have been caused by warm paint, observed in the paint layer. Air bubbles in the ground are observed in a paint sample from 17th century distemper painting in Heddal stave church [15].

The first paint layer, or under paint, which frequently also is the background colour, is usually white. A layer of glue on the surface prior to the white underpaint is recommended in a Danish manual for painters from 1794 [16]. The motives are roughly drawn on the ground with a drawing material similar to graphite or with a reddish coloured chalk. One often sees that the painted ornaments deviate from the under drawing. In some cases the underdrawing seems to be just for making sure that the motives fits within the area of the wall or ceiling. Compasses were used and incised lines are found, also recommended in the Danish manual from 1794 [16].

The colours of the ornaments are painted on a dry ground - usually a white paint; first the distinct local colours of the elements, then shadowing and other form-describing colours. The artist finished by adding the contours and lines that describes the final motives and the details in the painting. The artist seems to have used the paint that was on the brush wherever that colour was required within a particular area. For example, as long as the artist has red paint in his brush everything which is supposed to be red within reach was painted red. The details in the depiction of figures are sometimes painted wet-on-wet and other times they nearly approach the techniques of oil painting. This way of applying the paint indicates that the artist was familiar with the motif and the individual elements, that he worked quickly and effectively, and that he knew how to apply colours and contours to achieve the desired effect. There is no way to cover mistakes, so it takes an experienced artist to paint on walls with this kind of paint.

2.2. Why distemper paint?

In the 17th and 18th century oil paint was well established as a technique, and oil might have been chosen as the binding media. In the 1600s and 1700s linseed oil was the preferred oil for making paint. Linseed oil was a product that could only be bought in the larger cities. This meant that the oil had to be brought or delivered to the site. The painter had to be sure there was enough oil for the job, so ordering and delivery times would not delay the process. However, the expanse of a painted surface was probably crucial for the selection of distemper.

In addition, glue was cheaper than oil and easier available, since it could be made in situ. When Jostedal church's interior was painted between 1714 and 1716, glue for the binding media was made from 24 calfskins [http://www.norgeskirker.no/wiki/Jostedal_kyrkje, accessed 24.02.2016]. For the paint, chalk was the main white pigment, while lead white had to be used with oil to make a white paint. Lead white was more expensive than chalk, so if oil was used the pigment would add to the expenses. Another advantage of using glue was that the paint dried fast and the painter could work more or less continuously. Distemper paint can usually be painted over after a few hours in dry weather, or the day after. Alternatively, distemper could have been chosen because the painter and the employer preferred the distemper paint's surface and appearance. It is likely however that practicalities like availability, cost and drying properties of the paint have been more decisive for the choice of glue than the paintings' appearance. There have not been found any sources that state the reason for the painter's choice of binder. However, one written source mentions that the painter should use distemper paint when painting the interior of a church [Church accounts, Fåvang Church, Gudbrandsdalen, Norway, Hamar State Archives, Hamar, early 18th century].

2.3. Pigments and dyes in distemper paint

To be able to understand the colouring material originally used in a faded and altered painting, one needs to know the painting materials that were contemporarily available. In addition to the knowledge gained from the paintings and general dictionaries on pigments and dyes, there are a number of contemporary painter's manuals which describe the materials, including the pigments and dyes, and explanation of their use.

A main source of information regarding pigments and binding media available for the 17th century painters in Norway is Valentinus Bolten aff Rusachs collection of recipes from 1684 [17]. The accounts from King Christian IV's 'Colour Chamber' for the periods 1610-1611 and 1613-1625 are another important source of information [18]. The 'Colour Chamber' was a royal store from which pigments, as well as other materials and equipment, were dispensed for use in royal properties. The pigments listed in the accounts corresponds with the pigments in Rusachs manual and most of them are found in the distemper church paintings: chalk, lead white, orpiment, yellow ochre (iron oxide), red ochre (iron oxide), red lead, cinnabar, indigo, smalt, charcoal black and bone black [13-17]. Varieties of yellow, brown, red, blue and green has been used in most of the paintings, as well as black and white. The variations of colours observed are probably based on a small selection of pigments and dyes.

The colouring matter in distemper paint may be organic or inorganic. Most inorganic pigments are durable; they fade or change insignificantly, while organic dyes change and fade [19]. Organic water-soluble dyes are extracted from plants or insects. By precipitation of the dye on a base like chalk or an aluminium sulphate, the water-soluble dyes turn into a colouring matter

insoluble in water that could be refined and used as pigment in paint. The organic dye indigo is non-water-soluble, and could be used directly as a pigment in paint [20]. Faded organic dyes are not easy to detect in analyses, but by visual examination other organic pigments has been observed.

3. The misinterpretation of paintings due to faded colours

The distemper paintings in the churches have in general been more colourful than what they are today. This means that one need to be sceptical if the number of colours in decorative distemper paint appears to be limited (Figure 1).

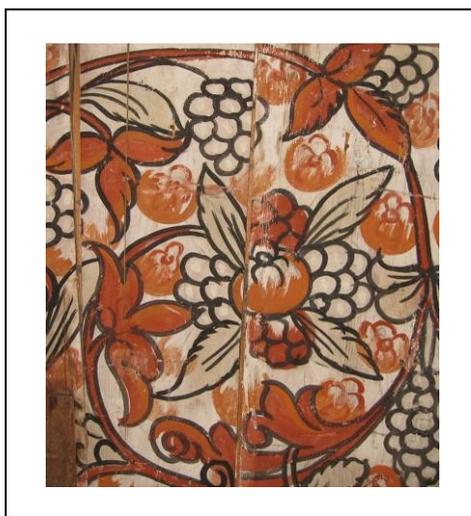


Figure 1. Detail of the distemper painting in Urnes stave church. The painting is dated 1601. Red colours dominate the painting today, but a trained eye observes green, pale violet and yellow. No analyses are done, but the faded colours are most probably dyes.

Photo: Birger Lindstad©.

In our experience, the intention of the distemper painter decorating the church interiors in the 17th and 18th century would seldom be to limit the variety of colours. It is easy to be deceived: The art historian Agnethe Mohn describes in the 1930s the wall paintings from 1601 in Urnes stave church thusly: “[...] the painting appears surprisingly sharp and clear. Perhaps because the light has not been able to fade the original colours much, [...] both the drawing and the colours emerge strongly from the white chalk ground. The black contours are the most essential part of the decoration, but the renaissance’s typical colours burnt sienna? Reddish brown and yellow are used [...]” [21] Painting conservators observed faded greens, yellows and purple colour areas in the wall decoration, in addition to the colours mentioned by the art historian. The faded areas are in all probability painted with organic colorants. The yellow pigment orpiment was observed in the distemper paintings in the same church [22], in areas that today

appear greyish white. Other art historians mention alterations of colours. The art historian Sigrid Christie observed that leafs in the 1680s decorative paintings in Uvdal stave church had faded and so altered the overall impression of the painting [23].

Parts of the blue areas in the tendrils in the 18th century paintings in Old Stordal church are in 1940 described as somewhat greener. This statement prompted the idea of alterations of the colours in Old Stordal church which today are dominated by blue and yellow colours [4, p. 138].

3.1. Old Stordal church - the disappearance of a green colour?

The wooden, octagonal Old Stordal church was built in 1789 to replace an earlier stave church on the site. It is one of the most decorated churches in Norway and is known as the 'Rose Church'. The interior walls and ceilings are covered with decorative distemper paint from 1799: painted vines, coiling foliage, roses and depictions of Bible stories. The artists' of the paintings are known [4, p. 138], but the two other church interiors they have decorated are now lost. This means that it is not possible to compare the painting technique in Old Stordal Church to their work elsewhere (Figures 2 and 3).

The distemper paintings in Old Stordal Church underwent conservation treatment executed by conservators from NIKU in 2013 and 2014 [12-24]. Research on the painting technique or analyses of the painting materials was not a part of the conservation project, but some research was added in mutual agreement with the church owner. The painting technique is traditional, except for the fact that under drawings are found only under the figurative motives. What makes the interior paintings really different from other paintings from the same period is the domination of blue and yellow colours in the decorative paintings. Additional colours to the blue and yellow are various reds, brown, grey and black. Based on visual examination by conservators during conservation work, it was found that few and inexpensive pigments were used for the painting; chalk, some lead white, yellow ochre, red ochre and black [12, p. 16].

The distemper paintings in the nave are dominated by blue. Two different blue colours were observed in the paintings in the nave: a well preserved blue colour on the lower part of the wall and a very faded, almost gone, blue higher up. The paintings on the wall in the chancel, however, seemed to lack the blue colour and the dominating colour in the decorative frieze in the upper half of the walls are yellow (Figure 4). Elements which were expected to be coloured, like the coiling foliage, appear white.

However, during the conservation work with the wall paintings in the chancel, remains of a blue colour were found in areas protected from light, for example between the logs (Figures 5-7). Because of the degree of deterioration, this blue is assumed to be a dye. As seen in the Table 1 a few blue dyes were in use in this period. As indigo was the most widely used blue for distemper paint

in the 17th and 18th century in Norway, the faded blue is probably an indigo. All the selected written sources in Table 1 propose the use of indigo.

The faded blue on the upper part of the wall in the nave is thought to be the same colour. Table 1 lists the blue pigments or dyes proposed by the contemporary sources mentioned earlier.

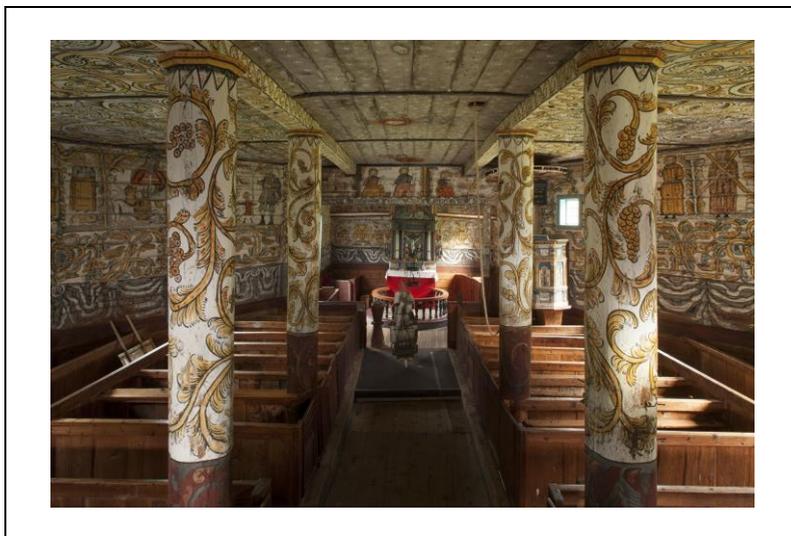


Figure 2. Old Stordal church, Norway. The interior seen towards the chancel. The distemper painting is dated 1799. Foto: Birger Lindstad©.

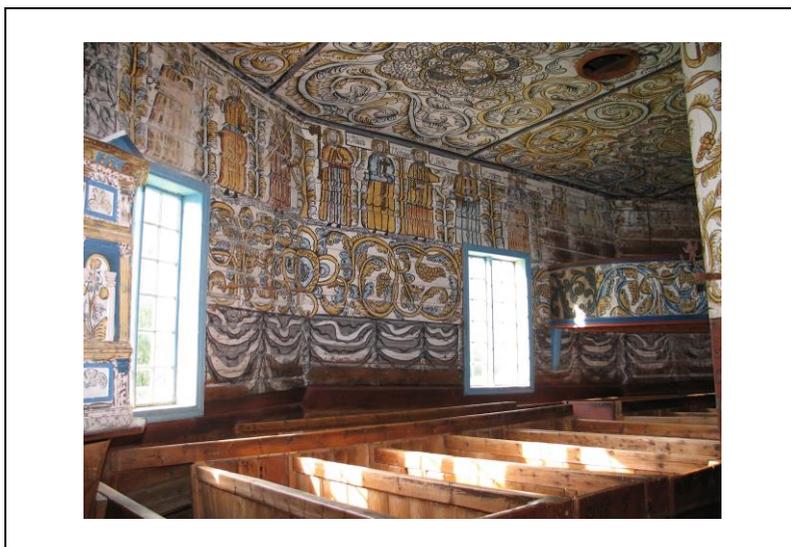


Figure 3. Old Stordal church, Norway. The south wall in the nave. Decorative elements in the upper frieze which seems to be white, have remnants of a blue colour, for example the stems and leaves of the threes dividing the figures. The blue colour in the central frieze is analysed to be Prussian blue. Foto: Birger Lindstad©.



Figure 4. Old Stordal church, Norway. The east wall in the chancel. Foto: Birger Lindstad©.



Figure 5. Old Stordal church, Norway. Detail from the south wall in the chancel. The yellow post-it note shows where the blue colour was observed and where the sample was taken. Photo: Tone Olstad©.



Figure 6. Old Stordal church, Norway. Old Stordal Church, Norway. Detail from the south wall in the chancel showing the traces of the blue colour. Photo: Tone Olstad©.



Figure 7. Old Stordal church, Norway. Detail form the chancel. The blue colour has been painted almost like a glaze and in the collected drip the colour is still blue. Photo: Tone Olstad©.

Table 1. The table shows blue pigments and dyes found in the three selected painters manuals and supplies from the Kings storage.

Painter's manuals/Information sources for pigments and dyes [14, 16-18]			
Painter's manual, 1648	Painter's manual, 1760	Painter's manual, 1794	Accounts, King Christian IV's Colour Chamber, 1610-1625
Blue colour agents listed in the sources above			
<ul style="list-style-type: none"> ◆ Indigo ◆ Smalt ◆ Litmus ◆ Ultramarine ◆ Blue from berries (blueberry, berries of <i>Vaccinium myrtillus</i> L., Ericaceae and elderberry (<i>Sambucus</i> 	<ul style="list-style-type: none"> ◆ Indigo ◆ Smalt ◆ Berlin blue ◆ Litmus 	<ul style="list-style-type: none"> ◆ Indigo ◆ Smalt ◆ Berlin blue ◆ Ultramarine ◆ Azurite 	<ul style="list-style-type: none"> ◆ Indigo ◆ Smalt ◆ Azurite ◆ Ash blue ◆ Litmus ◆ Mountain blue

The discovery of the blue colour in the chancel instigated new questions. Could the blue colour in the nave, and now also in the chancel, originally have been a green colour? Could the found blue in the tendrils in the chancel originally been mixed with a yellow pigment or dye to make green? The today white ornaments and tendrils in the chancel may once have had a green colour as seen where the blue colour have survived. However, green in distemper paint has only been found as a blended colour in this period.

In the 17th and 18th century only a few green pigments were available, such as copper-based pigments and *terre verte*. These green pigments were too transparent or unstable to be used in distemper paintings; thus green was typically made by mixing blue and yellow pigments or dyes [25]. As seen in Table 2 several pigments and dyes were used to make a blended green. In addition, it might have been more practical with one less pigment in the artists' travel box.

Table 2. The table shows yellow pigments and dyes found in the three selected painters manuals and supplied from the Kings Storage, and proposals for making a green colour.

Painter's manuals/Information sources for pigments and dyes [14, 16-18]			
Painter's manual, 1648	Painter's manual, 1760	Painter's manual, 1794	Accounts, King Christian IV's Colour Chamber, 1610-1625
Yellow colour agents listed in the sources above			
<ul style="list-style-type: none"> ◆ Orpiment ◆ French berries (Rhamnus infectorius) ◆ Lead yellow ◆ Saffron Yellow ◆ Safflower Yellow 	<ul style="list-style-type: none"> ◆ Orpiment ◆ French berries (Rhamnus infectorius) ◆ Light ochre 	<ul style="list-style-type: none"> ◆ Orpiment ◆ Berry yellow (Rhamnus infectorius) ◆ Lead Yellow ◆ Yellow ochre ◆ Dark ochre ◆ Naples Yellow (of lead and antimony) ◆ Turmeric 	<ul style="list-style-type: none"> ◆ Orpiment ◆ French Berries ◆ Lead yellow ◆ Ochre ◆ Saffron Yellow
Blue and yellow to make green			
<ul style="list-style-type: none"> ◆ Orpiment with ultramarine ◆ Orpiment with indigo ◆ Pea yellow with blue from berries ◆ Lead tin yellow with indigo ◆ Orpiment with chalk and indigo 	<ul style="list-style-type: none"> ◆ Indigo and yellow of choice 	<ul style="list-style-type: none"> ◆ Azurite with French berries ◆ Water green (blue ash, lead white and French berries) ◆ Blended green for rooms (lead white, French berries and Berlin blue) ◆ Olive colour (Berry yellow, 	

Since there are no remains of a yellow colorant to blend with the degraded blue to make green in the now white tendrils, it must have been an organic yellow which was even more unstable than the blue. This yellow could have been one of those listed in the sources in Table 2.

Table 2 also lists the manuals proposals for making green. Indigo is proposed as a blue colour by all the selected sources, but the 1648- and 1760-manuals proposes indigo as the blue for making green. The 1648-manual mentions blending orpiment with indigo to make a blue paint. Orpiment is easily observed by visual examination. During the conservation work in Old Stordal church no orpiment was observed.



Figure 8. Old Stordal church, Norway. Detail from the paintings in the chancel. The yellow and reds are preserved - other colours are faded. Traces of a blue are seen where the paint has been more protected from light. Photo: Tone Olstad©.



Figure 9. Old Stordal church, Norway. The same detail as in Figure 8 with a blue colour digitally filled in. The blue colour is an interpretation of the found colour done by the conservators. Photo: Tone Olstad©.

As mentioned earlier, limited research has been executed on 17th and 18th Norwegian distemper decorations. Only three green colours in 17th century distemper paintings in other churches than Old Stordal church have been analysed. In one of the green colours, the blue component was indigo; the two other blue colours found were also dyes, but remain unidentified [13]. No green pigment was detected. Only two paint samples were taken from the distemper decorations in Old Stordal church; one from a blue colour on the lower part of the wall in the nave, and one from a faded blue colour in the chancel. The sample taken from the nave is confirmed by analysis to be Prussian blue [H. Kutzke, Personal communication, University of Oslo, Oslo, 2015]. Analysis of the faded blue from the chancel did not detect elements that could indicate an inorganic blue. The blue is thus assumed to be a dye, probably indigo.

More research is needed to establish if green was the original colour of the blue areas in the nave as well as the white tendrils in the chancel of Old Stordal church (Figure 8). If this was indeed the case, the total original impression of the church interior was probably quite different from the present day appearance. Based on the visual examinations and analysis, a digital representation has been made to give an impression of how the decorations might have appeared in their original state (Figures 9 and 10).



Figure 10. Old Stordal church, Norway. The same detail as in Figure 8 with a green colour digitally filled in. The green colour is an interpretation done by the conservators. The residues of blue might have been a green colour made from a fugitive yellow and an unstable blue. Photo: Tone Olstad©.

4. Conclusion

The appearance of polychrome decorative paint often changed due to the alteration of certain painting materials. The colours of the past are communicated as we see them today, not as they were intended originally.

Decorative distemper paints from the 17th and 18th century is preserved in the interiors in Norwegian wooden churches and is an important part of the cultural heritage in Norway. Examinations of some of these paintings demonstrate that the once so colourful paintings are today only a faded version with a limited number of colours preserved.

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