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As part of a German research project into reverse paintings on glass from the Middle Ages in the collection of the Museo Civico d'Arte Antica, a survey was executed in June 2007 by an interdisciplinary team of art historians, chemists and conservators¹. Special interest focuses on paintings from Flanders, Burgundy and at the Lower Rhine region and on the time period from 1330 to 1550.

The project entitled "Reverse painted glass in Flanders, Burgundy and at the Lower Rhine of 1330 to 1550. Origins of cold painting on glass and the influence of stained glass and panel painting", was funded by the German Research Foundation from 2006-2008. The study was undertaken by the BAM Federal Institute of Materials Research and Testing in Berlin and the Museum Schnütgen in Cologne. In addition to those in the Museo Civico, paintings in other museums were viewed for comparison. Museums visited were for example the Bayerisches Nationalmuseum in Munich, Museum Schnütgen in Cologne and the Staatliches Museum in Schwerin; the Vitromusée in Romont in Switzerland, the Rijksmuseum in Amsterdam and Museum Catharijne Convent in Utrecht, Netherlands, and Les Musées royaux d'Art et d'Histoire, Brussels in Belgium. A comprehensive examination of medieval reverse glass paintings has never been conducted before. For

the research project a computerized database was developed by the members of the interdisciplinary survey enabling both written and photographic documentation based on the following criteria: the art-historical investigation; the scientific determination of materials; and descriptions of paint and glass technologies.

Reverse paintings on glass examined at the Museo Civico d'Arte Antica

Maria lactans, French (?), about 1430, Inv. No. 253/VD

Madonna with child, German, 1533, Inv. No. 264/VD

Crucifixion, Spanish (?), about 1430 - 40, Inv. No. 254/VD

St. Giovanni Battista, *St. Antonio Abate*, Burgundy (?), about 1450, Inv. No. 255/VD

Birth of Jesus Christ, Flemish, 3rd part of 15th C., Inv. No. 256/VD

Madonna with child, Flemish, 2nd half of 15th C. Inv. No. 257/VD

Death of St. Mary, German, about 1470, Inv. No. 258/VD

Birth of Jesus Christ, German, 2nd half of 15th C., Inv. No. 259/VD

Adoration, German, 2nd half of 15th C., Inv. No. 260/VD

Wedding of St. Catherine, German (?), 2nd half of 15th C., Inv. No. 261/VD

St. Paul with founder, French (?), early 16th C., Inv. No. 262/VD

Adoration, German, about 1540-50, Inv. No. 265/VD

Madonna with child, Flanders, 1591, Inv. No. 269/VD

Adam and Eve, German, 1622, Inv. No. 276/VD

The European tradition of reverse painted glass objects has a long history. The art of applying colours to the reverse side of a piece of glass originated in Antiquity. The earliest works date from the Minoan and Late Hellenistic periods as late as the 4th century AD. In the 13th century, this technique is found in Italy². Paintings of this kind from Germany, Flanders and Burgundy were highly valued in the Middle Ages and commissioned by the church, ruling houses and the high nobility. Over more than two hundred centuries from 1330 to 1550 reverse paintings evolved from decoration applied mainly to devotional objects to a more or less independent artistic expression.

The technique of reverse painting on glass was demanding for an artist, as the work had to be visualized in its entirety before the work began. The painter started by applying the highlights and the final detail of the image, progressing by moving backward in layers of paint, creating the larger areas of the design and ending with the background. The technique used for reverse painted glass in the countries north of the Alps is close to that used to create stained glass. Glass is the substrate in both cases: in reverse paintings the glass is decorated with pigments in an organic binding media (so-called cold painting), while stained

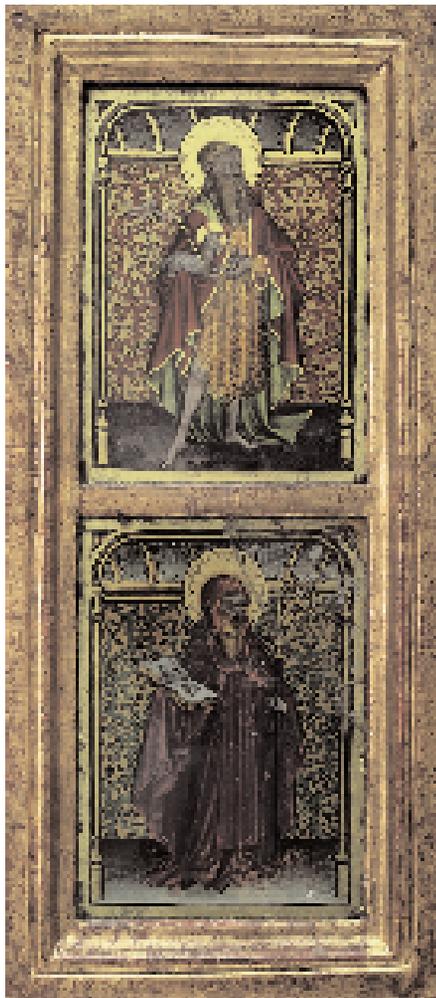


1. Team of German researcher examining reverse paintings on glass at the Museo Civico.

glass is decorated with vitreous enamels that are fired onto the glass. The crucial difference is revealed as the result of the role of light: reverse paintings on glass are viewed by light falling *onto* the glass and being reflected back. The reflections on the uneven surface of the glass helped to create a sense of mystery. Stained glass, by contrast, has its particular effect by virtue of its transparency and light falling *through* it (transmitted light)³. The glass panels, were cut from sheets of produced as cylinder glass (thickness of 0,20 - 0,25 cm), crown glass (0,15 - 0,20 cm) and moulded glass (0,25 - 0,30 cm). These techniques produced glass of uneven thickness resulting in it having an

uneven surface. The measurements of the glass panels vary and are mainly ca. 15 x 25 cm or 25 x 30 cm. For a typical German glass painting dated about 1330 the panel measures cm 32 x 27⁴. An altar with 15 glass panels dating from 1535 includes a panel of glass measuring 42 x 30 cm⁵. Glass panes of this size were unusual at this time. Glass was costly to produce and demonstrates the high value placed on the medieval glass paintings. As single works of art, diptychs or triptychs they were usually framed in wood, but occasionally lead frames were used. The glass panel was primarily selected because of its optical effect: direct contact with the glass

makes the colours of the painting shine intensely and creates depth. The binding medium for the pigments was oil as used in panel painting and easel painting. It was applied to the smooth and non-porous glass surface. Unlike adsorbent media like wood or canvas, glass requires paint with a strong bond for a long lasting adhesion to it. Gas chromatography/ mass spectrometry for the analysis of the binding media was performed by the Doerner Institut in Munich. The results showed that different colours and shades of linseed oil based paint had been applied by the glass painter⁶. The pigments could be identified by using scientific, non-destructive methods such as



2. *St. Giovanni Battista, St. Antonio Abate*, Burgundy (?), about 1450, inv. 255/VD.

VIS - reflectance spectroscopy and X-ray fluorescence analysis. The spectrum of the colours contains mineral pigments like ochre, azurite, copper green pigment as well as synthetic pigments like cinnabar, red lead, lead tin yellow and organic dyes (carmine), customarily used in panel paintings.

A technology so called *verre églomisé* is a specific artistic expression used for creating reverse paintings on glass. Instead of opaque paint, translucent lustres in the form of coloured resinous lacquer used in combination with shiny metal foils resulted in superb reflections, sparkle and luminosity. The lustres were painted directly onto the glass panel and then gold, silver, tin or Zwischgold foil was applied



3. *St. Giovanni Battista, St. Antonio Abate*, detail, Burgundy (?), about 1450, inv. 255/VD.



4. *Birth of Jesus Christ*, Flemish, 3rd part of 15th C, inv. 256/VD.

whilst the lacquer was still tacky. Yellow lacquer combined with silver foil imitated expensive gold leaf; and is referred to as 'gold lacquer'. The most interesting part of this research into the reverse paintings at the Museo Civico was the investigation of black contours on the glass as a very first layer before the oil paint was applied. The contours were either drawn with a pointed brush onto the glass or a thin black layer of paint was partially reduced by cross-hatching with the quill of a feather or a needle. The analysis by

micro-XRF revealed the presence of iron (Fe), copper (Cu), and lead (Pb) in the black paint, showing that the black lines and shadings were carried out using the ingredients of black enamel rather than with a carbon based pigment. Black enamel consists primarily of colouring iron oxides and a flux of lead glass. The microscopic analysis of the black outlines produced another crucial result: the damage indicates that the objects under investigation were cold painted. Usually the black enamel is fired: the lead flux melts slightly at the low temperature, so that the liquefied paint is adhered indissolubly to the glass. But here the ageing phenomena make it clear that the black layer of paint has flaked off from the surface of the glass without leaving remnants, i.e. it had not been fired. After the surprising result of the "cold-painted" black enamel on all the late medieval reverse paintings investigated, the question arose as to why a painting medium from the genre of stained glass came to be found in the palette of reverse painting on glass, which usually takes recourse solely to pigments of panel paintings. The reason is the quick drying process of black enamel paint bound in gum, compared to the longer drying time of carbon pigment bound in oil. The use of black enamel allowed the coloured paints to be applied immediately after so that the work of art progressed quickly. To conclude: the majority of materials used for creating reverse glass paintings, oil paint or gold and silver leaf, derive from the panel painting tradition; whilst the use of black enamel derives from that of stained glass manufacture. Thus, we have here an art genre that has combines materials and techniques from two traditions, one artistic and the other art and craft based. Nonetheless, reverse painting on glass can be regarded as an independent art genre due to the chal-

lenging nature of the technique (painting in reverse).

The examination and comparison of 60 reverse painted glass objects (14 glass panels from the Museo Civico) did not result in the possibility of attributing them to specific artists or workshops. Medieval reverse painted glass objects were typically not signed and could only be distinguished by stylistic elements and by the help of contemporary prints, drawings, panel paintings and stained glass windows. The majority were produced in the Netherlands and in

Germany with the preferred subject being Mary with the Christ child.

The physical damage to the reverse paintings on glass of the Museo Civico that were examined was dramatically revealed through microscopic investigation. The most typical disfigurement is the separation of paint from the glass, which when seen from the front appears as patches of greyish, less saturated areas of paint. This is the result of various factors such as normal ageing mechanisms under the influence of changing climate conditions

caused brittleness and flaking of the paint resulting in glass-like paint fragments. An estimated 60-70% of the paint surface is no longer securely attached to the glass substrate of some of the panels examined. Broken glass panels and the loss of glass seriously detract from the aesthetic enjoyment of the paintings and leave the paintwork open to further damage. Conservation treatment is urgently required in order to prevent further loss and to preserve these precious works of art for our future generations.

NOTE

¹ *Simone Bretz* in Oberau near Garmisch-Partenkirchen is a specialist in the conservation and restoration of reverse-glass painting with a focus on paint and glass technology. <www.bretz-hinterglas.com>

Carola Hagnau, Ph.D is an art historian, curator for stained glass (up to 1400), reverse glass paintings, easel paintings (14th – 15th century) at the Museum Schnütgen in Cologne.

Oliver Hahn, Ph.D at the Federal Institute of Materials Research and Testing (BAM) in Berlin is an analytical chemist with additional training in history of arts.

Hans-Jörg Ranz in Munich is one of the co-founders of an interdisciplinary group of restorers *Münchner Werkstätten für Restaurierung* and works as a conservator for decorative art objects and reverse-glass paintings. <www.mwfr.de>

² Keiser 1937, Pettenati 1978, Ryser 1991.

³ Jolidon 1999.

⁴ Meditation panel, Lüneburg, about 1330, Staatliches Museum, Schwerin, G 2627.

⁵ Theodosia altar, Netherlands, 1545, Museum Catharijne Convent, Utrecht, ABM s00146.

⁶ We acknowledge the support by Heike Stege, Ursula Baumer, Patrick Dietemann and Cornelia Tilenschi, Doerner Institut, Munich.

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