



ARCHLAB ACCESS REPORT

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THIRD/ Period MARCH 2017-SEPTEMBER 2017

Title of the ARCHLAB TNA Project: Polychrome paint on European precious silver objects – A merging of two independent research studies of a scarcely noticed colouring technique

Project Acronym: Paint on silver objects

User Group:

Name and forename(s) User Group Leader: Rainer Richter

Institution: Staatliche Kunstsammlungen Dresden, Grünes Gewölbe (SKD-GG)

Further researchers of the User Group:

Ulrike Weinhold, Theresa Witting, Eve Begov, Maria Willert (SKD-GG) and
Christoph Herm, Sylvia Hoblyn (HfBK: Hochschule für Bildende Künste, Dresden)

ARCHLAB **Provider**/home institution: Opificio delle pietre dure (OPD), Firenze (IT)

Contact person ARCHLAB Provider/home institution: Monica Galeotti

Period of the visit (Tuesday, 6th of June 2017 – Friday, 9th of June 2017):

Date of the report: 25th of July 2017

Background to the project: Roughly 6 to 7 years ago the Opificio delle Pietre Dure (OPD) and the Staatliche Kunstsammlungen Dresden, Grünes Gewölbe (SKD-GG) in close collaboration with the Archeometry Laboratory at the Hochschule für Bildende Künste, Dresden (HfBK) were starting to look independently more closely at applied translucent and opaque paint layers on goldsmiths' work. Very recently both institutions became aware of their individual research efforts, which are based on an interdisciplinary approach by art historians, conservators and conservation scientists. This provided a unique opportunity to compare already existing information (reports, data, images etc.) and to collaborate on a wide range of common objectives in the near future.

Questions addressed by Access:

Art History:

Since the phenomenon of polychrome paint applications has so far not been the subject of research, the results of our study can be used as a basis for further project development concerning other princely collections throughout Europe (e.g. Kunsthistorisches Museum Vienna, Schatzkammer Munich, the Esterházy collection at Forchtenstein Castle in Austria). A comparison between the Dresden and Florence collections might provide a better understanding of earlier concepts of colour design, as well as the aesthetics of goldsmiths' works at that time.

Art Technology:

A comparative study of the technological surveys undertaken at the OPD and the SKD-GG (and possibly other collections examined by additional cooperating partners) should help to clarify whether the application of paint on precious metal should be classified as a local or a widespread transnational phenomenon. It will also augment the knowledge of the evolution of this decorative technique and how various paint layers should be dated or may have changed their appearance over time.

Conservation:

The development of proper treatments for the consolidation and conservation of fragile paint layers will lead to sustainable strategies for the preservation of these materials. In quite a few cases, only rather small traces of paint have survived earlier treatments. Publication of the research results will increase the awareness of metal conservators of the need to pay more attention to the possible occurrence of this historical technique.

Conservation Science:

An optimized set of analytical tools for the investigation of polychrome silver objects will be developed, data collected and prepared for publications in the field of Archeometry. Due to the very limited access to sampling material, in many cases the focus should be on the application of non-destructive techniques.

Main objectives of the project proposal:

Art History:

The objects data on dating, attribution, acquisition and provenance collected at the OPD and the SKD-GG should be compared.

The history of the holdings of goldsmiths' works in Dresden had been verifiably linked with major courtly strategic policies such as proof of alliances, marriages, friendships and New Years gifts. Archival notes are important for the reconstruction of courtly practices which may even include the re-working of precious works of art.

Art Technology:

It is necessary to extend the knowledge and expertise on the various painting techniques for goldsmiths' work, including methods of historic restoration. There are known examples where enameled and painted decorative motifs show a deceptively similar appearance. The use of a binocular microscope has proven to be an indispensable means of examination, and the comparison of technological findings in Florence and Dresden (written reports, images) will provide a good basis for professional discussion about whether common practices existed among European artists.

Conservation:

The often disastrous state of preservation of polychrome paint on metals presents challenges for conservators, and mechanisms of deterioration must be understood prior to any treatment. The project will offer an excellent opportunity for the extremely few specialists in this field to share practical experience and knowledge by browsing the OPD conservation archive where detailed records on the state of preservation and on treatments completed on "cold enamels" are stored.

Conservation Science:

Analytical data from the OPD and HfBK Dresden / SKD-GG will be gathered, compared, and evaluated in terms of raw materials, painting techniques and preservation state. Reference data will be obtained from objects with reliable dating and attribution.

The results of compositional and morphological analysis (pigments and binding media) should help to differentiate between unique local features and widely disseminated sources and recipes for painting materials. For example, the copper-based green compounds in glazes offer a great variety (e.g. verdigris, copper resinate) which may be distinctive. The effectiveness of destructive and non-destructive analytical methods applied in Florence and Dresden will be critically evaluated.

Main achievements of the ARCHLAB visit:

Introduction:

Our main contacts at the scientific laboratory OPD were the two chemists Monica Galeotti and Andrea Cagnini. The first meeting at the OPD also involved the freelance conservator Mari Yanagishita who restored the objects of interest. Each of us presented our work concerning polychrome paint on European precious silver objects. We soon agreed on the necessity to compare the applied measuring methods and the results. In preparation for our exchange we had a guided tour through the laboratory at the OPD. In the following days we visited the restoration workshops. This allowed us to discuss various methods of treatments for polychromed art objects.

Art History:

From the art historical point of view archival proofs, which make mention of early technical use of paint to decorate silvers surfaces, are of high relevance. The Florence colleagues drew our attention to the inventory of the Grand dukes de' Medici from 1589. Here one can find a reference to the use of polychrome paint on a vase in the shape of a ship made of rock crystal: "Un vaso [...] colorito a modo di smalto". This object is preserved at the Tesoro dei Granduchi (former Museo degli Argenti), inventory number Bg., n.4 / GFS, n. 267263. That source shows that the colouring technique can be dated back at least to the sixteenth century. This is an important discovery since the earliest entry concerning paint on goldsmiths' work in Dresden inventories only dates back to 1610.

The records in the OPD archives reported on the presence of polychrome paint on some goldsmithing objects of the Palazzo Pitti collections, but they gave few details on their appearance. So, with the assistance of Valentina Conticelli from the Palazzo Pitti we had the opportunity to examine closely three objects: Two reliquaries, dating from the 1560s as well as the ship which dates approximately 1545. All of them show notable traces of polychrome paint and they are of French provenance and came from the heritage of Christine de Lorraine (1565-1636). In addition a German coconut goblet and an Italian sculpture made of ivory, with a silver foliage pattern along the base, show the phenomenon of polychrome paint. Since the Grünes Gewölbe possesses mainly German and Dutch silver works with a painted surface, the study of the objects in the Palazzo Pitti increased our awareness of this phenomenon. This observation shows us that this colouring technique is not only a German practice.

The colleagues from Florence provided also us with specialist literature (mainly Italian catalogues and articles) which is presently being studied in our working group.

Art Technology and Conservation:

In order to properly describe the various phenomena of colours painted onto silver surfaces we discussed the use of an accurate term. Up to the present the term "cold enamel" is common in the literature. As the painting technique excludes any firing like that required for vitreous enamels we agreed on the term "paint layers" and "polychromy". The painted layers did not in all cases imitate true enamel but progressively developed as a type of decoration of its own.

It is striking that the polychromy on the objects in the Tesoro dei Granduchi is much better preserved than the examples in the Dresden collection which are in a fragmentary condition. The Florence objects help us to better understand the original appearance of this locally applied colouring technique (Fig. 1).

Both institutions prepared cross-sections of minute samples taken from the applied paint. This provided more insight into their layering structure and later enabled specific analytical investigations. During the visit, we searched photos of cross-sections of applied paint in the OPD archive. A better comparison between the cross-sections from Dresden and Florence was made by re-examining them with the microscope. The visual comparison reveals distinct similarities. The paint was applied directly onto the metal surface without a preparatory grounding. The layers thicknesses range from 10 to 100 μm and were topped with a varnish at some time in the past. Predominant colours were found with a translucent green, red, and blue as well as with an opaque black and white. All other shades such as orange and yellow were detected less commonly in both collections.

Figure 1: Visual comparison of paint layers in Dresden and Florence:



Goblet, German, Nuremberg, about 1600 (GG, Inv. Nr. III 143). Detail of mounting: angel's wing with green and red paint
photo: Workshop Grünes Gewölbe



Reliquary, France, Paris 1561 (MdA, Inv.-Nr. A.s.e., N.227). Detail of pedestal: Wings of angel with green and red paint, photo: Ulrike Weinhold



Goblet, Pomerania, Szczecin, 1583 (GG, Inv. Nr. V 260). Detail of lid: Fruits with translucent green and opaque orange, red and white paint, photo: Ulrike Weinhold



Reliquary, Paris 1561 (MdA, Inv.-Nr. A.s.e., N.227). Detail of pedestal: Fruits with translucent green, orange and red paint, photo: Ulrike Weinhold

The various preservation states led to a discussion about the required consolidation treatments between the two conservators, Mari Yanagishita and Eve Begov, based on the conservation reports describing the procedures applied by the OPD. The Dresden experience has shown that the application of the “i- BMA polymer Paraloid B 67” is a recommended practice for consolidation. The solvent of choice is a non-polar solvent, e.g. White Spirit (100-140°) because the colours are easily dissolved in any kind of polar solvent (even by elevated contents of aromatic hydrocarbons). Based on the same idea, the Florence colleague Mari Yanagishita used a “n- BMA polymer Plexisol P 550” solved in petroleum ether.

Another topic of discussion dealt with the application of a protective lacquer coating in order to prevent the silver from tarnishing. Due to the unique open display of Dresden treasury objects without showcases it is necessary to coat the surfaces with a suitable lacquer. In contrast the colleagues in Florence leave the surfaces unprotected. This method requires permanent observation. It will be very interesting to compare the results of the two different approaches after several years.

Conservation Science:

The focus of the discussion was to compare the possibilities and limits of the analytical methods (as non-invasive methods or micro invasive techniques when cross-sections are analyzed, such as SEM-EDX, Raman, R-FTIR, ATR-FTIR). Due to the similar methods in Dresden and Florence the obtained results can be compared very well.

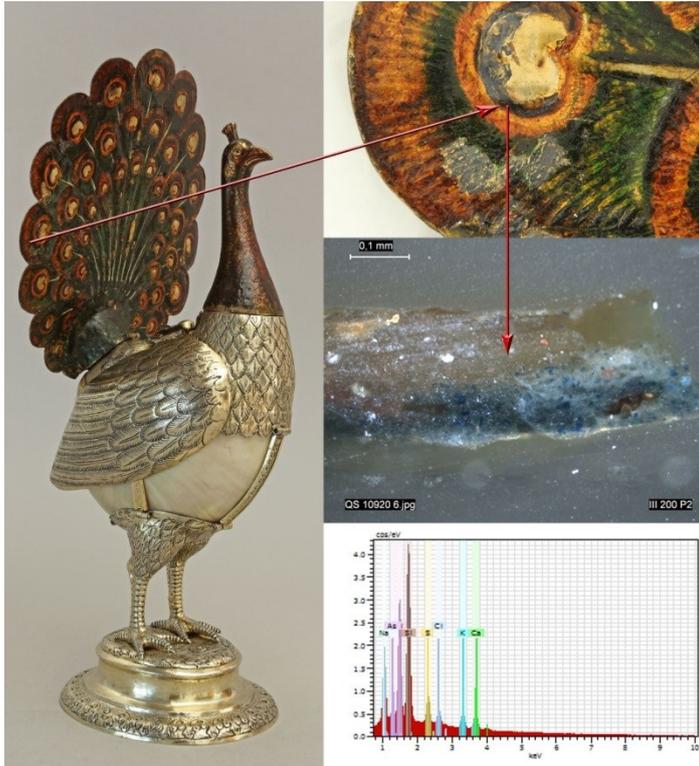
Thanks to the systematic archival filing in both institutions all samples, even those dating back to the 1960s, can be easily traced for re-investigation.

Furthermore we became familiar with an improved FTIR-spectrometer of the OPD which was specifically designed by our Italian colleagues. This accessory part will be of great benefit for Dresden, because it can be implemented onto the same type of spectrometer rapidly and will enlarge the range of suitable objects to be examined by FTIR in reflectance mode.

In several of the samples of the SKD-GG a mixture of lapis lazuli and sodalite was detected as pigment in the blue paint layers (Fig. 2). The article published by the OPD¹ provides valuable information for a further interpretation.

¹ C. Galliano Lalli/F. Innocenti, Appunti sulle caratteristiche chimico-fisiche dell' Azzurrite e del Lapislazzuli, in: Rivista dell'Opificio delle Pietre Dure e Laboratori di Restauro di Firenze, 26/2014, p. 78-82

Figure 2: Detection of Lapis lazuli:



Nautilus cup: "Peacock as a drinking vessel" Paulus Widmann, Nuremberg, 1593-1602, Silver, partially gilt, polychrome paint
Inv. No.: III 200, H: 38 cm
Overall view

[Earliest record in the inventory from 1640](#)

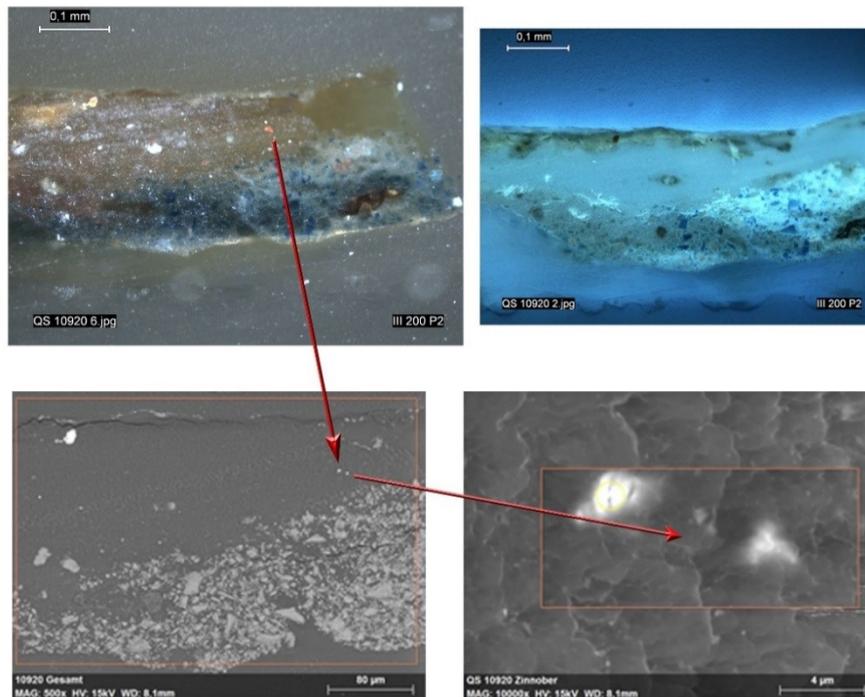
The polychromy on the peacock's fan, head and neck are exceptionally well preserved (dating c. 1600 or 1724?)

- 1+2. Site of sampling (top)
3. Cross-section (center) for SEM-EDX/ FTIR-analysis
4. SEM-EDX spectrum (bottom)

photos: 1+2 workshop Grünes Gewölbe, 3+4 Sylvia Hoblyn

An additional interesting detail was found in Dresden with sparingly dispersed red particles of vermilion detected within the varnish and the paint layer (Fig. 3). A closer look at the cross-sections in the OPD uncovered that this phenomenon can be traced in the Florence samples as well (Fig. 4). Therefore a former thesis that the vermilion may serve as a marker for a certain local workshop (e.g. Koehler workshop at the court of Dresden) appears doubtful. This raises the question, if the minute amounts of vermilion may have been introduced for yet unknown technological reasons. This requires more research in painting techniques applied in Europe during the Renaissance and Baroque times, including the study of contemporary treatises on painting materials.

Figure 3: Cross-section. Lapis Lazuli with cinnabar in the varnish:



OZ	Serie	norm.	C	Atom.	C	Fehler
			[Gew. %]	[At. %]		[%]
Quacksilber	80	M-Serie	83,97	45,57		1,7
Schwefel	16	K-Serie	16,03	54,43		0,3
Summe:			100,00	100,00		

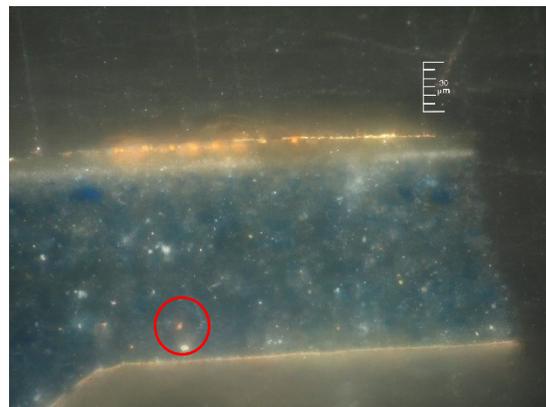
1. Cross-section (top left), VIS-light
 2. Cross-section (top right), UV light
 3. SEM image BSE (center left)
 4. Detail of SEM image (center right)
 5. SEM-EDX elemental analysis of red particles, C and O disregarded (bottom)
Conclusion: Red particle = HgS (vermillon)
- photos : Sylvia Hoblyn

Figure 4: Comparison of cross-sections:

Red particles of vermilion found in several samples (indicated with a red circle)



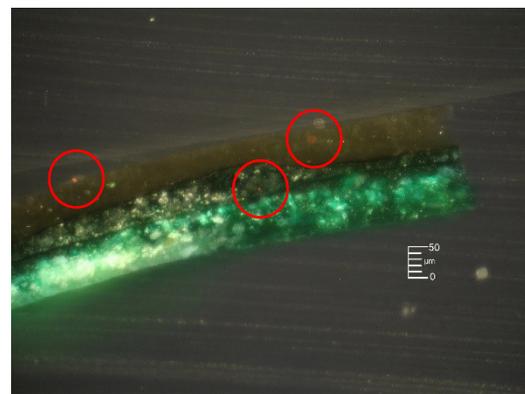
Cross-section, Dresden, photo: Sylvia Hoblyn



Cross-section, Florence, photo: Andrea Cagnini



Cross-section, Dresden, photo: Sylvia Hoblyn



Cross-section, Florence, photo: Andrea Cagnini

The analysis of the binding medium by FTIR-ATR on the cross-sections determines its general composition (natural pine resin/colophony with oil). Two samples were investigated by GC-MS which gave evidence of Venetian turpentine, colophony, sandarac (only one sample) and very small amounts of oil and fat. The OPD apply GC-MS for their investigations, too. The analytical results indicate the use of a mixture of sandarac and pine resin. The comparative evaluations of the results from both institutions showed a quite similar composition of the binding media.

Dissemination:

- The results of the investigation of polychromy on silver as part of the research project “Goldsmith’s Art from the 16th to the 18th century at the Dresden Court as an Instrument of Royal Prestige” will be summarized by February 2018. It will be published in connection with the catalogue raisonné, presumably in 2019.
- An international workshop is planned on the topic of polychrome paint applied to silver objects. The ARCHLAB providers are invited to present their results.
- Publication in international scientific journals on technical art history
- Papers to be presented at international conferences (e.g. ICOM-CC, IIC, CHEMCH)

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