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GRAPHIC DOCUMENTS

# Maurice-Quentin de La Tour and Jean Valade pastels: History, materials and studio practice

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## ABSTRACT

In 2015, the conservation treatment of three French pastel portraits by Maurice-Quentin de La Tour and Jean Valade at the National Museum of Sweden gave the opportunity to study pastels by two leading 18th-century French pastellists from the golden age of pastels. Media, supports, mountings and framings were studied and materials analysed. The results obtained combining photographic techniques and elemental and molecular analyses are shown, discussed and related to their historical context as well as to contemporary bibliographic sources and other artists' practices. They provide new information about the artists' materials and working procedures.

## INTRODUCTION

Maurice-Quentin de La Tour (1704–1788) and Jean Valade (1710–1787) were two of the leading French pastellists of the 18th century. The National Museum (NM) of Sweden houses two pastels by de La Tour and one by Valade. The *Portrait of a Lady* by Valade and the *Portrait of Marie-Sophie de Courcillon*, *Princess of Rohan (1713–1756)* by de La Tour were acquired in 2014 (Olausson 2014, 39–40). They are finished portraits, unlike the *Portrait of Voltaire (1694–1778)* by de La Tour, which is a preparatory drawing (Figure 1). The pastels had earlier suffered a severe mould development and an infestation, causing much damage to the surface. In 2015, the decision was made to carry out conservation because they will be part of the new display after the museum reopens in 2018. Pastel paintings are rarely studied unless they are unframed, so this was a unique opportunity to study both artists' colour palettes and working procedures, with a particular focus on supports, pigments, binders and fixatives used by the artists in the 18th century.

**Figure 1.** *Portrait of Marie-Sophie de Courcillon, Princess of Rohan* (ca. 1740, pastel on blue paper, 58.2 × 47.8 cm, NMB 2650) and *Portrait of Voltaire* (1735, pastel on blue paper, 26.5 × 18 cm, NMB 1946) by Maurice-Quentin de La Tour; *Portrait of a Lady* (1761, pastel on blue paper, 63.7 × 52.5 × 2 cm, NMB 2651) by Jean Valade. After conservation in direct light. © Nationalmuseum

## METHOD OF STUDY

The combination of a non-invasive approach, together with micro-invasive analyses conducted on a number of selected micro-samples, provided the authors of this paper with information on the material structure and composition of the pastels. Preliminary visual analysis, photographic analysis (including UV and infrared photographs, with digital x-radiography) and x-ray fluorescence analysis (XRF) were complemented by analyses – such as enzyme-linked immunosorbent assay (ELISA), Fourier transform infrared (FTIR) and Raman spectroscopy[1] – carried out on micro-samples from the front of the pastels and the backboard of one pastel.

## Technical description

### *Mounting and paper support*

**Figure 2.** *Self-Portrait with Maurice-Quentin de La Tour's Self-Portrait* (pastel on blue paper, 92 × 111 cm) by Marie-Suzanne Roslin. Private collection

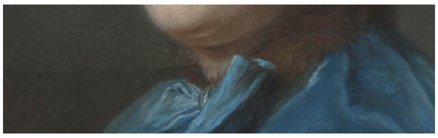

**Figure 3.** Detail of the paper joint in the *Portrait of the Princess of Rohan* by Maurice-Quentin de La Tour (NMB 2650). © Nationalmuseum

In her pastel-painted self-portrait (Figure 2), Marie-Suzanne Roslin (1734–1772) depicts herself outlining Maurice-Quentin de La Tour's (her master's) self-portrait (Salmon 2007, 54). She is drawing on a sheet of blue paper pasted to a stretched canvas nailed to a wooden strainer, which is secured on an easel.

De La Tour's two pastels are painted on blue paper pasted to cardboard while Valade's pastel is on blue paper pasted to a stretched canvas. Due to an infestation, the strainer of the princess's portrait was removed and replaced by cardboard at the end of the 19th century.

The analyses show the three pastels are painted on indigo-dyed paper, which was used by many 18th-century pastellists, who favoured it over the parchment used by others such as the Swiss Jean-Étienne Liotard (1702–1789). Blue paper was contemporaneously used as a cheap wrapping paper; it was small in size, which gave it a fibrous texture, and ideal for close adherence of pastel pigments. The middle-tone nuance was also convenient for making quick portraits of sitters who had little time. De La Tour advises his pupil Belle de Zuylen (1740–1805), in a letter from 1770, to keep the blue colour of the paper 'pure' to create 'dark shadows' (Debrie 2000, 40).

In the *Portrait of Marie-Sophie de Courcillon, Princess of Rohan*, two pieces of paper were pasted together. The face was depicted on the upper piece and the join runs transversally below the chin and is entirely covered by the layer of pastel (Figure 3). De La Tour usually made several sketches of his sitter's face on a single piece of paper, as for the *Portrait of Voltaire*. The chosen preparatory drawing for the face was pasted onto a stretched canvas to make it sufficiently sturdy to later be framed. He would add more pieces of paper in order to depict the garments and the décor of the full-size portrait. Four additional strips of paper were pasted on the periphery both in de La Tour's and Valade's portraits. This process was commonly used by contemporary pastellists, probably as a way to match the paper to the size of the strainer.

## Pastel layer

A pastel stick is traditionally made out of ground mineral or organic pigments mixed with a binder and a white filler/extender added to the pure pigment to create a wide range of lighter hues. As it is difficult to blend pastel colours on the support, the pastellist needed to have a wide colour range of pastel sticks. In a letter from 1763, de La Tour explains to the Marquis de Marigny (1727–1781) the difficulty of using pastel in comparison with painting: 'the tint is never right, one is obliged to make colours on the paper and give several strokes with various crayons instead of one, with the risk of altering a fine touch with no possibility to improve it once the damage is done' (Salmon 2004, 81–82). Pastellists could make pastel sticks themselves or buy them. It is not known whether de La Tour and Valade made and/or bought them. However, in 1747, François Lieudé de Sepmanville (1762–1817) mentions Jean Charmeton (1701–ca. 1750), who claimed he had found a 'varnish' to fix pastels and was given money by de La Tour (Besnard 1928, 40). Charmeton offered his services to fix pastels, but was also a painter and a pastel maker who provided Charles Antoine Coypel (1694–1752) with pastels (Jeffares 2016, 'Inventors, writers, suppliers, and copyists). Both de La Tour and Valade (Coypel's pupil) may also have bought his pastels.

The pigments identified on all three pastels are typical of 18th-century pastellists' palettes as listed in the French treatise on pastel painting written by Paul-Romain Chaperon (1732–1793) in 1788. Chaperon mentioned 10 to 12 basic pigments: ivory black, chalk from Troyes, yellow and brown ochre, *stil-de-grain* yellow or gold, cinnabar stone, carmine lake, Prussian blue, umber and Cologne earth (Cassel earth). These were basic colours known at the time to be available in spice- and drug-dealers' shops, which were sufficient to make many pastels (Gombaud 2015, 6).

*Black and dark pastels*

Following de La tour's teachings, Marie-Suzanne Roslin outlined her composition with black pastel, which was also applied in *à-plats* in order to create dark underlayers. She sharpened a white pastel with a knife in order to indicate lighter areas in her composition, before applying colours.

Infrared photography contributed to visualising the carbon-based medium of the underdrawing. Both in Valade's and de La Tour's portraits, it consists of a black wet medium thinly applied with a brush to delineate the features around the eyes and the mouth. Broadly applied blotchy areas in the darker parts of the Princess of Rohan's face seem also to have been applied wet with a brush (Figure 4).

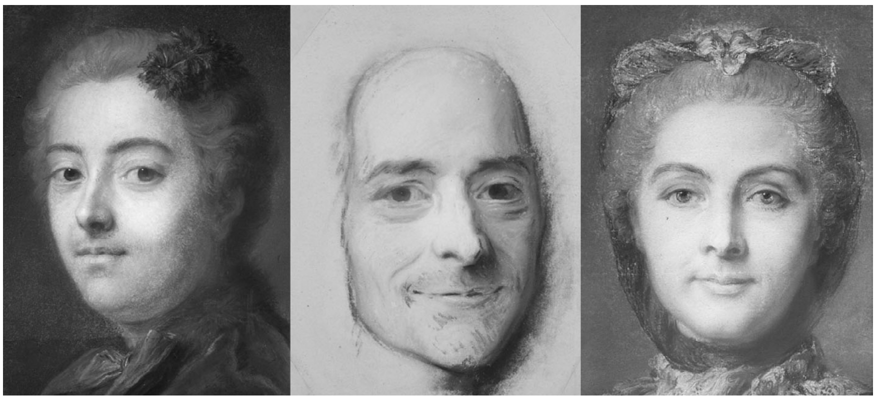

**Figure 4.** Details of the infrared photographs of NMB 2650, NMB 1946 and NMB 2651. © Nationalmuseum

Carbon-based black pigments were used to set down the underdrawing and to produce dark underlayers as shadows in the faces or the garments. Dark shades of blue are a mixture of Prussian blue with black pastel, while

**Figure 5.** *Portrait of Voltaire* by Maurice-Quentin de La Tour (Inv. 1995-6-1). © Musée Antoine Lécuyer

dark brown is made of iron-based compounds mixed with carbon-based pigments or black earth. They can be found in both pastels. Bone or ivory black pastel is used to draw details in the faces, the pupils or the lashes, for example. Shadows, furs or backgrounds are mixtures of iron-based compounds (ochres, umber earth), manganese-based compounds (such as black oxide of manganese), carbon-based black pigments, Prussian blue and indigo.

*White*

White pigments as calcium carbonate/gypsum or kaolin can be found in all the samples. Used as fillers/extenders in most pastels, they create lighter shades of colours. Lead white has better covering properties than chalk white, which explains why the artists added it to white fillers to highlight pupils and irises. In the Princess's portrait, lead is present in many samples. This could be explained by the fact that the artist started his composition by applying black and white pastel on the paper. Used pure, the white underlayer creates lights that help build up complexions as in the other preparatory drawing for *The Portrait of Voltaire* from the Musée Antoine Lécuyer (Figure 5). When it is mixed with vermillion to make pink pastel crayons it creates modulations and flesh tone highlights in the faces' top layers. It was also used mixed with black pastel to create the powdery effects in the hair.

*Blue pigments*

Pigment analysis indicates that the blues consist of Prussian blue and copper-based pigments such as azurite, sometimes combined together. Cheaper than blue mineral pigments, Prussian blue was extensively used for the making of pastel crayons and often used by pastellists to depict garments. At least five shades of blue are visible in the Princess's mantle (Figure 1). The artist builds up pastel layers in order to convey a three-dimensional effect. Prussian blue mixed with black pigments creates darker modulations, while slightly greenish copper-based pastel strokes mixed with white produce the lighter shades that highlight the cape. In two micro-samples (NMB 2651, samples 1 and 3, Table 3) indigo was detected as a component of the blue pastel sticks.

*Carnations*

De La Tour's technique is visible in Voltaire's preparatory drawing. Pastel underlayers are built up with iron-based pastels made of yellow and red ochres. In the Princess's portrait, vermillion pastel was used for the mouth and the cheeks. The strong fluorescence under UV shows the broad application of the layer that was later blended and covered with a white translucent layer (Figure 6). Thinly applied strokes highlight and redefine the flesh areas in the upper layers.

*Red lakes*

Due to a prolonged exhibition to light, the lips have partly lost their red colour in Valade's portrait. The analysis did not allow us to determine the presence of a red lake in addition to vermillion.

**Figure 6.** UV photographs of NMB 2650, NMB 1946 and NMB 2651. © Nationalmuseum

**Binders, fixatives, preparations for paper**

*Binders*

Binders are an essential component of the very lightly bound technique. They keep pigments together and have an impact on the texture of the pastel stick. Since the 15th century, gums have been the main binding material used to make pastel sticks (Jeffares 2016, 'Treatises').

*Fixatives*

The preventive conservation of pastels was a great concern for 18th-century pastellists and their clients. De la Tour talks about 'dusts' and 'the weakness of some colours' in his letter to Marigny (Salmon 2004, 81–2), while humidity caused mould development. Glass was used to protect pastels after their completion, while fixatives were used during and at the end of the working process. They were meant to adhere the fragile pastel layer to the support and reduce or remove the risks of mould development at the surface of the pastel (Burns 2007, 145–52). No evidence of the presence of fixatives could be seen at the surface of the finished pastels.

Even though they were said to alter colours' properties, gums were used as fixatives during the 17th and more seldom during the 18th century. Sturgeon glue was the main ingredient in 18th-century fixative recipes (Chaperon 1788, 314–29).

*Preparations for papers*

Pastellists also used to prepare supports that were especially meant to adhere pastel powder. Jean-Étienne Liotard (1702–1789) gives a recipe to make pumice paper with sturgeon glue (Trivas 1941, 29–32).

*Analysis results*

Proteinaceous materials were detected at the surface of NMB 2650 and NMB 2651 with ELISA analysis.

At the surface of the *Portrait of the Princess of Rohan* and the *Portrait of a Lady*, ovalbumin from egg was detected. Gums and sturgeon proteins were only found on de La Tour's portrait (Table 4).

## DISCUSSION

As part of pastel recipes, the presence of gums in analyses is not surprising. On the other hand, the characterisation of sturgeon glue on de La Tour's portraits thanks to ELISA is very unique as previous similar attempts on Liotard pastels had failed (Schultz and Petersen 2011).

Both de La Tour and Valade were involved in the contemporary research into fixatives, but left no treatise or specific recipe about their practices. De La Tour had been using a wet solution that he applied on his pastels as early as the 1730s. A more finished portrait, the *Portrait of Jean Restout (1692–1768)* painted in 1737 (Figure 7) bears a very visible tideline around the face like many other preparatory drawings by the artist housed in the Musée Lécuyer. But the tidelines are hidden under the pastel layer in the final portraits, which fosters the idea that fixing is part of the making process as it might be in the *Portrait of the Princess of Rohan*, painted in 1740.

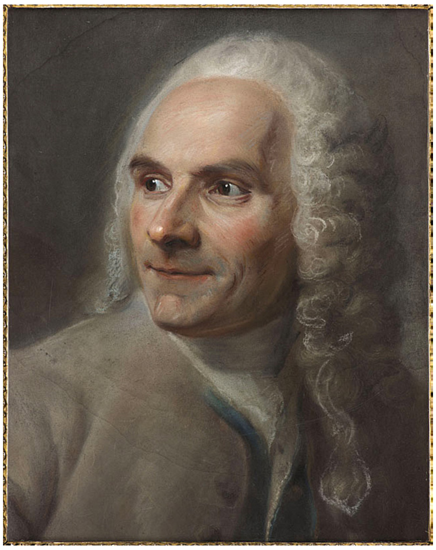

**Figure 7.** *Portrait of Jean Restout* by Maurice-Quentin de La Tour (Inv. LT37). © Musée Antoine Lécuyer

Jean Valade was part of the commission established by the Royal Academy of Painting and Sculpture to study the fixative recipe invented by the royal engineer Antoine-Joseph Loriot (1716–1782). On 6 October 1753, Loriot presented his secret recipe to the Academy. Even though sturgeon glue was not characterised on his pastel, Valade was aware of Loriot's recipe since he painted a portrait of the inventor in 1763 which he presented at the Salon after having fixed half of the pastel with his recipe. Loriot was selling his services as early as 1754 as advertised at the time (*Mercure de France* 1754, 156–58). However, de La Tour made and probably fixed the portrait of the Princess with sturgeon glue much earlier than 1753.

The tidelines on Voltaire's portrait might not have been solely caused or caused at all by sturgeon glue. Maurice-Quentin de La Tour prepared his blue paper with a coloured dilution to tone down the blue hue of paper and thus avoid applying a thick amount of pigment at the paper's surface. The thinner the pastel layer, the smaller the amount of salts at the surface of the paper. The less salt, the less hydrophilic is the pastel layer which reduces the risks of mould growth. In his 1770 letter to Belle de Zuylen, the artist explains: 'About the mould stains caused by the salt contained in black chalks and most pastels, they should not bind or thicken; simply rubbed off the paper they don't stain: they can then be removed with a knife end; apply a hot iron to remove moisture from the salt they contain, and remove the thick parts with the knife. This is what I recently tried, as well as to apply a light yellow ochre dye in water, mixed with a little bit of egg yolk on blue paper; it will prevent the heaviness, which is inevitable due to the amount of colours, which in turn are necessary to cover the blue colour of paper' (Debrie 2000, 40).

The samples taken from the *Portrait of Voltaire* were too small to be identified with ELISA.

However, the tideline visible on the painting could have been caused by a fixative or by the same preparation described above. Both the portrait and samples of blue paper prepared with de La Tour's recipe were photographed under UV.[2]

The fluorescence of the tideline in comparison to the fluorescence of egg yolk when applied on a paper sample was similar. A wet substance was also applied on the entire surface of the sitter's face as numerous cracks are visible to the naked eye, especially along the jaw where a thick translucent layer is visible.

The artist could have used the same egg-yolk-based mixture he used to prepare his blue paper supports to fix his sketches and preparatory drawings so they would not smudge when glued to the canvas in order to paint a finished portrait. The same ochre egg-based preparation was found by the conservation scientist Benoît de Tapol a few years ago on the blue paper support of the *Portrait of Pierre-Louis Laideguive (1704–1776)* painted in 1761 and housed in the National Museum of Catalonia.[3] The artist was still using his recipe almost thirty years later after the execution of the Princess's portrait. Valade may have known de La Tour's preparation for blue paper and used it too.

## CONCLUSION

Thanks to a multidisciplinary approach – the combination of several methods of examination and scientific techniques – part of Maurice-Quentin de La Tour's and Jean Valade's palettes were revealed, as well as very rare information about the presence of proteinaceous materials at the surface of the pastels. The identified materials are consistent with their time period when compared to historical and written sources. They are also material evidence that relate to de La Tour's written recipe of prepared blue paper and to his working process. The presence of egg in Valade's portrait requires further investigation. For the first time, sturgeon glue was identified at the surface of pastels by Maurice-Quentin de La Tour, which places the pastellist back in the context of contemporary research and competition to find a fixative for pastels. De La Tour may have used sturgeon glue to fix his works as early as 1740 and influenced later inventors in search of recognition and of a lucrative activity, such as Charmeton and Loriot. Furthermore, these findings were very useful to the conservation work as they help to explain the visible damage at the surface of Voltaire's portrait.

## ACKNOWLEDGEMENTS

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## NOTES

[1] Instrument specifications and experimental settings are reported in Table 1. XRF results with suggested pigment composition are shown in Table 2, while FTIR and Raman results are in Table 3, and ELISA results in Table 4.

[2] Mock-ups were prepared in February 2015 with a solution of ochre in water mixed with egg yolk applied on 19th-century blue paper and blotting paper.

[3] De Tapol, B., National Museum of Catalonia, personal communication, 17 February 2015.

**Table 1.** Spectroscopic techniques and experimental settings employed in the diagnostic campaign

| TECHNIQUE | DESCRIPTION |
|---|---|
| **X-ray fluorescence spectroscopy (XRF)** | Elemental analyses were made with the Elio portable x-ray fluorescence (XRF) system from XGLab – X and Gamma Ray Electronics. Measurements were performed non-invasively and directly on the areas of the pastel paintings. Analyses were conducted in ambient air conditions on areas of 1 mm diameter for equal live-times of 120 seconds at 40 kV and 20 µA, using a Rh-target and no filtration. An average of 40 measurements was carried out on the surface of each pastel. Duplicate or triplicate analysis was conducted on each coloured area. |
| **Fourier transform infrared spectroscopy (FTIR)** | The samples were analysed by Fourier transform infrared spectroscopy (FTIR) in transmission mode with a Bruker Tensor 24® spectrometer coupled to a Hyperion® 3000 microscope equipped with a cryogenic mercury-cadmium telluride (MCT) detector. For measurements in the transmission mode, the samples were placed between the windows of a diamond cell and observed with a 15× objective. With the MCT detector, spectra were acquired in the 4000–600 $cm^{-1}$ range with a 4-$cm^{-1}$ spectral resolution and 64 scans. |
| **Raman spectroscopy** | Raman analyses were carried out directly on the loose samples with a Bruker SENTERRA system with a thermoelectrically cooled charged-coupled device (CCD) detector. Raman spectra were recorded by focusing a 785-nm laser beam using 50×, 50× long-distance and 100× Olympus objective lenses. ~ 9–18 µm lateral resolution and 400 lines/mm gratings and 3–5 µm lateral resolution and 1200 lines/mm gratings were used. The laser power at the sample was 1–25 mW with an acquisition time between 7–120 seconds for each spot and 1 accumulation. |
| **ELISA** | The samples were extracted in an aqueous buffer and plated into PS microwell plates. After incubation and washes with PBS, a blocking solution (5% NCS) was added followed by specific primary antibody solutions for ovalbumin, sturgeon collagen and gums. The plates were washed with PBS/Tween 20 and secondary antibody solutions conjugated with HRP were added. After final washes with PBS/Tween 20 and PBS only a substrate buffer with ABTS and $H_2O_2$ was added and the reaction was stopped after 10 min. The optical density (OD) was measured with a spectrophotometer (Epoch Biotek) at 414 nm. |

**Table 2.** Summary table of suggested pigments/compounds on the basis of XRF results

| COLOUR | SUGGESTED COMPOUNDS | | |
|---|---|---|---|
| | **NMB 1946** | **NMB 2650** | **NMB 2651** |
| **White** | Calcium-based compound * | Lead white # <br> Calcium-based compound * | Calcium-based compound * |
| **Red** | Vermillion or iron-based compound | Vermillion or iron-based compound | Vermillion or iron-based compound |
| **Yellow** | Iron-based compound or orpiment | / | / |
| **Orange** | Vermillion and iron-based compound | / | Vermillion and iron-based compound |
| **Brown** | Iron-based compound | Iron-based compound | Iron-based compound |
| **Green** | / | / | Copper-based compound |
| **Blue** | Copper-based compound (likely azurite) <br> Iron-based compound (likely Prussian blue) | Copper-based compound (likely azurite) <br> Iron-based compound (likely Prussian blue) | Copper-based compound (likely azurite) <br> Iron-based compound (likely Prussian blue) |
| **Black** | Carbon-based compound (sometimes bone/ivory black is attested by the presence of phosphorous) <br> Manganese-based compound | Carbon-based compound (sometimes bone/ivory black is attested by the presence of phosphorous) | Carbon-based compound (sometimes bone/ivory black is attested by the presence of phosphorous) <br> Manganese-based compound |
| **Grey** | / | Lead white and carbon-based compound and/or copper-based compound | Lead white and carbon-based compound and/or copper-based compound |

* Variable very high amounts of calcium were detected in every coloured area indicating the probable presence of calcium carbonate/gypsum as filler and/or whitener in the pastel sticks.

\# In NMB 2560 lead white was always detected together with a calcium-based compound in all the white areas.

**Table 3.** Summary table of the FTIR and Raman results collected on the loose samples

| SAMPLES | | DESCRIPTION | FTIR | RAMAN |
|---|---|---|---|---|
| **NMB 1946** | Sample 1 | Light blue pigment on the backing board | Cellulose<br>Calcium carbonate<br>Gypsum<br>Kaolin<br>Quartz<br>Prussian blue | Calcium carbonate |
| **NMB 2650** | Sample 1 | Paper fibres and blue pastel from the bluish background | Cellulose<br>Calcium carbonate<br>Gypsum<br>Prussian blue<br>Indigo (only in the blue fibres) | Carbon-based compound<br>Prussian blue<br>Indigo (only in the blue fibres) |
| | Sample 2 | Blue-black pigments, dark shadow of the coat | Cellulose<br>Calcium carbonate<br>Prussian blue<br>Bone/Ivory black | Carbon-based compound<br>Prussian blue |
| **NMB 2651** | Sample 1 | Particles of different colours from the brown greenish background | Cellulose<br>Calcium carbonate<br>Silicate<br>Quartz<br>Prussian blue (possible)<br>Bone/ivory black<br>Gypsum | Goethite<br>Carbon-based compound<br>Indigo |
| | Sample 2 | Red and whitish particles from the lower lip | / | Calcium carbonate<br>Vermillion |
| | Sample 3 | Brownish particles from the top part of the armchair | Calcium carbonate<br>Quartz<br>Silicate<br>Gypsum<br>Prussian blue | Goethite<br>Hematite<br>Carbon-based compound<br>Indigo |
| | Sample 4 | Blue paper (only fibres) | / | Indigo |

**Table 4.** Summary table of ELISA results

| | | | | ELISA | | |
|---|---|---|---|---|---|---|
| **OBJECT#** | **SAMPLE#** | **TYPE OF SAMPLE** | **LOCATION** | **ovalbumin (egg)** | **sturgeon collagen** | **gums** |
| **NMB 2650** | 2 | Samples were overall very small (~ 1–30 µg) and contained pigment particles, some transparent particles as well as dirt/dust since they were taken during cleaning | Face | - | + | + |
| | 4 | | Face | + | + | + |
| **NMB 2651** | 3 | | Face, hair, neck, collar | - | - | - |
| | 5 | | Face | + | - | - |

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