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Collaborative Efforts for Paint Analysis: Two Opportunities for Technical Examination of Major Works in Tandem With Outside Institutions

The subject of this talk is a summary of my technical investigation of Ingres's final version of his painting, *Oedipus & the Sphinx*. This was done in collaboration with the Walters Art Museum in preparation for an upcoming exhibition. The results of the study will then be provided to the art historians writing the catalog for the show. It was a win-win situation. I would help reveal and document elements of Ingres materials and techniques found in the analysis while completing my required 2nd year technical study. Using data from the analysis & information from historical sources, I also hope to show that Ingres created the painting as a work of art unto itself.

All 3 versions are expected to be included in the exhibition. The first & largest is shown on the left. It was begun in 1808 but was greatly expanded in 1827 for the salon of that year. The London version, shown in the middle, is a very small work painted in 1828. The Walter's painting is shown again on the right. It was completed just 3 years before the artist's death at the age of 87. Ingres wrote that this would be the definitive version of the image. He did make a number of compositional changes, adding a figure & lowering Oedipus's arm. More importantly, the entire image is flipped mirror-like and the sphinx is depicted reacting in horror to Oedipus's success with the proposed riddle. Previous versions seem to come a little earlier in the narrative.

Ingres was a giant of 19th-century French Painting. The artist's home & studio now house a museum devoted to his life & work. Here is a self-portrait painted when he was 24, just a few years after leaving the studio of his teacher Jacques Louis David. Ingres is known as the primary champion of the French classical tradition opposing the radicalism of Delacroix. Typical of an academic, he held historical and mythological painting as the highest form of the art, as in this work from 1811. 20th century critics see a lot of Romanticism in his paintings and find his distortions of form quite modern, this can be seen here in the woman's oddly contorted neck. Modern critics appreciate this distortion & in his interesting mix of coldness and sensuality. Finally, while Ingres considered them to be menial labor, his portraits tend to command the most respect today

To date, very little analysis of works by Ingres has been published. The small amount that has been written about his painting technique has been gathered from anecdotal sources, letters, and observations made studying the surfaces of his works. Ingres was known to be obsessive in his attempts at perfection & outspoken in his preference of line over coloristic effects. Certainly, Ingres was an academic painter, and what is known of Academic painting may be used as a point of comparison. Albert Boime, the acknowledged expert in 19th century French Academic practice, has recorded the steps likely followed in academic painting technique. A synopsis is seen on this slide. This can be further simplified into: drawing transfer, underpainting, full tonal painting, and augmentation with impastos, glazes, and scumbles.

I was given 9 cross-sections taken by conservators at the Walters, five of which had full stratigraphy. They were sampled from these areas. X-ray Fluorescence was performed to analyze the elemental pigment information available at the surface. These arrows point to the sites of that analysis. Three small, unmounted samples were also provided to help characterize the organic components found in the painting. Here is a table listing the total analytical tests performed on the painting and cross-sections. The red X's indicate the specific tests mentioned here in my talk. I began my analysis using non-destructive methods. Multiple X-radiographs were taken. None revealed any information. The thickness of Ingres lead white ground effectively hid all information below the surface. Infrared reflectography was performed using an IR vidicon. It revealed no information not seen in visible light. A deviation from the underdrawing is just barely visible on the right side of the figure's left calf. These lines trace its length and an obvious pentimento is seen where Ingres changed the shape of Oedipus's right bicept. This image shows the painting in Ultraviolet light. As can be readily discerned, the work has been selectively cleaned, with residual natural resin left on all regions but the figure and sky. The nonfluorescing areas in the image suggest extensive overpaint. It may be covering abrasion caused by aggressive varnish removal. The restoration layers would impact my interpretation of the data.

Microscopy was performed on each cross-section. This sample was taken from an area representing the sphinx's wing which is warm-grey in surface appearance. Here we can see the thick ground which confounded the X-radiography. This paint sample exhibits 6 layers. The first thing one notices is this layer of blue and white pigments. It had been observed by conservators at the Walters that blue could be seen through small traction cracks along the right side of the painting. This had me really excited. Could it be that this version of the painting was begun in the same orientation as the first 2 and was later flipped after the artist had begun? Subsequent research indicated that. No, probably not, although it would require far more sampling or a good X-radiograph to be definite. There are many sketches showing the figure and the sphinx in the same orientation as this painting.

One can even see the evolution the sphinx's reaction to Oedipus's success with the riddle in these 2 sketches, both in the same orientation as the Walter's painting.

Fogg curator, and former conservator, Marjorie Cohn, has written that the painter would have sought out classical precedents for his imagery. We know that Ingres did reference an engraving of a classical carved carnelian for the figure of Oedipus. It is interesting that the source has the figure in the orientation of the Walter's version. Ingres had actually flipped the composition on the previous versions of the painting. The cross-sections were viewed in visible & ultraviolet light and stained with fluorochrome stains to characterize the organic binders used in the paint stratigraphy. The image on the right shows the sample's reaction for proteins. The green fluorescent reaction here is probably the result of glue used to size the canvas. There does appear to be a positive reaction throughout the ground as well. The photo on the right shows the cross-section in UV. The ground and paint autofluorescence, the layers above do not.

The image on the right is same sample stained for oils, which react with a red-orange fluorescence. The ground appears to have an oil binder in addition to the protein. Perhaps, the canvas was primed with an emulsion ground. All subsequent layers test positive for oils. The uppermost portion of the sample appears to be the remains of an oil containing coating which seems to be quenching the autofluorescence below. This cross-section, which has a yellowish, pink surface color, was sampled from the edge of the thumb. The sample exhibits 6 layers with 5 alternating lighter and darker layers used for the flesh color.

SEM-EDS was used to provide elemental information about the layering in the cross-section. This revealed an interesting fact. The elemental map suggested that one layer contains only calcium pigments. The layer is here on the visible light photo. Perhaps the artist used it to provide a scumble effect or to give body to a transparent interlayer. Whatever its purpose, the multilayering suggests that Ingres was searching for the perfect color & value to represent the thumb and its place in space.

This cross-section was taken from a clean blue area of the sky near a small loss. The left half of the sample shows 6 discrete layers. However, the right half exhibits only 3. The differences between the right and the left can be seen clearly in UV. On the left side, the bottom 4 layers are autofluorescent. The same region on the right is not. This indicates that the central layer on the right side is a toned fill from an earlier restoration. Here is the dividing line between original and restoration.

SEM-EDS revealed some interesting facts about the paint sample. The lowest blue layer is primarily ultramarine with some lead white, earth colors & a calcium pigment. The lowest neutral colored layer

appears to contain lead white and bone black. This would make a grey. The middle blue layer, however, contains cobalt and aluminum in addition to lead, calcium, and iron. This indicates the presence of cobalt blue, suggesting that Ingres toned down the ultramarine layer with a grayish layer & then strengthened the blue by adding a cobalt blue layer. Even when one discounts the restorations, Ingres seems to have used at least 3 layers in an attempt to perfect the color of the sky.

This cross-section was taken from an area representing the sphinx and is warm grey in surface appearance. Notice the blue pigments within the lowest paint layer. There are 8 layers in evidence. 2 blue fibers can be seen within the ground. They originate from the blue stripes that run through the herringbone weave linen mattress ticking used by Ingres as a support.

Evidence of a natural resin varnish can be seen here in UV. Probably, this was an earlier presentation surface. The top three layers seem to be restoration. This means that Ingres used 3 to 4 paint layers to achieve the surface effect.

The materials used by Ingres on the painting include a mattress ticking linen substrate. This was primed with a lead white ground that appears to be bound by an emulsion, containing oil and protein. The work is painted with oil paints chosen from typical conservative pigments available in the 19th-century. There is evidence of a natural resin varnish and an oil coating, which may result from restoration.

A number of the artist's techniques were discovered in this study. He generated numerous sketches specifically for the Walters version. The canvas had a very thick white ground to provide a smooth working surface. While he did not use a toning layer, the artist used very complex, layering methods as the painting evolved. There were areas of glazing and indirect painting. An unexplained blue layer exists under the upper layers along the right side of the painting. Finally, Ingres seemed to add white lead to most colors and used a calcium white layer to interlayer.

So when it is said & done, what can be learned from this study? I feel that my analysis can offer the art historians writing that catalog for the exhibition a very important conclusion regarding Ingres intent in painting a 3rd version of the Oedipus image. The diverse, complex layering found in the painting does not seem to simply mirror the system attributed to French academic painters. Additionally, a copy produced merely for economic reasons would have all of its efforts centered on capturing only surface effects. It would seem that after a lifetime of painting, Ingres would have had little trouble knocking off a copy without making numerous false starts.

The cross-section of such a work would contain few layers, and those that did exist would probably be almost identical in color. The painter would only need to search for the surface color already determined by the model. The *Oedipus & the Sphinx* owned by the Walters does not exhibit this at all. Far more than just flipping the image, the refinement of Oedipus's pose, & the sphinx's reaction, this technical study indicates that Ingres was constantly responding to the work as he created it. The cross-sections and other scientific analyses reveal that he continued to rework the form, color, and composition as the painting evolved. These are the characteristics of an artist creating an autonomous work of art, irrespective of earlier variants.