

# Metal Soaps and Visual Changes in a Painting by René Magritte – *The Menaced Assassin*, 1927

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**Abstract** *The Menaced Assassin* by René Magritte is a major surrealist painting from the collection of the Museum of Modern Art (MoMA). A recent conservation treatment coupled with scientific analysis has characterised some puzzling and visually disturbing surface phenomena once attributed to mold growth.

A detailed examination of the painting under the microscope has evidenced that the formation of radiating dark micro cracks is responsible for the overall speckled appearance of the painting. These web-like cracks often surround a small white crystalline particle and are generally accompanied by aggregates of very small white particles sitting on the top of the surface. The examination also revealed the presence of larger flat pustules of a translucent and softer material with no apparent visual impact. An overall whitish haze is visible as well over the areas painted in red and brown earth tones.

Samples of both white and translucent material were analysed by Fourier transform infrared spectroscopy (FTIR) and confirmed the presence of metal soaps. Past exhibition conditions of the painting and composition of the ground layer may have played a role in the formation of the soaps, in particular the coarse calcium carbonate rich priming layer and presence of kaolin as identified by FTIR and scanning electron microscopy combined with electron dispersive spectroscopy (SEM-EDX).

**Keywords** Lead soaps • Zinc soaps • Magritte • FTIR • SEM-EDX • Pustules • Micro-cracks

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## Introduction

*The Menaced Assassin* (1927) by René Magritte is a major surrealist painting from the collection of The Museum of Modern Art (Fig. 1). It was painted for Magritte's first one-man show at Le Centaur in Brussels. It is sometimes considered to be a pendant to a painting of the same size and date titled *The Secret Player* (1927, Royal Museum of Fine Arts Belgium).

MoMA acquired *The Menaced Assassin* in 1966. Prior to this, both paintings were on long term loan from the previous owner to the Casino Communal in Knokke Belgium where the environmental conditions are presumed to have included exposure to high humidity for approximately 10 years. Upon acquisition of *The Menaced Assassin*, MoMA Conservation department records noted an overall spotty surface appearance, which was attributed to mold growth. To address this condition, in 1967, the painting was cleaned, lined with wax resin adhesive, and surface coated with a synthetic resin varnish. In subsequent treatments the "mold" spots were concealed with inpainting as they were judged to be visually disturbing.

In preparation for the exhibition *Magritte: The Mystery of the Ordinary 1926–1938* opening in September 2013, the painting underwent treatment to remove the



**Fig. 1** René Magritte. *The Menaced Assassin*. Brussels, 1927. Oil on canvas, 59 1/4" × 6' 4 7/8" (150.4 × 195.2 cm) (The Museum of Modern Art. Kay Sage Tanguy Fund. © 2013 Charly Herscovici, Brussels/Artists Rights Society (ARS), New York)

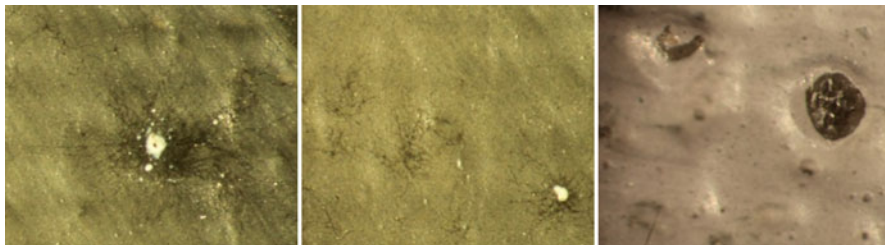
degraded varnish, inpainting, and excess yellow wax resin from the surface. This treatment also allowed for a closer examination of the surface phenomena once thought to be mold but now determined to be a condition related to the Magritte's choice of materials.

## Examination

Magritte used preprimed, commercially prepared canvas cut from a roll for *The Menaced Assassin*. Microscopic examination of cross-sections indicated the priming consists of two white preparatory layers. Reflected IR does not reveal any obvious under-drawing. Radiography and transmitted IR imaging showed that Magritte applied his paint in broad strokes for the background while leaving space for the figures and furniture in reserve. Adjustments to the length of the table cloth and the diameter of the phonograph speaker were made but otherwise no major changes to the composition are evident. Magritte used a fluid paint imparting a smooth surface with low impasto. Glossy areas in the male figures hats and suits indicate that he used a natural resin or medium rich paint to highlight these areas. He also applied or mixed in a resin to highlight the faces of the three heads at center. These areas have a greenish fluorescence under ultraviolet illumination suggesting an aged natural resin component. No overall resin coating was applied by the artist. The speckled appearance resembling mold growth is shown in Fig. 2. It is most prominent and visible in the darker colours but is also seen in the light gray background suggesting an overall condition issue. A whitish haze is also observed over the brown and red earth coloured areas. Aside from the spotty appearance, the overall condition of the paint film is very good. There are a few localised mechanical cracks but no extensive drying cracks or other paint film defects.



**Fig. 2** Details of *The Menaced Assassin* showing the dense population of spots on the overall painting. The dimensions of the visible spots are mostly between 1 and 3 mm diameter



**Fig. 3** Magnified view of some representative spots (from *left to right*): web like network of dark micro cracks with or without large white opaque formation in the center ( $\sim 20\ \mu\text{m}$ ) and smaller opaque micron size white droplets and small round and transparent to semi opaque pustules ( $\sim 200\ \mu\text{m}$ ). Images obtained with a Dinolite  $\times 200$  microscope

Further examination of the surface was thus carried out under magnification and revealed three distinct phenomena (see Fig. 3):

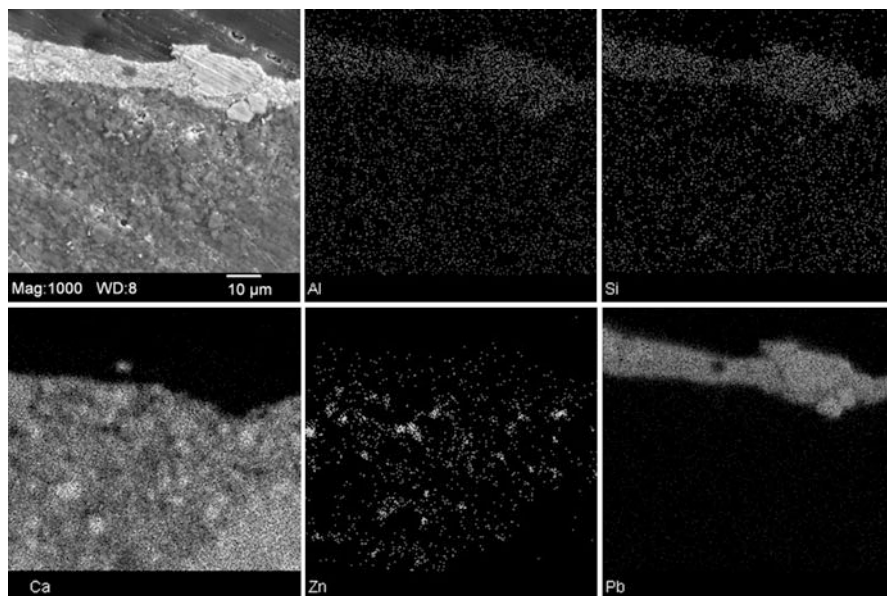
- Web like network of radiating dark micro cracks (originally confused with mold hyphae)
- Opaque white droplets associated with the dark cracks (often one large round particle in the middle of the network surrounded by smaller particles)
- Small round pustules – transparent to semi opaque

## Analysis

Cross sections of the two preparatory layers and scrapings of both types of surface deposits and pustules were examined and/or analysed by microscopy, SEM-EDX and FTIR. In situ analysis with a handheld XRF was also done to help elucidate the composition of the paints. The paint layer is smooth and thin and shows no areas of loss to take samples for cross sections.

Examination of a cross section from the two preparatory layers (taken from the edge of the painting) under normal light and UV illumination showed the presence of a first layer containing small particles that fluoresce green under UV as well as large particles, some opaque, and some more translucent and a few blue particles too small to identify by FTIR. This first layer is covered with a thin white more opaque coating that also contains small translucent particles.

The composition of the two layers was further examined by SEM and EDX mapping. The first layer is in average  $100\text{--}150\ \mu\text{m}$  thick and contains mostly calcium based large and coarse particles (possibly carbonate) mixed with Zn containing particles (possibly zinc oxide), as well as Al and Si (possibly kaolin). This layer is coated with a thin intermediate layer (less than  $20\ \mu\text{m}$ ) of lead white mixed with kaolin (Fig. 4).



**Fig. 4** SEM image of the cross section showing the ground and an intermediate layer that form the preparation (*left top corner*) and maps of the elements identified by EDX (*top*: Al, Si, *bottom*: Ca, Zn and Pb). SEM-EDX was performed with an Evex Mini SX-3000 instrument in high vacuum mode. The cross section was coated with gold and both imaging and elemental mapping were conducted at an accelerated voltage of 20 kV. The presence of these elements was confirmed by handheld XRF performed with a Bruker Tracer III-SD operated at 40 kV and 3 µA under He purge for the detection of Al and Si

A sample from the ground was also analysed by FTIR and confirmed the presence of calcium carbonate ( $\text{CaCO}_3$ , 2,509, 1,794, 875 and 713  $\text{cm}^{-1}$ ) and oil (fatty acid chains 2,923, 2,851  $\text{cm}^{-1}$ ). A second sample was particularly rich in beeswax residues from the wax lining. The presence of kaolin was not confirmed by FTIR but Al and Si were clearly detected by XRF analysis.

### *Characterisation of the Deposits and Pustules Material*

Samples of the small white deposits and large translucent pustules were analysed by FTIR. The spectra obtained show the typical bands of metal monocarboxylates (Noble et al. 2002; Robinet and Corbeil 2003; Noble and Boon 2007; Centeno and Mahon 2009; Ferreira et al. 2011) namely the  $\text{COO}^-$  asymmetric and symmetric stretch around 1540  $\text{cm}^{-1}$  (sometimes seen as a doublet) and 1400  $\text{cm}^{-1}$  respectively, as well as bands characteristic for the fatty acid chains and free fatty acids (shoulder at 1,710  $\text{cm}^{-1}$  corresponding to the  $\text{C}=\text{O}$  vibration). Identification of the metal counterpart (Zn, Pb or Ca) requires further analysis with other techniques.

## Summary

Microscopic examination of *The Menaced Assassin* by René Magritte has revealed that the peculiar freckled appearance of the painting previously confused with mold is in fact due to the presence of radiating micro cracks possibly saturated with varnish. The occurrence of these cracks is apparently related to the formation of metal soaps that accumulate at the surface of the painting in the form of aggregates of very small white particles, larger translucent pustules and a whitish haze. The simultaneous occurrence of these three types of manifestations is somehow unusual and needs to be further investigated.

The formation of soaps is a well known conservation issue in both old and modern paintings and is due to the reaction of metals from pigments in the ground layer or in the paints, with free fatty acids from the oil binding medium. Calcium carbonate, lead white and zinc white can lead to the formation of metal soaps and have all been identified in the ground layer, but further analysis is needed to precise which of the metals are involved in the saponification.

Other components and factors can contribute to the formation of soaps. The ground layer for this painting for example is unusually rich in coarse calcium carbonate particles when compared to other Magritte paintings also examined in preparation for this exhibition. The ensuing porosity of the ground may have facilitated the absorption of free fatty acids. The presence of kaolin is also known to lower the local pH and promote some of the reactions involved during the saponification (Ferreira et al. 2011). Environmental conditions can play a role as well (Cotte et al. 2006). The high humidity of the previous collector's uncontrolled environment might also have contributed to the speckled appearance of the surface of *The Secret Player*, 1927 (Royal Museums of Fine Arts of Belgium) although no white deposits on the surface are evident on this painting. Comparison with another Magritte painting from 1927, *Meaning of Night* (The Menil Collection, Houston) that exhibits a similar patchy appearance in dark passages, but again no white droplets on the surface, suggests that the formation of the soaps is dependent on a combination of external forces and material composition.

Once the removal of the discoloured varnish and wax resin residue was complete the nuances of Magritte's original palette could be appreciated. Even after treatment, the presence of the soaps and associated patchy appearance was still visually distracting in areas. With this in mind, a decision was made in consultation with the exhibition curator to do a minimum of inpainting in the most affected areas. This solution allowed for the appreciation of the composition without completely disguising the paint film defects. With the work on display, monitoring of the surface will continue. It is hoped that in the museum environment, the factors contributing to the soaps formation have been arrested and no further conservation intervention will be required to stabilise *The Menaced Assassin* for the near future.

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