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Discovery and multi-analytical study of the last missing quarter from René Magritte's La pose enchantée

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Abstract

The last missing quarter of *La pose enchantée*, a 1927 Magritte's oil painting disappeared in 1932, has been finally found beneath *Dieu n'est pas un saint*, picture painted by the Belgian surrealist between 1935 and 1936, conserved at the Brussels Magritte Museum (Royal Museums of Fine Arts of Belgium) (inv. 11681). The in-depth study conducted on *Dieu n'est pas un saint* by means of non-invasive and complementary imaging and analytical techniques has allowed formulating substantiated conclusions regarding this double painting. On the one hand, the routine imaging methods, including XRR, IRR and digital microscopy, have delivered a comprehensive outcome regarding the transformation process of the right top part of *La pose enchantée* into the current composition. On the other hand, the pigments used for both the visible and the hidden composition have been characterized through the MA-XRF analysis of the whole picture and punctual Raman measurements. Additionally, the present paper proposes a virtual colorization of *La pose enchantée*, which has been build on the basis of the overall material evidences collected about the right top part lying beneath *Dieu n'est pas un saint*.

Keywords: René Magritte, Hidden painting, MA-XRF, Pigments, Non-invasive imaging techniques

Introduction

The most famous Belgian surrealist artist, René Magritte (1898–1967), was always reluctant to talk about the painting materials and techniques he used, and, although abundant, the literature devoted to Magritte deals primarily with stylistic, iconographic and psychoanalytic approaches [1–5].

As a result, the materiality of his work is poorly documented and, so far remains understudied. Yet it is by nature a fundamental aspect of Magritte's work that conditions the preservation and the transmission of his cultural heritage legacy. In such circumstances, questioning the painting materiality appears as the only possible way of moving forward. The research project *Magritte on practice* has been created in response to the lack of available information on Magritte's painting materials and techniques. This on-going research project, initiated in 2016, is a collaboration of the Royal Museums of Fine Arts of Belgium (MRBAB/KMSKB) and the Centre Européen d'Archéométrie of the University of Liège (CEA), which aims to throw a new light on the René Magritte's painted oeuvre by applying technical art history and conservation science tools on an extended number of paintings he made throughout his career. For this purpose, 42 oil paintings and 21 gouaches made between 1921 and 1963, conserved at the Magritte Museum, are being investigated in situ by means of non-invasive and complementary scientific imaging and analytical methods.

The in-depth study of a large panel of Magritte's paintings through scientific tools addresses multiple issues; one of them is the discovery of lost youth compositions. Indeed, the precarious financial situation of the painter between 1920 and 1935 had led him to regularly reuse canvases from his former compositions. Regarding this Magritte's habit and the extended corpus of works intended to be investigated, one could reasonably expect to discover underlying painted compositions,

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unpublished or indexed in the René Magritte Catalogue Raisonné (RMCR) with the mention "whereabouts unknown".

It is precisely in the frame of *Magritte on practice* that the last quarter of *La pose enchantée* has recently been unveiled, amongst the oil paintings from the Magritte museum collection.

La pose enchantée (RMCR n°163) is a major Magritte's large-scale oil painting made in 1927 that has disappeared since 1932 [6]. It has first resurfaced in 2013 through the discovery of its upper and lower left parts, in the subsurface of two oil paintings from 1935, respectively *Le portrait* (RMCR n°379) and *Le modèle rouge* (RMCR n°382) [7, 8]. In 2016, it is the lower right section of *La pose enchantée* that was discovered beneath the paint layers of *La condition humaine*, dating also from 1935 (RMCR n°390) [9]. Until very recently, what happened to the upper right section of this quartered painting remained a challenging question addressed to art historians and conservation scientists around the world. The last missing quarter is now located on the subsurface of *Dieu n'est pas un saint*, painted by Magritte in 1935–36 (RMCR n°392), shown in Fig. 1. The present paper proposes an overview of the technical and material information collected about this double picture, by combining X-ray Radiography (XRR), infra-red reflectography (IRR), X-ray fluorescence (XRF), Raman spectroscopy (RS), high-resolution photography under visible and ultra-violet (UV) light, and digital microscopy techniques.

Fig. 1 René Magritte, *Dieu n'est pas un saint*, 1935–36, oil on canvas, 67.2 × 43 cm, MRBAB/KMSKB, Brussels, inv. 11681. ©Ch. Herscovici, Belgium

Experimental

A high-resolution photographic documentation was first gathered. It incorporates full size images of *Dieu n'est pas un saint* under visible (Fig. 1) and UV light (Additional file 1: Figure S1), acquired by using the homemade scanning system of the CEA [10]. The acquired images have been enriched by XRR and IRR images (Fig. 2). The painting surface was also examined with a Dino-Lite digital microscope™.

In order to obtain further details on the hidden composition and to get a better understanding of the pigments distribution through elemental maps, XRF spectroscopy was used in macro scanning mode (MA-XRF). The XRF scan of the whole painting has been completed in approximately 35 h by using the CEA translation stage and homemade XRF system [11–13], made of a Moxtek™ Magnum X-ray tube (50 kV) (with a Ag anode), a detector X-123SDD Amptek™ (25 mm^2), with a resolution of 130 at 5.9 keV. Scanning step was set to 1 mm, speed to 3 mm/s. X-ray tube was set to a voltage of 40 kV and a current of 120 μA. Spectra were treated in batch mode using PyMCA [14], allowing to separate the signals from the different chemical elements.

The analyses by RS were performed with the Enwave Optronics setup (portable Raman analyzer I-Dual-G), using a laser at 785 nm [15]. Three Raman spectra of 10 s integrated three times were acquired for each of the twelve investigated sites, with the lowest laser power necessary to obtain valuable results (ca. 30 mW). The recorded spectra were treated using GRAMS AI™. The MA-XRF analysis and the RS measurements were performed at the MRBAB/KMSKB thanks to the CEA portable instrumentation.

Results and discussion

A preliminary visual examination of the painting without frame pointed out the presence of painted canvas edges alongside the stretcher. The blue and ochre colors of the current background are actually extended over the tacking edges. The XRR image recorded for *Dieu n'est pas un saint*, illustrated in Fig. 2, unveiled straightaway a female nude from above the head to the lower breast, unrelated to the current composition. Portrayed in profile, in a sculptural style, the truncated large-scale female figure beneath the surface paint layers was promptly

Fig. 2 XRR and IRR of *Dieu n'est pas un saint,* in landscape orientation, revealing a truncated female nude (from above the head to the lower breast) beneath the current picture

identified as being the last missing quarter of *La pose enchantée* (RMCR n°163), presented in Fig. 3. Executed by Magritte in 1927, this large-format oil painting had disappeared since more than 80 years. The painting was shown the same year in October at the Galérie Epoque, Brussels. The last trace of *La pose enchantée* is found in a letter dated 3th November 1932 from the secretary of the Oeuvre Nationale des Beaux-Arts asking Magritte to remove the painting that has been submitted for the Salon held in the Palais des Beaux-Arts, Brussels (See: RMCR n° 163). Between 2013 and 2016, the top left side and the lower left and right parts of the lost composition have been located underneath three distinct oil paintings from 1935, respectively titled *Le portrait* (RMCR

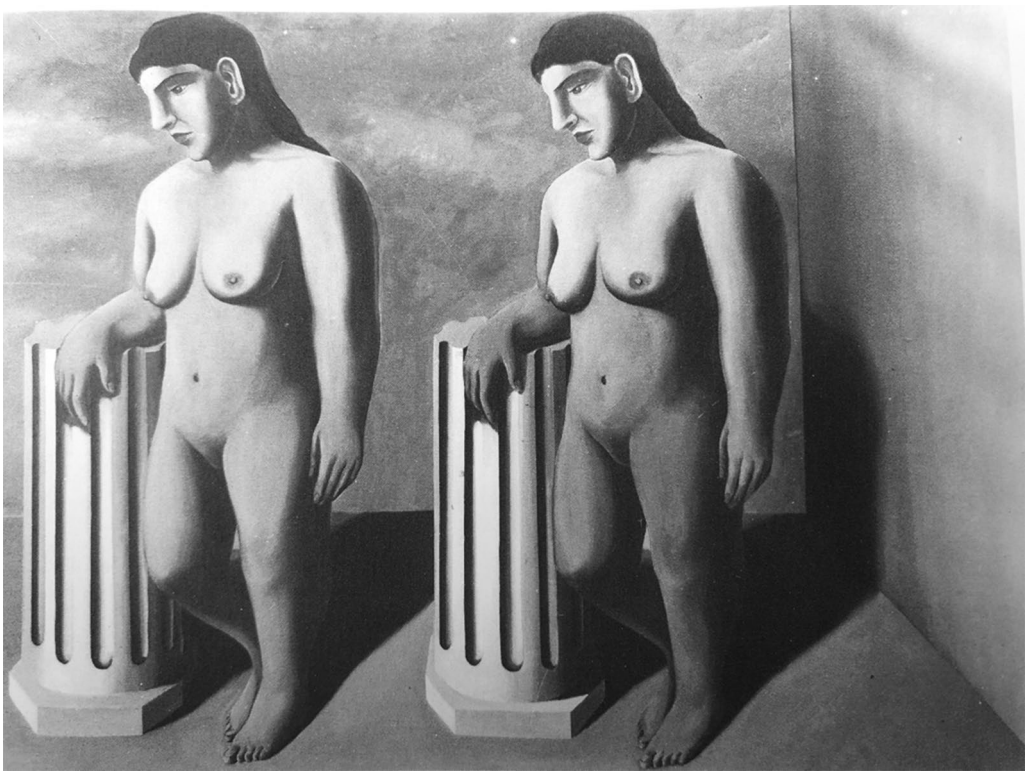

Fig. 3 René Magritte, *La pose enchantée*, 1927, oil on canvas, listed under n°163 in the RMCR with the mention "whereabouts unknown". Black and white photograph reproduced in RMCR. ©Ch. Herscovici, Belgium

n°379), *Le modèle rouge* (RMCR n°382) and *La condition humaine* (RMCR n°390) [8, 9]. The discovery of the top right part of *La pose enchantée* beneath *Dieu n'est pas un saint* (RMCR n°392) finally allows resolving the worldwide puzzle caused by this important Magritte's youth painting, untraceable from 1932 [6]. Note that the last discovered quarter differ from the other parts through its smaller format (67.2×43 cm). The Fig. 4 shows the four X-ray radiographs unveiling the four parts of *La pose enchantée*, superposed on the black and white photograph of the lost composition (reproduced in the RMCR). By comparing the XRR and the picture currently visible (Figs. 1 and 2), one can see the skyline dividing the top blue and the lower ochre backgrounds perfectly superposes the borderline between the sky and the wall from the underlying composition. While the sky area (including the nude) has been transformed into a uniform blue background, the wall has been changed into an even ochre background. Here, it is interesting to note that Magritte used the blue and ochre colored surfaces exactly in the opposite way for transforming the upper left side of the quartered painting into *Le portrait*. Besides the routine imaging techniques, the MA-XRF analysis conducted on the whole picture has provided further substantial information about the hidden picture, especially in regards to the palette used for it. Indeed, the elemental distribution maps recorded for *Dieu n'est pas un saint* allowed characterizing the inorganic pigments associated to the features formerly depicted. For the sake of clarity, the material information and the analytical data collected for the ground layer, the female figure, the sky/blue background, the wall/ocher background, the dove and the shoe, are discussed separately.

Ground layer

The ground layer is no longer accessible on the canvas edges. Although it remains difficult to conclude anything without cross-section to investigate, the higher intensity of the Zn and the Ca signals detected in the whitish thin linear cracks, along the length of the stretcher edges, is compliant with a zinc white rich priming layer rich, involving a calcium-based extender, such as chalk and gypsum.

Female figure

On the basis of the MA-XRF PbL, Fe and Zn maps shown in Fig. 5, the flesh tones of the female figure primarily involve lead white, zinc white and iron based pigment(s).

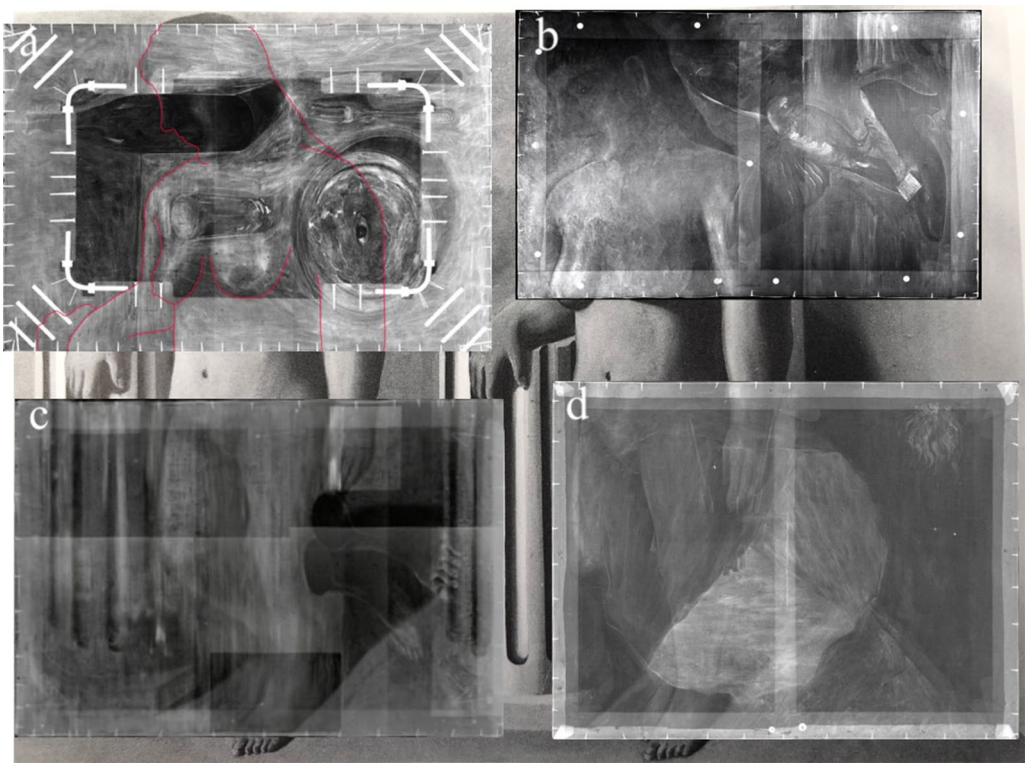

Fig. 4 X-ray radiographs unveiling the four parts of *La pose enchantée* superposed on the painting illustration taken from the RMCR. **a** *Le portrait*, 1935, oil on canvas, 73.3 × 50.2 cm, MoMA, New York [7, 8], **b** *Dieu n'est pas un saint*, 1935–36, Oil on canvas, 67.2 × 43 cm, MRBAB/KMSKB, Brussels, **c** *Le modèle rouge*, 1935, Oil on canvas, 72 × 48.5 cm, Moderna Museet, Stockholm [7, 8], **d** *La condition humaine*, Oil on canvas, 54.2 × 73.2 cm, Norwich Castle, United Kingdom [9]. ©Ch. Herscovici, Belgium

By comparing the XRR and the PbL map, one can see that the features appearing brighter in the radiograph correspond to lead rich areas. The Zn scan image outlines some areas richer in zinc white, such as the face and the region between the left breast and the left arm, and appears as the negative image of the PbL distribution map. The MA-XRF scan of mercury shows isolated Vermilion-based highlights over the lips, the nose and the ear of the nude. The obtained Hg distribution map is fully consistent with the results obtained for the left female figure lying beneath *Le portrait* [8]. The distribution of the Fe signals detected in the nude indicates the use of one or more ferrous pigment(s) for the flesh tones rendering. The presence of Fe-based pigment(s), such as iron oxides, is particularly evident in the face, in the neck and in the left breast region. The iron element is much less abundant in the hair region, which is distinguished through much higher contents in zinc. These findings suggest that the dark colors used for hair, should involve zinc white admixed with dark pigment(s) containing light elements, such as carbon black and bone black.

Sky/blue background

The MA-XRF scanning performed on *Dieu n'est pas un saint* also provided elemental information about the overpainted sky. As shown in Fig. 5 the fluorescence emission of the Cr, Zn and PbL elements recorded all around the female figure seems related to the hidden sky and supports the use of Cr-based pigment(s), zinc white and lead white mixtures for its depiction. The identification of a chromium pigment throughout the sky is fully compliant with the results for the upper left part of *La pose enchantée* alias *Le portrait* [8]. However, the Cr and Zn elements appear more abundant in the area edging the wall. The detection of more intense Cr signals, originating from the paint layer beneath the dove, suddenly interrupted in the nude's right shoulder, and, the greenish blue color observed under microscope on the subsurface of the wings suggest that the right section of the sky was greener than its left counterpart.

A virtual colorization of *La pose enchantée,* elaborated on the basis of the MA-XRF scanning results and the examination under microscope of (accessible) subsurface

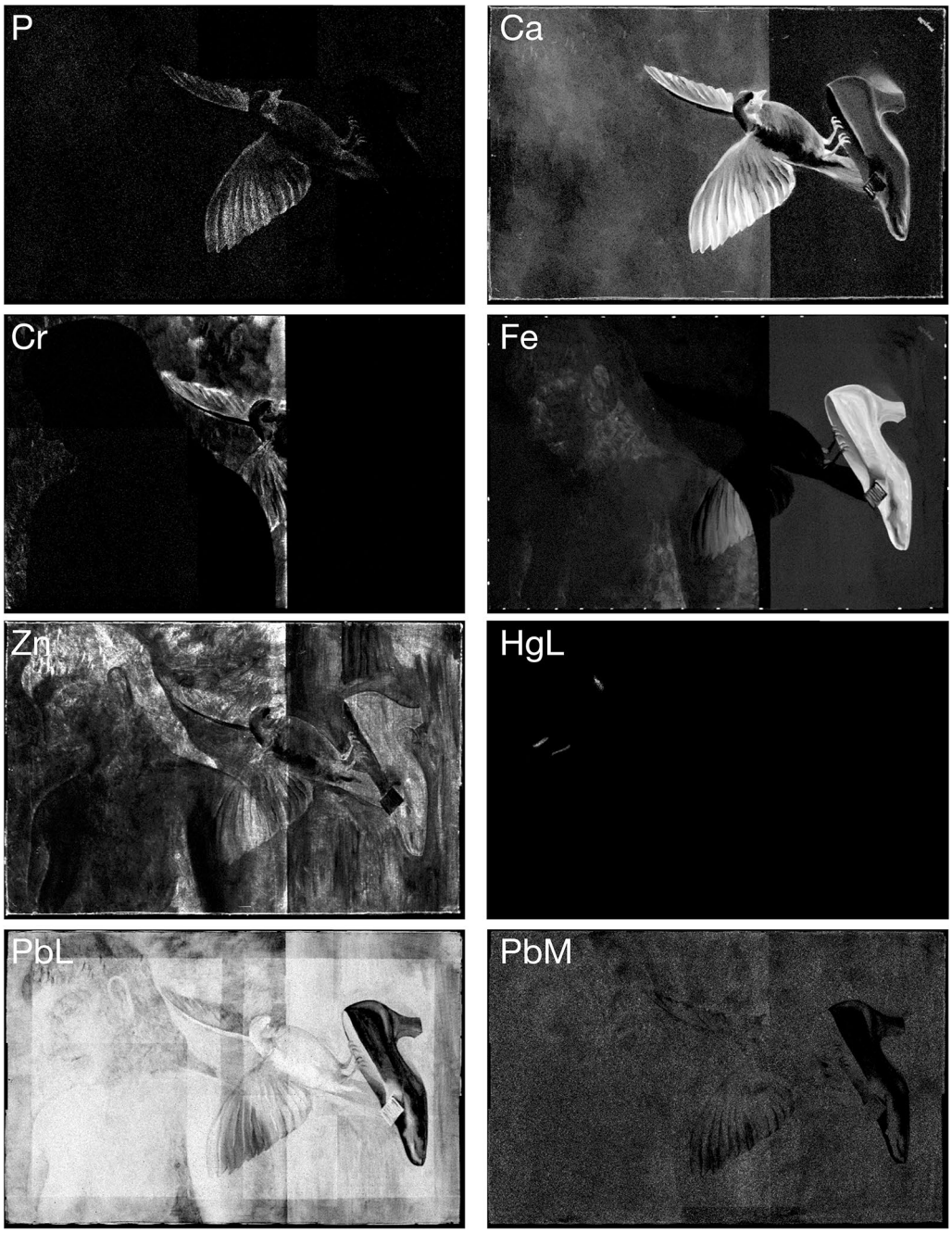

Fig. 5 MA-XRF maps showing the distribution of the P, Ca, Cr, Fe, Zn, Hg (L rays) and Pb (L and M rays) elements detected all over the painting. The grey scale corresponds to the intensity of the signal of each element, black being the minimum of the signal, white, the maximum

paint layers, is proposed in Fig. 6. The As noticed above, the current blue background extends over the tacking edges, and then dissimulates the paint layers from the sky and the nude underneath. However, the examination of the blue painted edges with digital microscopy device allowed the distinction of two or three blue paint layers according the location on the edges. As shown in Fig. 7, three different blue layers are superposed on the top left corner of *Dieu n'est pas un saint* that corresponds to a part of the previous sky. The deepest blue layer, punctually visible under microscope and appearing lighter and greener than the upper ones, is presumed to be a tiny unscathed part of the sky from *La pose enchantée.* The green pigments particles observed in the ×200 magnified

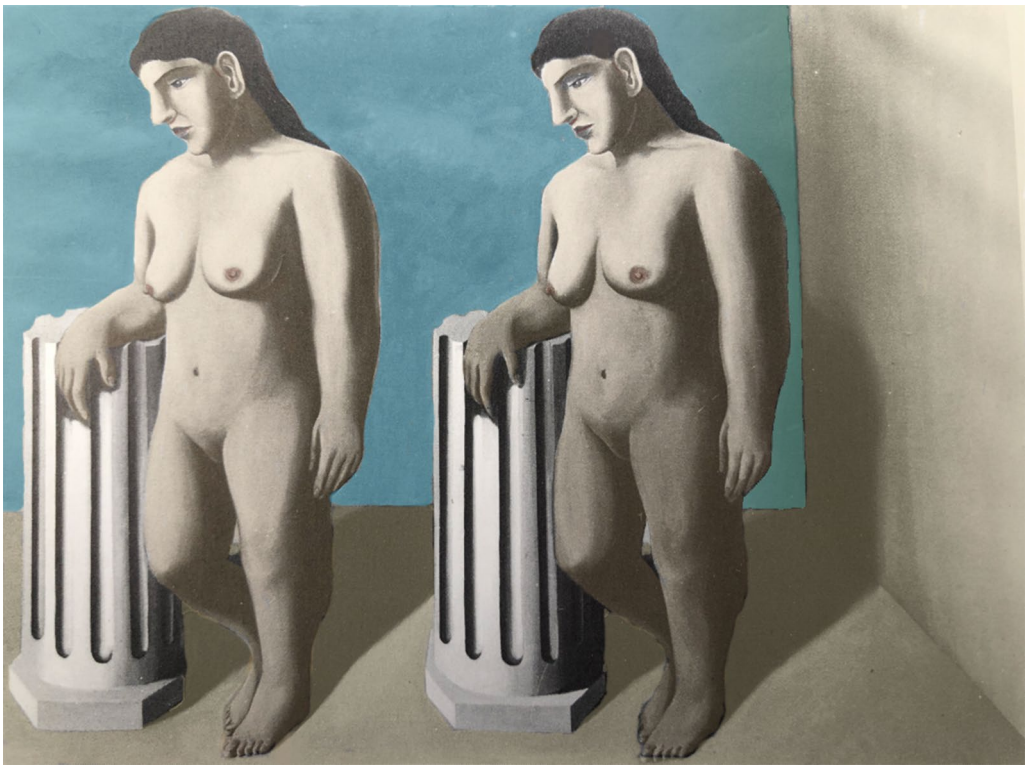

Fig. 6 Virtual colorization of the black and white photograph of *La pose enchantée,* reproduced in the RMCR, which has been elaborated on the basis of the MA-XRF results and the examination under microscope of the accessible subsurface paint layers

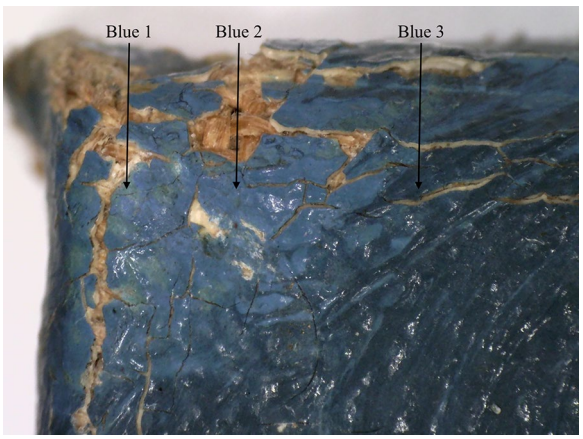

Fig. 7 Magnification ×50 of the left upper corner of *Dieu n'est pas un saint* obtained with a DinoLite™ digital microscope, showing three distinct blue paint layers (Blue 1, Blue 2, Blue 3) that are overlaid. The deepest one (Blue 1), appearing lighter and greener than the upper ones, is presumed to be a tiny unscathed part of the sky from *La pose enchantée*

image and the detection of chromium signals through MA-XRF in the related area tend to evidence the use of a chromium green pigment to achieve the sky color shades.

This layer is also distinguishable under UV light exposure through its greenish fluorescence (see Additional file 1: Figure S1), likely resulting from its contents in zinc white. The blue layer directly applied over it exhibits a bright blue color without green shade. In comparison, the third and upper blue layer lying is much darker. The pigments responsible for the blue tones of the surface and subsurface layers remain unidentified. However, the blue color and the even distribution of calcium throughout the blue background are compatible with the presence of ultramarine [16] in the top paint layers. The detected signals of P (lighter than Ca) and PbM can be considered as coming from the surface layers as well. Therefore, on the basis of the Ca, P and PbM maps, shown in Fig. 5, the current blue background could be made of lead white, ultramarine and Bone black, the late one being characterized by its P and Ca contents [17]. The punctual Raman measurements performed on several blue sites led to the identification of lead white and bone black but did not confirm the use of ultramarine.

Wall/ocher background

In terms of composition, the ochre and blue backgrounds have in common all the elements detected by MA-XRF,

except chromium and mercury. The even distribution of the Fe, PbM, Ca and P elements in the overall ochre region suggests the presence of iron oxide pigment(s), such as ochers and earths, lead white and bone black on the painting surface. Bone black and lead white were successfully identified through Raman analyses conducted on the visible ochre area. A close examination of the ocher brushstrokes surrounding the dove and the shoe pointed out that they were applied subsequently to the depiction of both features. Regarding the wall lying beneath the ocher background, the Zn and PbL distribution maps indicate subsurface layers zinc white rich, involving lead white as well. As mentioned above, the skyline, dividing the top blue and the lower ochre background, perfectly overlaps the demarcation line of the wall belonging to the former composition. The dark brown borderline partly covered by the upper ocher paint layer could then correspond to the left outline of the overpainted wall. Interestingly, the examination of the ocher region edging the skyline under microscope revealed the presence of darker grey/brown under layers. Inversely, the buff-colored underlayer partly visible on the lower edge, which fluoresces under UV light (see Additional file 1: Figure S1), supports the use of much brighter tones in the outside section of the wall. These findings tend to evidence that the hidden wall was made of different shades of brown and grey, lighter and lighter from left to right. The MA-XRF measurements conducted on a part of the lower tacking edge showed that the buff-colored under layer and the ocher top layer mostly differ through the intensity of the detected Zn signals. Indeed, the underlayer that emits more intense Zn signals clearly stands out from the Zn distribution map.

Dove, shoe and signature

Concerning the dove from the current image, the Pb, Ca and P distribution maps suggest a prominent use of lead white and bone black for depicting the bird [18]. Punctual Raman analyses performed on the grey and black brushstrokes confirmed the combination of bone black and lead white. The detection of more intense Zn and Cr signals, associated to the former sky, in the dark grey and black shades of the dove can be explained by the fluorescence emission of both elements, which is less attenuated in the areas richer in bone black (Ca and P being lighter elements than the Pb, more abundant in the surrounding regions). In the same way, the Fe and Zn signals detected in the upper part of the left wing, partly covering the nude's shoulder can be considered as coming from the flesh tones lying beneath. The shoe seems mainly made of iron-based pigment(s) admixed with variable proportions of lead white, the white pigment being more abundant in the lightest brown shades found in the buckle and inside the shoe. The use of earth pigments could explain the concomitant presence of Ca and Fe elements found out in the shoe and in the legs of the bird. One can see that the signature stands out in the Fe and Ca maps. The abundance and the even distribution of both elements are compliant with a writing based on earth pigments.

Conclusions

The in-depth study of *Dieu n'est pas un saint* by means of complementary imaging and analytical methods delivered plenty of material and technical information about the last missing quarter of *La pose enchantée* lying underneath the visible picture. While the XRR allowed visualizing the hidden composition in detail, the MA-XRF analysis made possible to characterize the pigments associated to the overpainted features, as well as those related to the current composition. These results are in good concordance and complimentary with the ones obtained on the other quarters [8, 9]. Strips of canvas of a few centimeters wide in the middle of painting are still unaccounted for. Unlike the three quarters of *La pose enchantée* previously discovered, the XRR has highlighted the obvious linkage existing between the picture of *Dieu n'est pas un saint* and the overpainted image. Indeed, the skyline dividing the top blue and the lower ochre backgrounds exactly reproduces the borderline between the sky and the wall underneath. Also, while the sky area, including the nude, has been transformed into a uniform blue background, the wall has been changed into an even ocher background. On the basis of the MA-XRF results, the nude flesh tones primarily involve lead white, zinc white and iron oxide pigment(s), the sky is rich in chromium green and zinc white, and, the wall contains large amounts of zinc white. Besides the elemental composition revealed by MA-XRF for both, the hidden and the visible picture, some pigments from the surface paint layers have been successfully identified through RS. A close observation of the painting with the naked eye and the examination of areas of interest under microscope provided further material evidences regarding the original appearance and the transformation process of the right top part of *La pose enchantée.* The hidden wall certainly exhibited different shades of brown and grey, lighter and lighter from left to right and the blue sky most probably displayed uneven bright greenish blue shades.

Additional file

Additional file 1: Figure S1. Photography under UV light of *Dieu n'est pas un saint*. ©Ch. Herscovici, Belgium.

Authors' contributions
CD, EH and DS have realized the in situ measurements (imaging, XRF and Raman), CD, DS, FV and FL have interpreted the results of the analysis. All authors read approved the final manuscript.

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Competing interests
The authors declare that they have no competing interests.

Ethics approval and consent to participate
Not applicable.

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