Painting on glass required the mastery of a difficult skill since projection greatly magnifies details and imperfections. Colour transparency was a constant concern. Watercolours were said to be preferred to oil, but they could also be combined with excellent results.[14] Varnishes would also be mixed with the paints to give them more transparency or applied on top for protection.

Preliminary results on the painting materials have already revealed a correlation between what was mentioned in written historical sources on the production of hand-painted slides and what is found in historical slides of the same date. A change in the colour palette over time was observed. Analyses of the 18th-century slides revealed that, in the early stages of production, pigments such as haematite for red and goethite for yellow were used, as well as copper green, Prussian blue and carbon black pigments,[15] also found in written sources from the same period (e.g. Denecke, 1757)[16] (Fig. 2). In 19th-century English slides from both collections, it was possible to identify colourants mentioned by British authors such as Groom (1855),[7] Rintoul (1857)[17] and Middleton (1876).[18] Examples are the yellow colour Gamboge, Prussian blue, a carbon black pigment and a possible indication for Crimson Lake with the identification of an anthraquinone red lake of animal origin (such as cochineal) with gypsum as filler (Fig. 3).[13] Regarding the varnishes applied, shellac and mastic resins were identified through FTIR analysis in slides from the 18th and 19th centuries, which is also in accordance with the literature of the same period.

The material analysis was found to be essential for an accurate assessment of the conservation state. Although the paintings' poor state of conservation is macroscopically visible in the 18th-century slides by the extreme loss of the paints' cohesion and adhesion to the glass substrate, metal carboxylates and oxalates – known degradation products – were detected along with colour alterations, which is indicative of severe degradation problems (Fig. 2). On the other hand, using as an example the slides from the 19th century from the MUHNAC collection, it is possible to find paints with no macroscopic signs of degradation but with evidence of it at the molecular level, being only a matter of time before this degradation progresses unless the appropriate preventive conservation action is taken.

Furthermore, by understanding in depth how these artefacts were conceived, we can move towards the development of efficient methods for the preservation and reconstruction of original slides. These reconstructions will enable this heritage of magic lantern slides to be experienced in all essentials without putting at risk the safety and integrity of the original slides.

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6. Francisco Frutos, 'From Luminous Pictures to Transparent Photographs: The Evolution of Techniques for Making Magic Lantern Slides', *The Magic Lantern Gazette* 25(3), 2013, pp.3–11
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8. Energy Dispersive X-Ray Fluorescence (XRF) spectroscopy is an analytical technique which measures the emissions characteristic of particular elements when exposed to X-rays.
9. Ultraviolet-Visible (UV-Vis) is an absorption or reflectance spectroscopy that measures the electronic transitions between the ground and excited states of the colourants' atoms and molecules.
10. With Fourier Transform Infrared (FTIR) spectroscopy it is possible to obtain spectra images that result from the interaction of infrared radiation with matter. A Fourier transform is a mathematical operation that enables the best signal to noise ratio in the resulting spectra.
11. Raman is a spectroscopic vibrational technique that enables identification of the components in the sample at molecular level.
12. For example, the studies on window glass production in England by David Dungworth.
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THE MAGIC LANTERN WITHIN

Just one slide this time, but it is the ultimate 'show within a show'. This rackwork slide sent to us by **Patrice Guérin** (Diaprojection) revolves to reveal different images 'projected' by the magic lantern in the centre.

Please keep sending in any slides you have with images of magic lanterns, slides or peepshows and, if possible, let us have some information about them.