AUTHENTICATION IN ART

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Cracks on old paintings like the Mona Lisa make the artwork tough help masterpieces survive for centuries

- **Increase in cracks on a painting are directly linked to the painting's strength**
- **A painting it less likely to snap and break if it has several cracks throughout**
- **Cracks are seen on many old paintings, such as Mona Lisa and The Last Judgement by Hans Memling**

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Cracks on old paintings such as the Mona Lisa look unsightly but may actually be the key to keeping masterpieces stable over centuries, according to new research.

It found restorers should be wary of filling in the cracks, as the network of fractures prevents further damage to the artwork.

The network of cracks allows the surface to expand and contract without paint peeling off and offers protection against degradation.

Pictured, the cracks on the face of a figure depicted in The Last judgement by Hans Memling which is more than 500 years old. researchers found the cracks may be the key to its strength


© RMN Grand Palais (Musée du Louvre) Michel Urtado

Cracks on old paintings such as the Mona Lisa (pictured) appear unsightly but may actually be the key to keeping masterpieces stable over centuries, according to new research

WHAT IS GESSO?

Gesso is traditionally a mixture of animal glue and white pigment.
It is very similar to white acrylic paint, only thinner.
It was applied o wood panels for oil paintings to provide a base for oil.
When wood expands due to increasing humidity, or when it shrinks when the air becomes dry, the gesso becomes cracked.

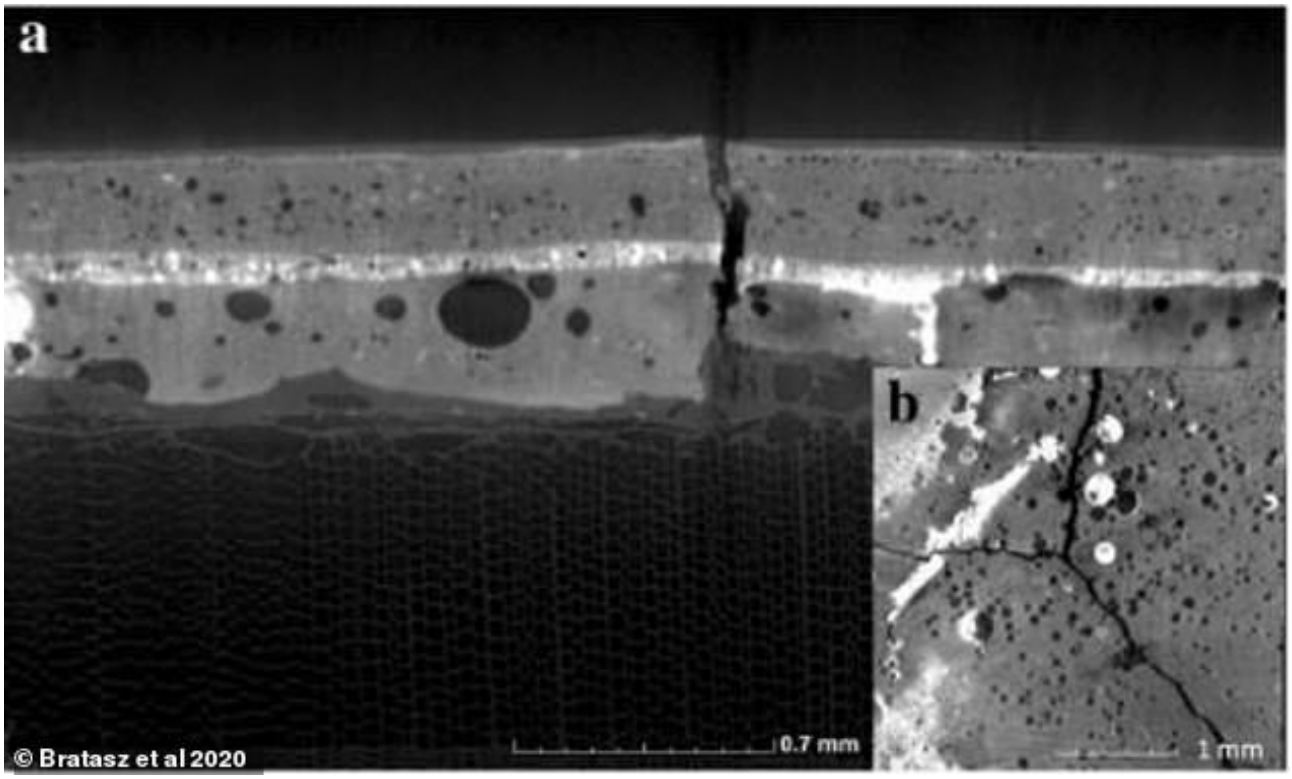
Before the 16th century, most paintings were painted on wood panels.

The crazed surface of oil paintings placed on wooden panels offers greater resistance to changes to moisture in the air than other canvases.

The Mona Lisa, for example by Leonardo da Vinci, is painted on a poplar panel and has a highly cracked surface, known as craquelure in art restoration.

A team from the Polish Academy of Sciences, University of Strasbourg and Yale University investigated cracks on the layer applied to a wood panel as a base.

This so-called gesso is a mixture of animal glue and white pigment.
When wood expands due to increasing humidity, or when it shrinks when the air becomes dry, the gesso becomes cracked.
Researchers prepared wooden panels and joined them joined with gessoes prepared according to traditional recipes.
The specimens were stored at 25°C and relative humidity of 30, 50, 75 and 90 per cent for two weeks before being subjected to splitting tests, which measure how resistant gessoes are to cracking.



Pictured main, X-ray images of a layer of historical paint. the gesso is the third layer from the bottom on top of a wood panel. A crack can e seen throughout. Inset, in image b, a look down vertically on one of the cracks

Using data gathered from scanning historic samples of panel paintings, the authors created a computer model of a panel painting to simulate further crack formation.

The authors found that the stress on the gesso decreased as the number of cracks increased over time.

Lukasz Bratasz, the corresponding author said: 'The current environmental standards for the display of painted wood allow for only moderate variations of relative humidity.
'The safe range was determined based on laboratory testing of when cracks start to form in new, undamaged material.
'However, this does not reflect the physical reality of paintings as they age and complex craquelure patterns form.

'Our research more accurately reflects that physical reality, accounting for changes in the susceptibility to environmental stresses as paintings age.'

He added: 'Our findings offer a potential explanation as to why historical panel paintings with developed craquelure patterns remain stable, even if the environmental conditions they are stored in are far from ideal.

'We hope that this knowledge may contribute to development and acceptance of more moderate-cost climate control strategies in historic buildings and museums, especially ones that may have limited potential for tighter climate control.'