

MARS BARS TO MANET



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Conservation & Technology Dept.



Artists



Scientists

Conservators



Art Historians
& Curators



ART AND SCIENCE

ART

Complex combination of traditional and new materials



SCIENCE

Find out what materials the ART is made from

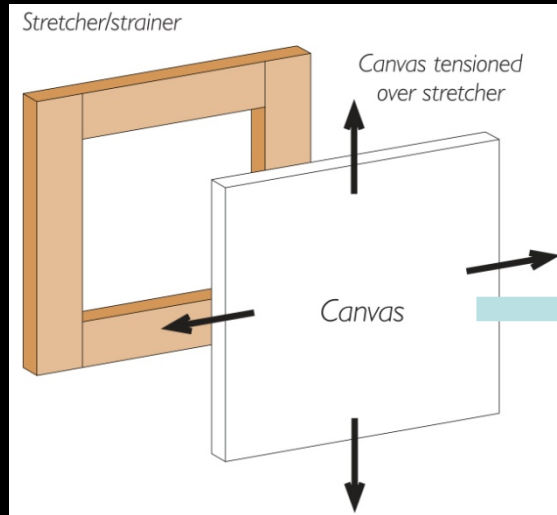
*Helps **curators** interpret the ART*



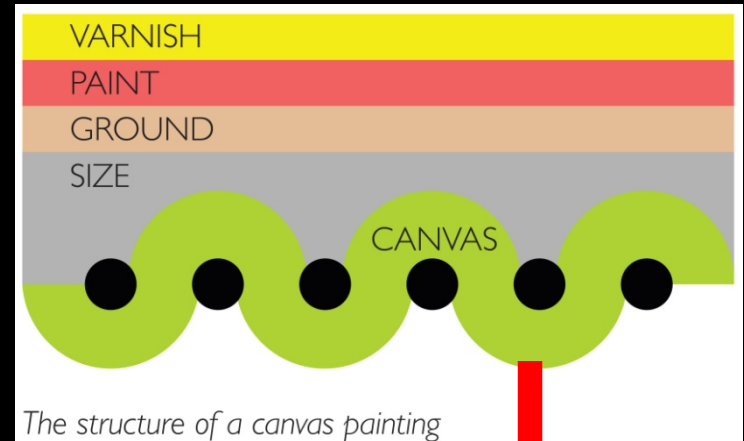
Find out how the materials behave

*Most of the materials degrade- the ART will need to be **conserved** whether they it is 500 years old or 5 years old.*

The Structure of a Painting on Canvas

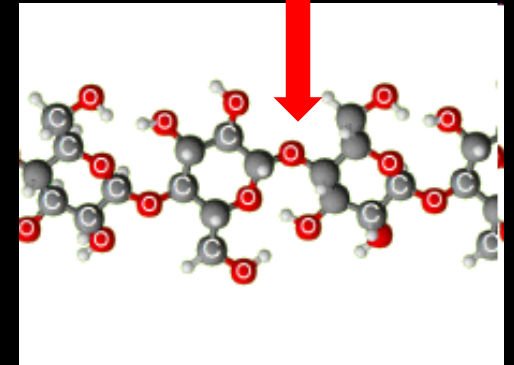


Simplified multilayer structure

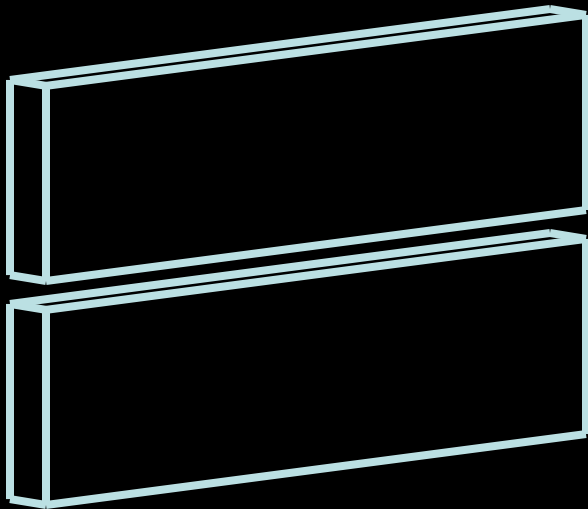


Each layer is made from different polymers

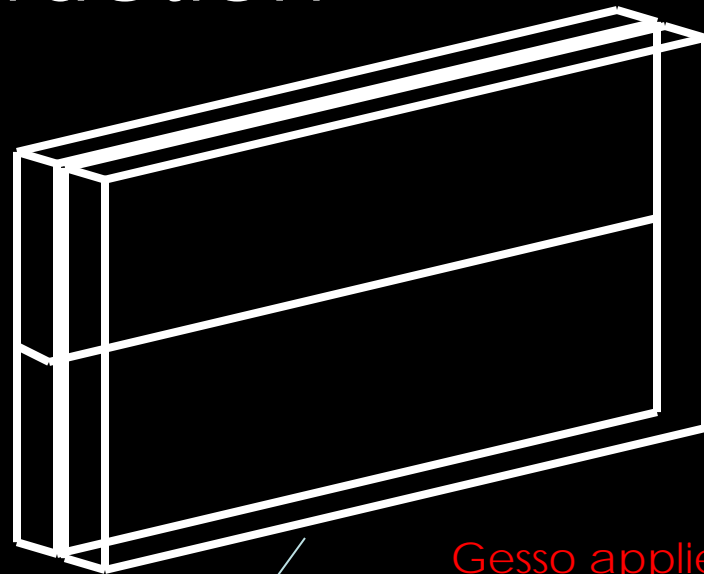
Cellulose in linen canvas



Panel Painting Construction



Oak or poplar boards joined together



Gesso applied as ground layer ready for paint layers

Construction of Rubens's Landscape by Moonlight



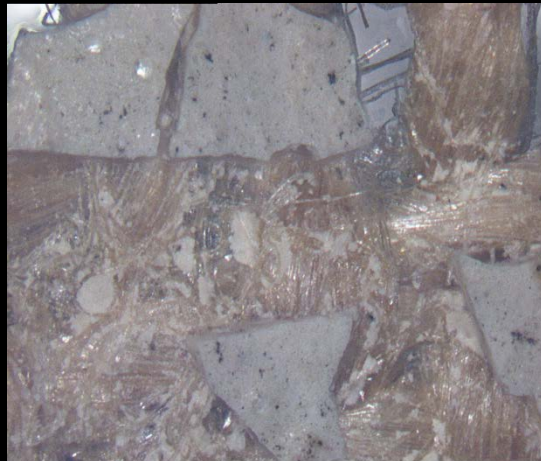
Imaging

- Digital Photography
- Optical Microscopy
- Scanning Electron Microscopy (SEM)-
- *A beam of electrons hit the surface of a material. Scattered electrons are imaged.*



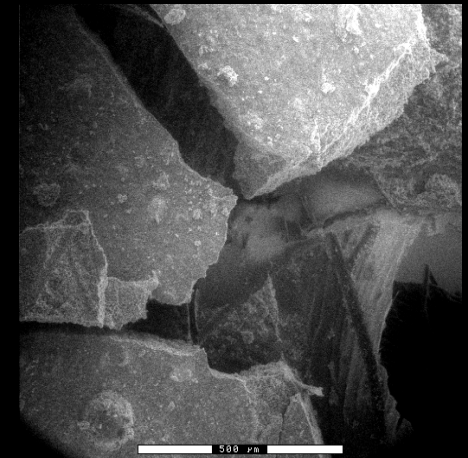
5.0 mm

Digital camera



1.0 mm

Microscope



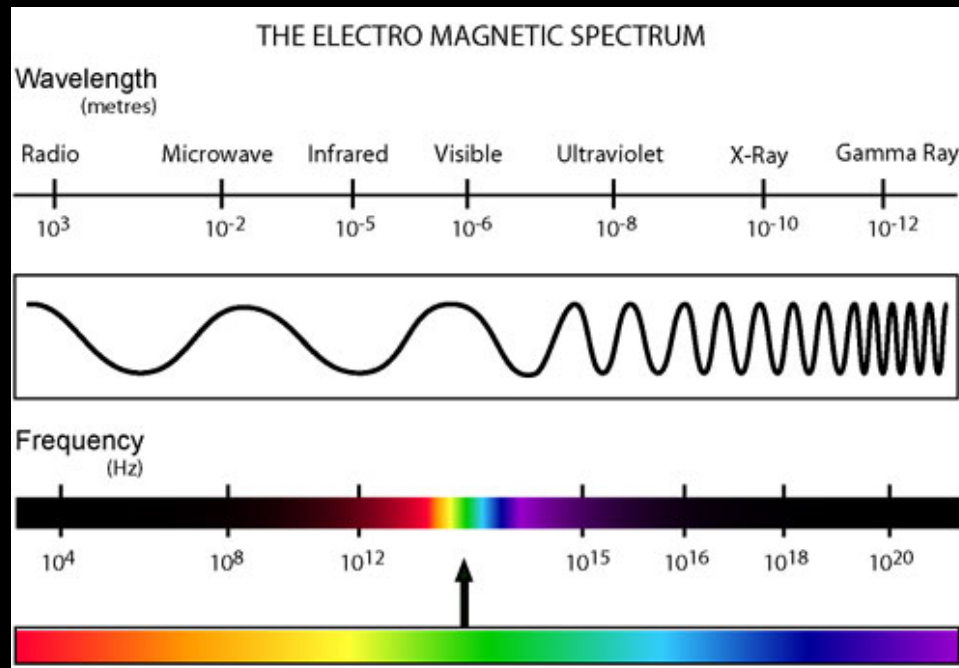
0.5 mm

ESEM

Multilayer Structures

Most layers in a work of art are not transparent to visible light.

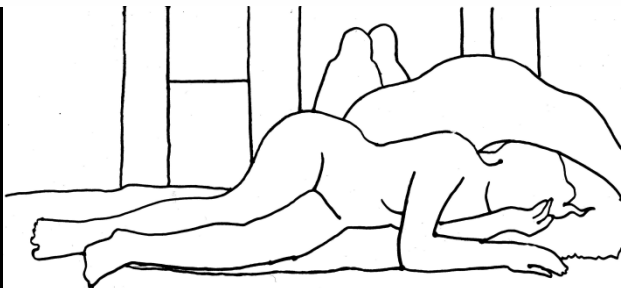
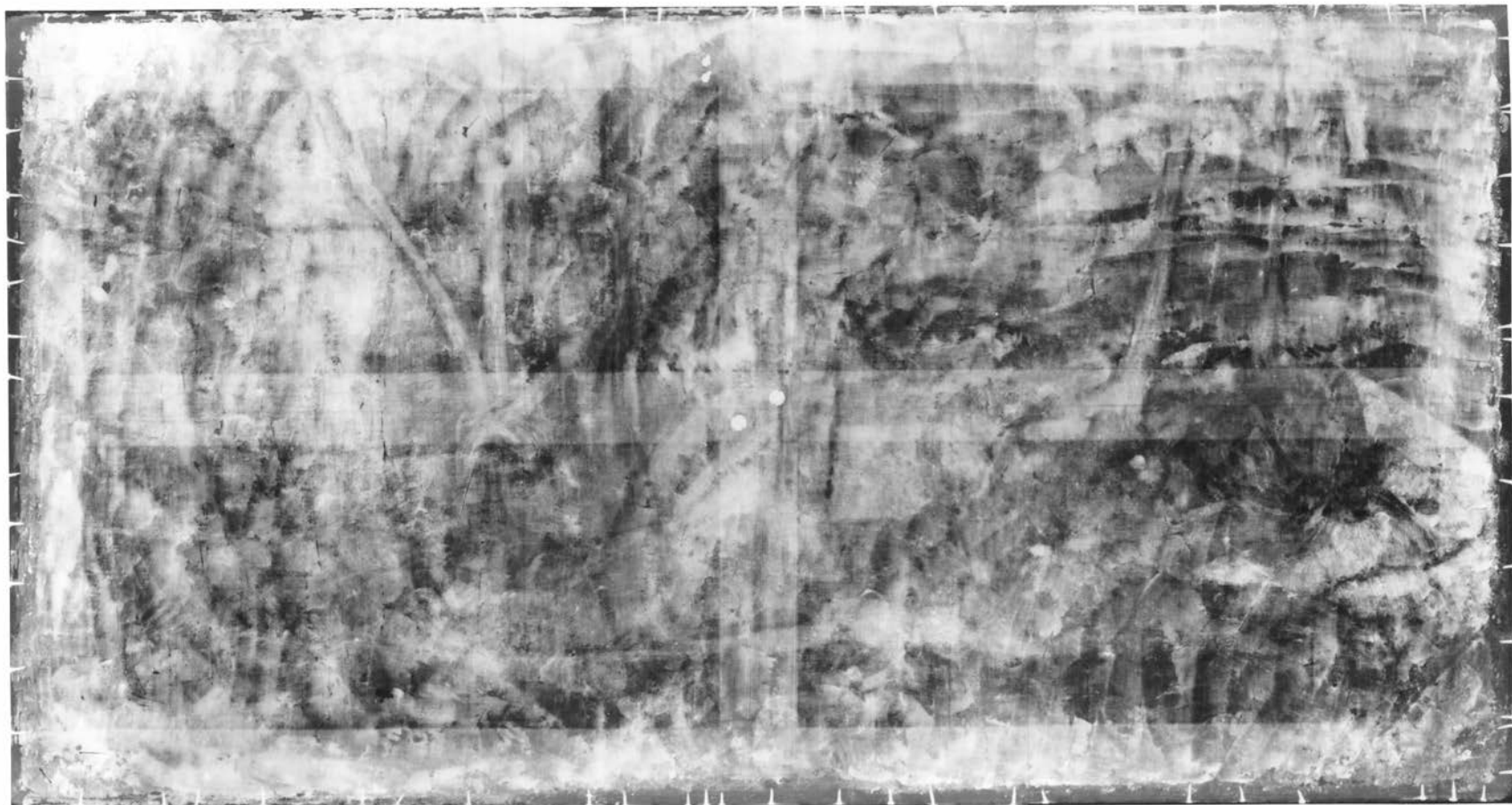
Need to use other parts of the electromagnetic spectrum.



X Rays

- 👉 The X-rays are too small to be scattered by most paint pigments.
- 👉 Pigments such as lead white and dense objects such as wood and tacks, strongly absorb X-rays.
- 👉 The image observed on an X-ray are the areas of absorption.





Infra-Red

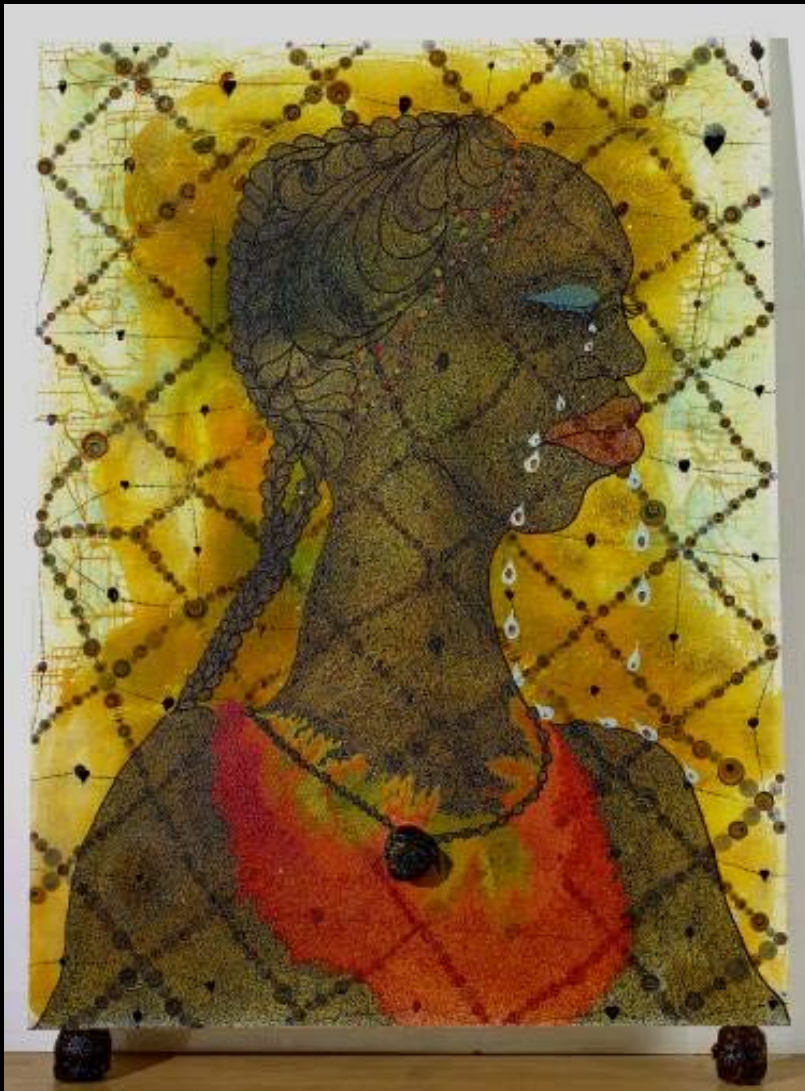
- ❑ Infra red light is not scattered or absorbed by most paint, therefore it penetrates to the under painting.
- ❑ If the under painting has been made in an IR absorbing material (e.g. charcoal) then none of this light will be reflected back and it will appear dark.
- ❑ The "image" shown by an IR reflectogram.

Infra-red Image of a Courtauld Gallery panel painting

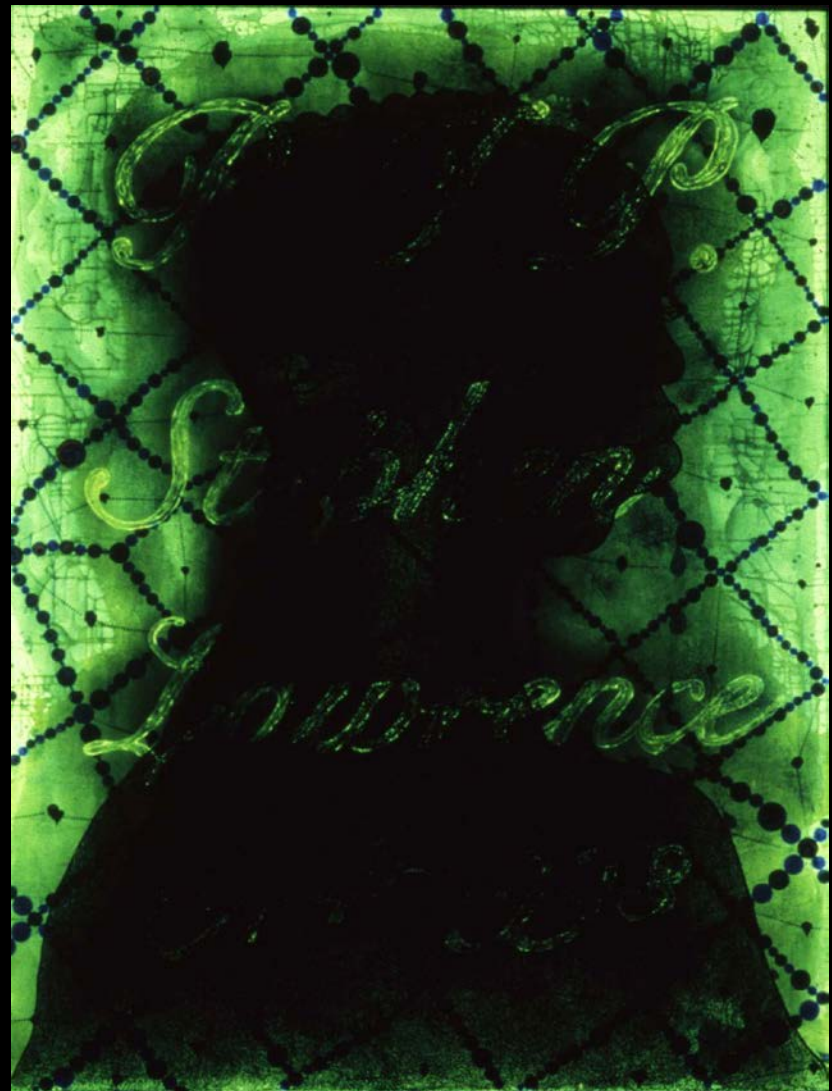


Figures in lower paint layers

Infra Red Reflectography

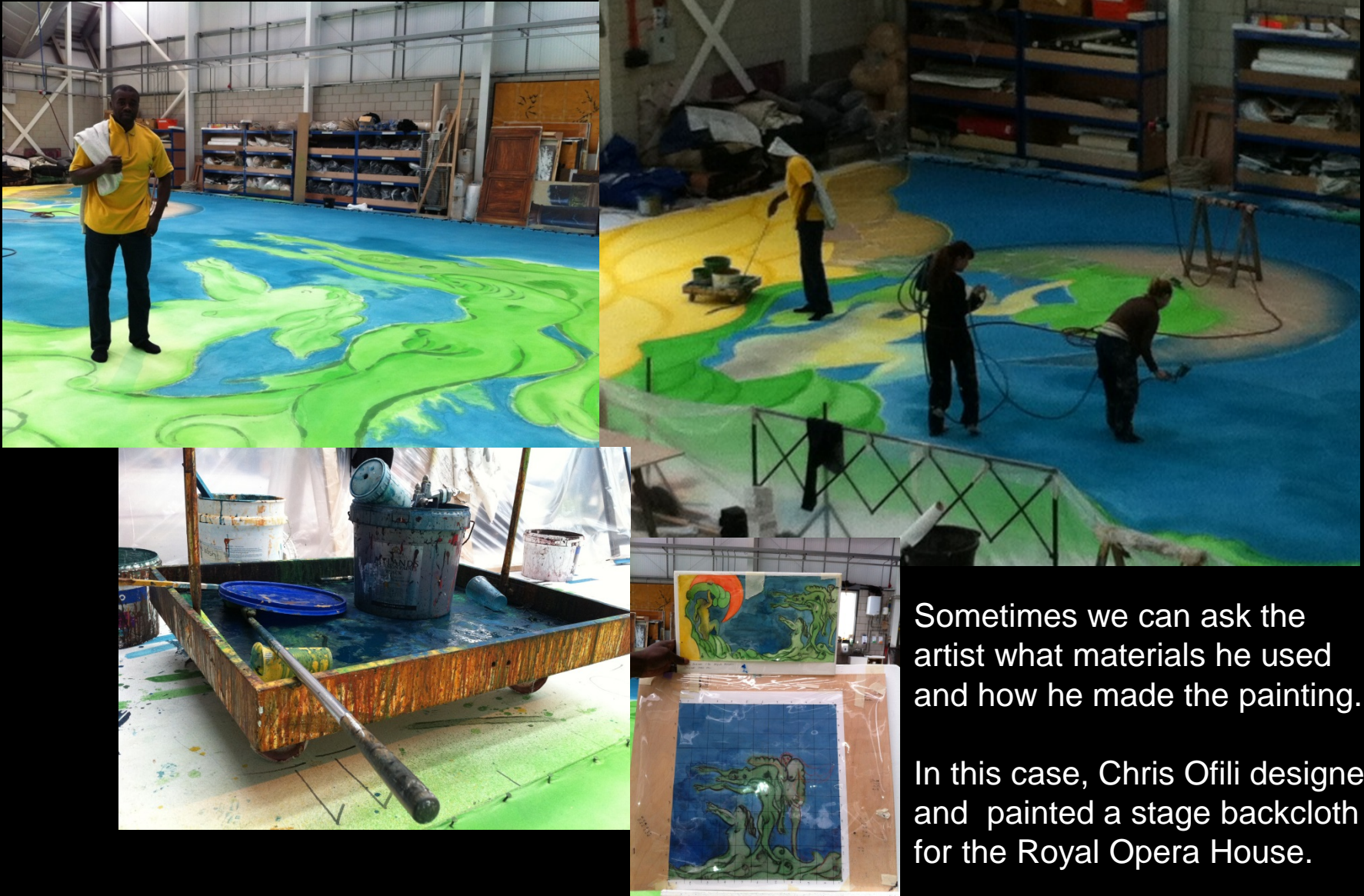


Chris Ofili *No Woman No Cry* 1998



"RIP Stephen Lawrence"

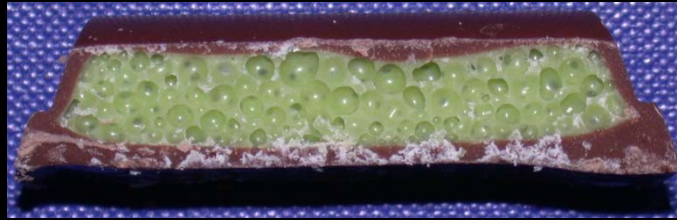
Artists Interviews



Sometimes we can ask the artist what materials he used and how he made the painting.

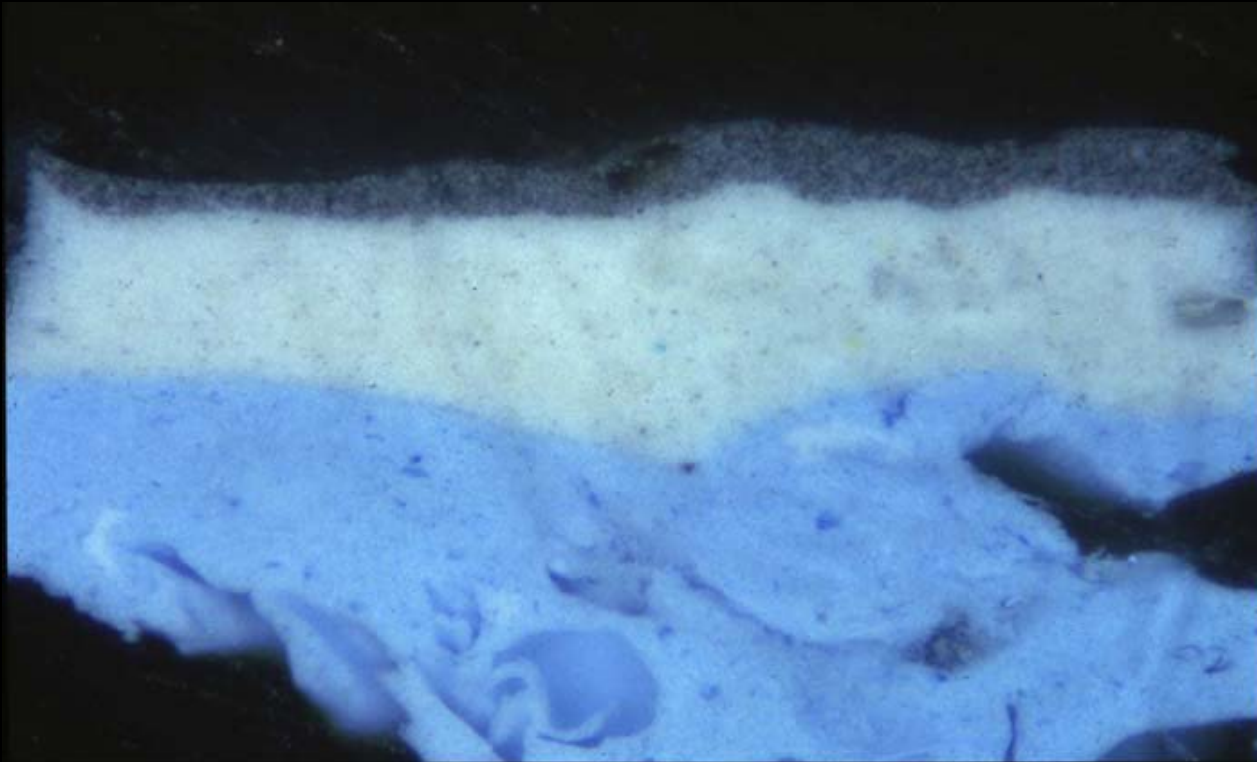
In this case, Chris Ofili designed and painted a stage backcloth for the Royal Opera House.

Cross Sections



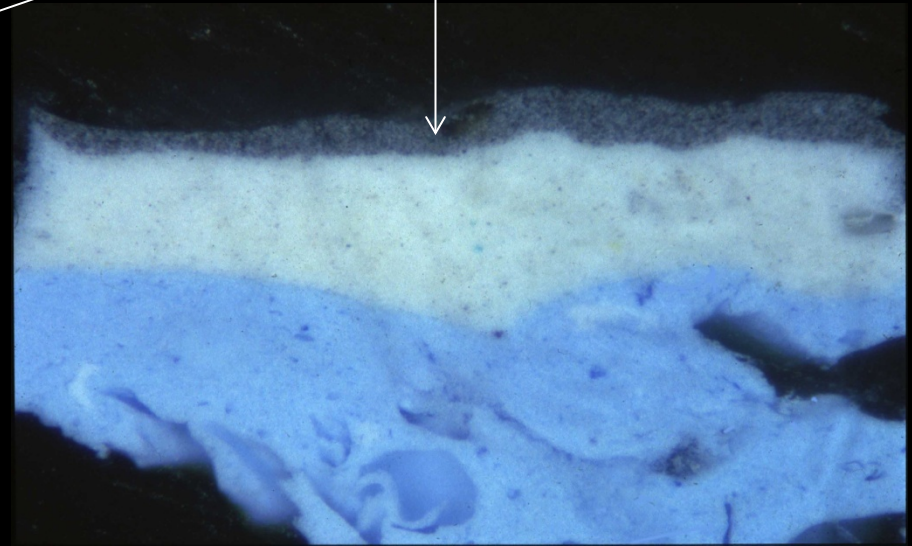
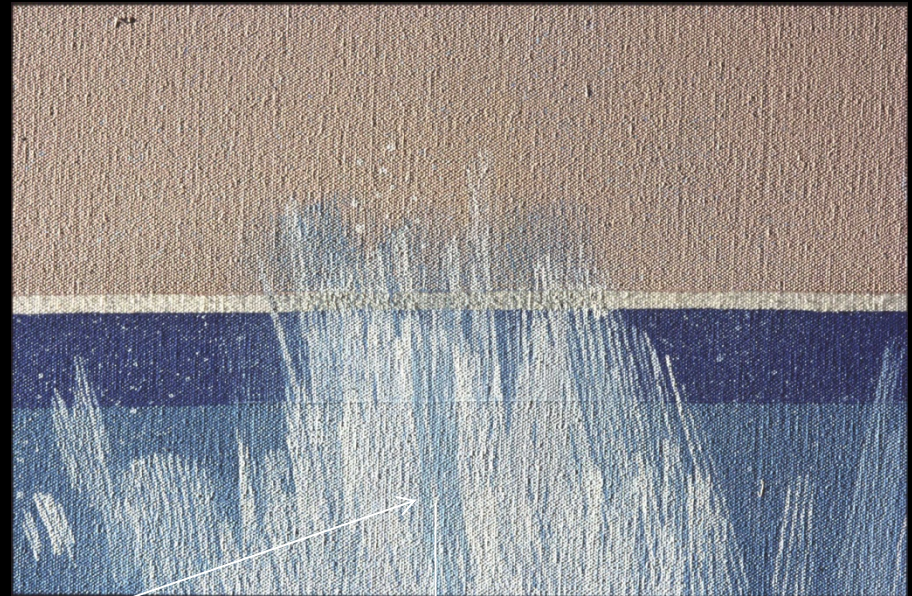
Paint Cross Sections

- ❑ *Take a tiny piece of paint from a damaged area*
- ❑ *Slicing through it to make a cross section*
- ❑ *See the layer structure by looking at it with a microscope.*



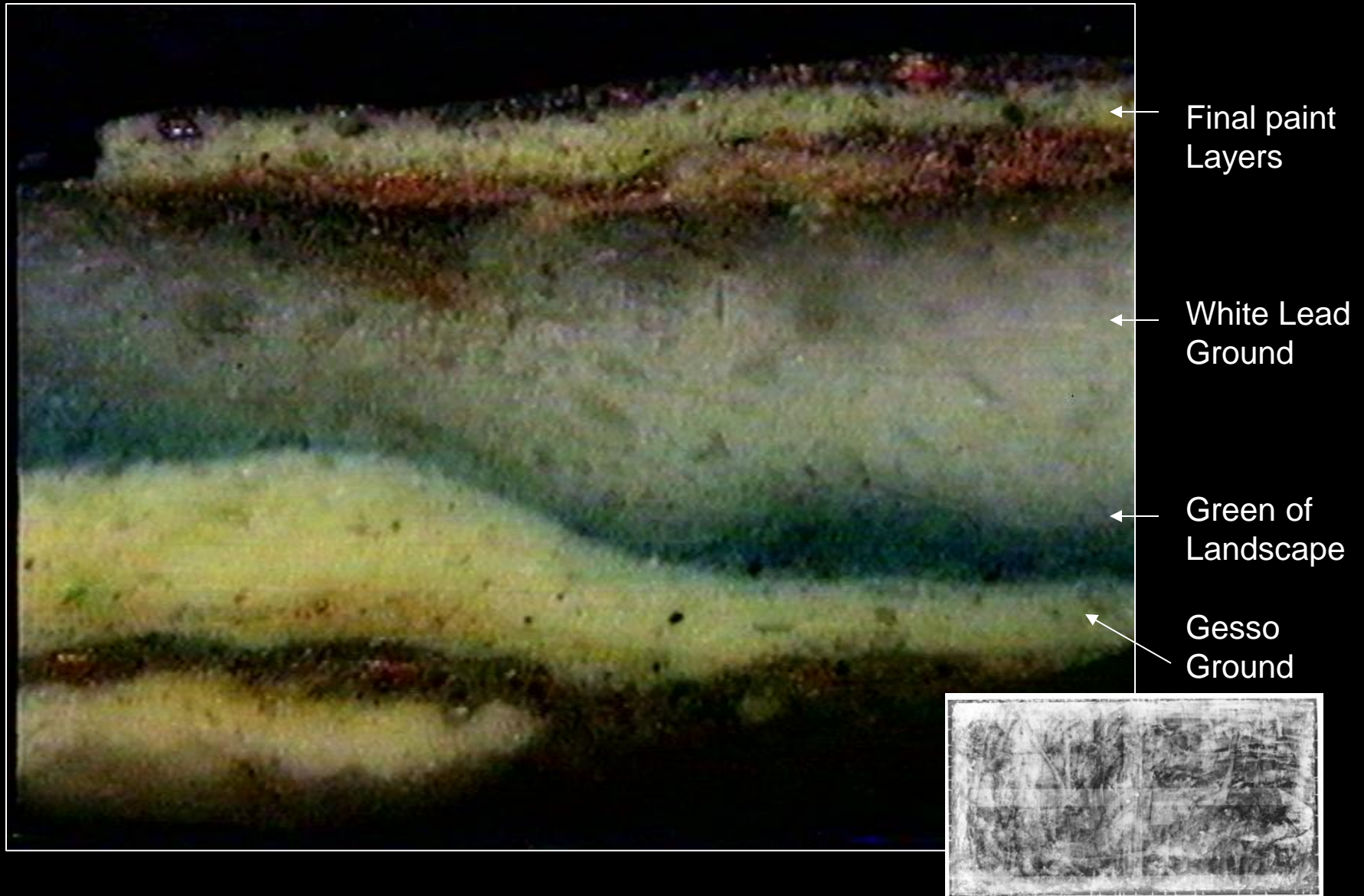
David Hockney *A Bigger Splash* 1967

Artists' Materials and Techniques



David Hockney *A Bigger Splash* (1967)

Cross section from ?



Mechanics

Different solid materials have different mechanical properties.

Tensile strength - *how strong they are when pulled*

Stiffness – *how much they extend when they are pulled*

Hardness – *how much they indent when touched*

We need to know these properties to understand how works of art will respond in different situations.

Canvas – Woven Fabric Support



warp

weft

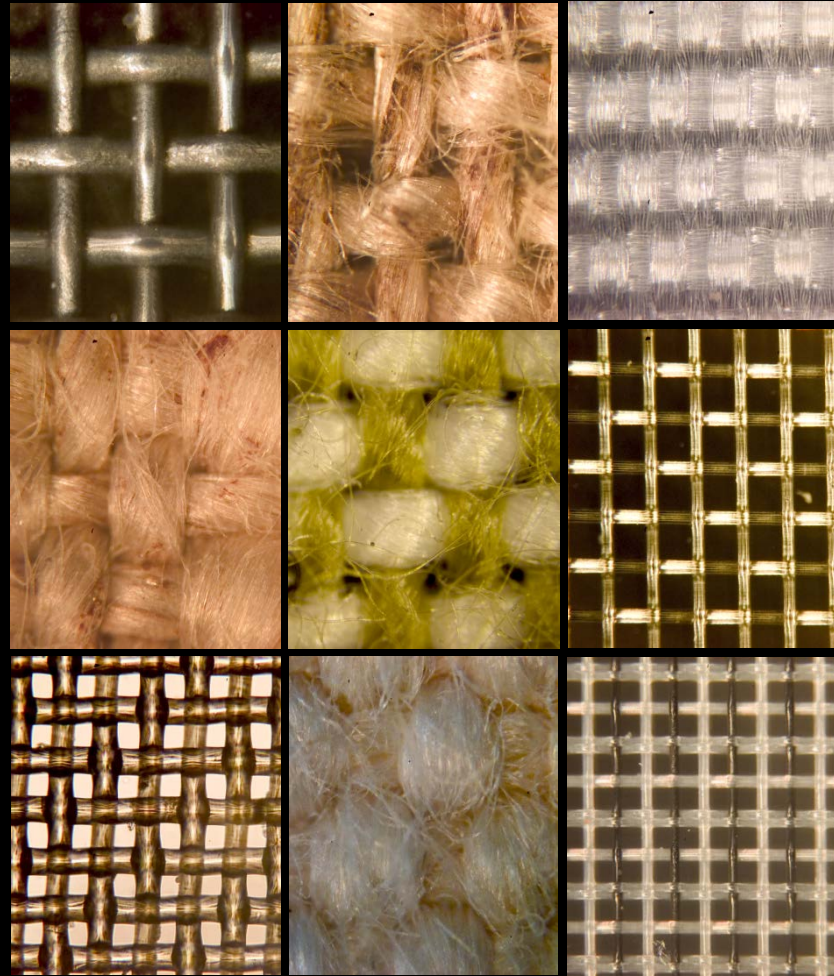
Microscope Images at 5X Magnification

Geometry of
canvas

Natural Materials:
cotton / linen / silk

Synthetic Materials:
Carbon fibre/
polyester /acrylic

warp



weft

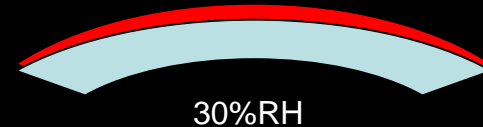
Panel Shape and Moisture

Hydroscopic-response from outside inwards

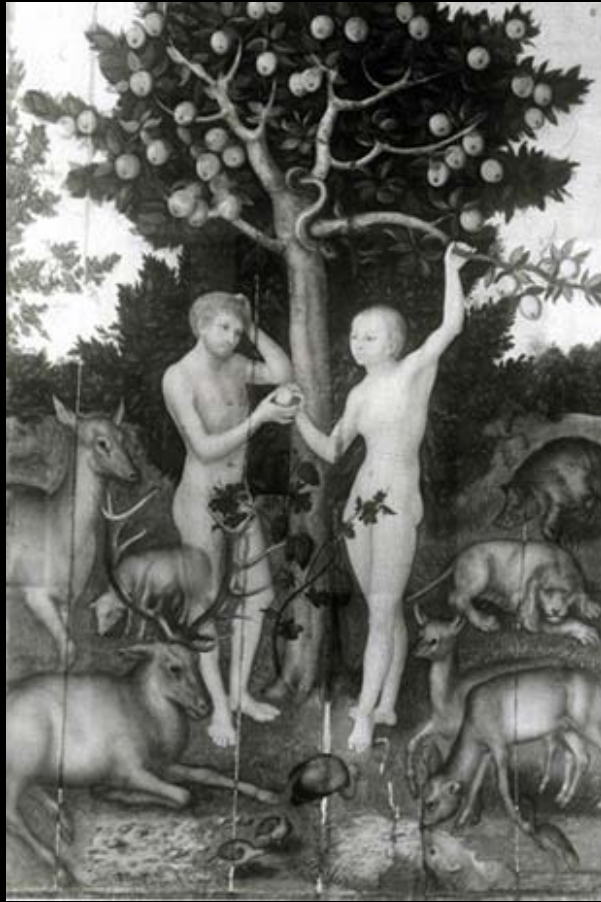
Wood swells differently in different directions.

Panel painting-paint film acts as a moisture barrier.

Moisture can leave more easily from the back → back contracts more than the front → painting will warp into a convex shape
paint layer will crack → characteristic pattern along the grain



Cranach - Adam and Eve



Infra red

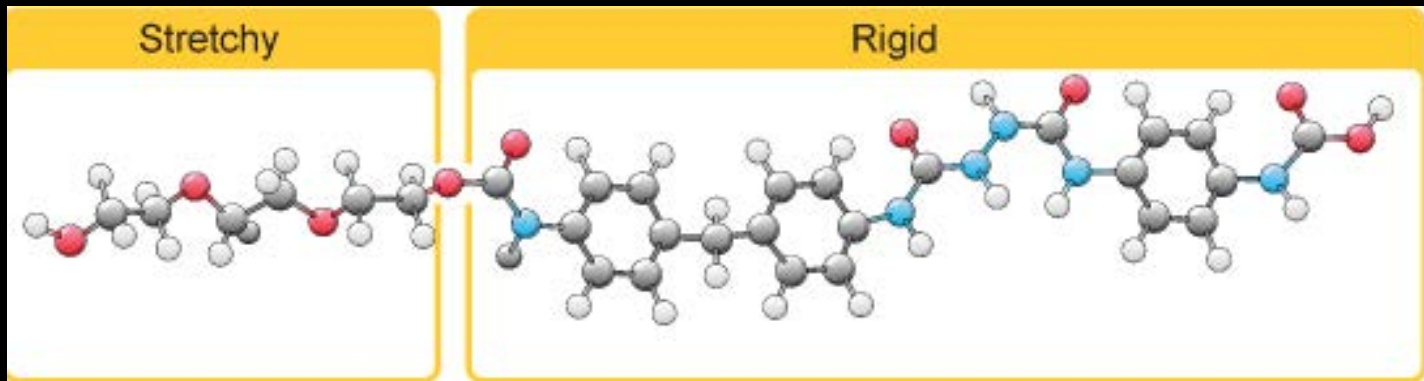


X ray

Viscoelastic

Many material found in ART are VISCOELASTIC

Their response to an applied force depends on the temperature, moisture content and the speed of that force.



Temperature

At cold temperatures materials become brittle.



Most art we want to keep around room temperature.



Mark Quinn *Blood Head*
National Portrait Gallery



Environmentally Controlled Truck



Speed



**CANVAS
PAINT
VARNISH**



Pulling materials fast makes them brittle.

Conservators handle art gently.

Thank You

http://www.courtauld.ac.uk/vr_tour/new/index.shtml?pano=room_02-1.xml

<http://www.guardian.co.uk/books/audioslideshow/2009/feb/22/art-philippullman>

<http://www.getty.edu/conservation/>

<https://twitter.com/royaloperahouse/status/312157362918129664/>

<http://www.nationaltheatre.org.uk/discover-more/digital-classroom>

<http://www.physics.org>

<http://www.rhul.ac.uk/science/sciencefestival/home.aspx> Saturday 1st March Free at Royal Holloway College, Egham