

ABSTRACT

A report, still in draft form, of the on-going conservation of a small polychromed carved wood figure of St Tobias. At present the report covers initial research and provenance of the figure, environmental monitoring, treatment and future conservation plans.

It also
samples for

**A DRAFT REPORT ON THE CONSERVATION OF
AN EARLY NINETEENTH CENTURY POLYCHROMED
CARVED WOOD FIGURE OF ST TOBIAS**

Help in identification, dating and provenance was given by the generous loan of a second figure of St Tobias, stylistically very similar, from Sotheby's sculpture department.

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ABSTRACT

A report, still in draft form, of the on-going conservation of a small polychromed carved wood figure of St Tobias. At present the report covers initial research and provenance of the figure, environmental monitoring, transport and packing considerations.

It also looks at embedding and examination of paint layers, cleaning tests and taking pigment samples for identification.

Help in identification, dating and analysis has been greatly assisted by the generous loan of a second figure of St Tobias, stylistically very similar, from Sotheby's sculpture department.

1. PROVENANCE

The figure belongs to Mrs A D Sutton-Vane and was given to Mr and Mrs Sutton-Vane as a wedding present in 1950 by Muriel Martin Harvey. This is the only information on the figure.

The second St Tobias on loan from Sothebys appeared at around the same time. It was purchased in Germany shortly after the end of the Second World War (possibly in the late 1940's).

1.1 The Story of St Tobias

St Tobias is usually represented with the attributes of a fish and often a rod. The lengthy story of St Tobias appears in the Scriptures in the Book of Tobias and has been summarised as follows:

Tobit was a rich and just man, married to Sarah. But a series of misfortunes occurred to them: first they were taken prisoner by the Assyrians; then Tobit became blind and finally he lost his fortune and was left with nothing but his wife and son, Tobias. He prayed for death to release him, so God sent one of his seven Holy Angels, the Archangel Raphael, down to Tobit, to cure his blindness.

Tobit then remembered that he had made a loan some years before and sent Tobias on a journey to collect the debt. But Tobias protested that he would not know the borrower, and so the Archangel Raphael accompanied him, although Tobias did not know he was an angel.

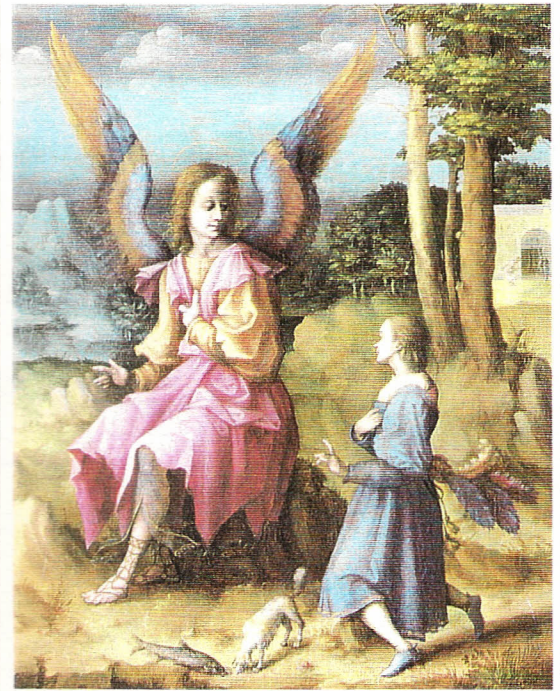
On their first evening they came to the river Tigris and camped for the night on the bank. Whilst Tobias was washing in the river a fish leap out at him. Tobias caught the fish and Raphael instructed him to remove its heart, liver and gall and to preserve them carefully. On asking the reason for this, the angel replied that the heart and the liver would exorcise anyone possessed by evil spirits and the gall would cure blindness.

Later on in their journey the angel Raphael instructs Tobias to take a wife, Sara. However, Sara has already had seven husbands who all died in the bridal chamber, and it is believed she is possessed with evil spirits. Tobias objects to the angel's choice of wife, but Raphael assures him that this is the wife that God intended for him. To prevent himself from becoming the eighth victim, Raphael instructs Tobias that he should make a fire of the heart and liver of the fish that he had preserved on entering the bridal chamber. This he does and the evil spirit is banished from Sara and he survives the night. A great feast of celebration ensues lasting 14 nights. In honour of their marriage Sara's parents give her a generous dowry and while they celebrate Raphael continues on the journey and collects the debt for Tobias. Raphael, Tobias, Sara plus a little dog that travelled with them then return to Tobias' parents. There is great rejoicing at their return, and Tobias then cures his father's blindness by rubbing the gall from the fish on his eyes, as instructed by Raphael.

Tobias and his father decided to reward Raphael with half their fortune. Raphael then revealed to them that he was an angel and that, instead, they should pray to God. At that, he disappears. This they do gratefully for the rest of their prosperous, happy and long lives (St Tobias lived until the age of 127).

Fig 1: The Three Archangels with Tobias, Francesco Botticini (1446-98), Florence,

Fig 2: Tobias and the Angel, Bacchicca



2. PACKING MENTAL MONITORING

In order to transport the figure from Dorset to London by train, a case was made from double thickness 2mm bookbinder's millboard adhered with PVA, dimensions 400mm x 240mm x 240mm. This was calculated to allow 50 mm all round the figure. The case was lined with cream archival quality cartridge paper and the outside covered in waterproof black Oxford Book Buckram adhered with PVA. Brass D-rings were attached via brass bolts to the outside edges of the case as attachments for nylon carrying straps. The lower D-rings also acted as small stands to raise the base of the case off the ground.

Inside, the case was lined with loose sheets of acid-free tissue, and then with 10 mm thick sheets of plastizote covered in tissue to act as initial padding and shock absorbers.

Finally, after placing the figure in the case, it was supported and cushioned with wedges of acid free tissue.

Fig 3: Carrying case made from bookbinder's millboard and covered in washable buckram

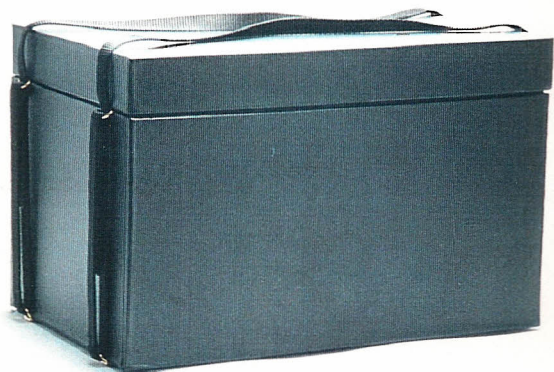


Fig 4: The figure of St Tobias in the case



3. ENVIRONMENTAL MONITORING

3.1 Prior to Moving to London Guildhall

It was considered to be an important part of the project to monitor the conditions in which the figure had been displayed prior to bringing it to the London Guildhall workshops for conservation.

The figure was displayed on a ledge, approximately 5 metres from the floor, against an East-facing internal wall. It was well shaded from the main source of natural light, a large North-facing window, by a gallery-style landing to one side. Due to its inaccessibility it was rarely handled.

A Meaco Quartz Hair Thermohygrograph, adjusted to a 31 day operation, was placed by the figure on the ledge. This was read monthly for a period of 5 months covering a wide range of climatic conditions from August 2000 to January 2001.

Fig 5: The figure standing on the ledge with the thermohygrograph placed next to it.

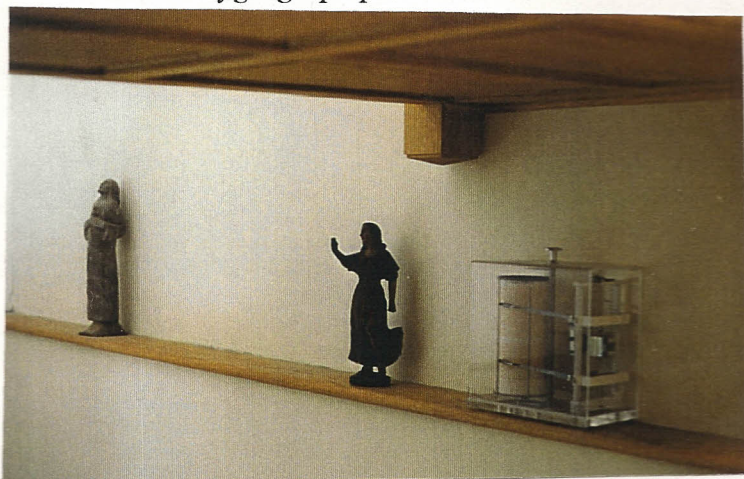
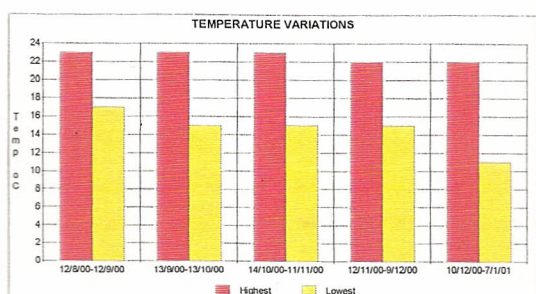


Fig 6: Variations in temperature and humidity over the 5 month period, showing the highest and lowest readings for each month.

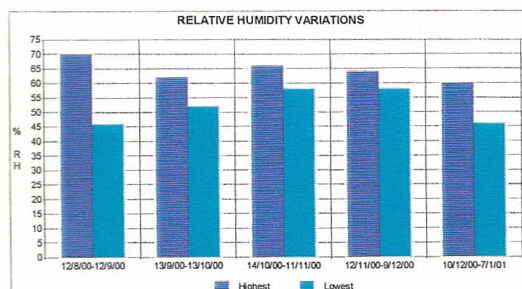
a) Temperature

Temp °C	12/8/00-12/9/00	13/9/00-13/10/00	14/10/00-11/11/00	12/11/00-9/12/00	10/12/00-7/1/01	Overall
Highest	23	23	23	22	22	23
Lowest	17	15	15	15	11	11
Variation	6	8	8	7	11	12



b) Humidity

RH %	12/8/00-12/9/00	13/9/00-13/10/00	14/10/00-11/11/00	12/11/00-9/12/00	10/12/00-7/1/01	Overall
Highest	70	62	66	64	60	70
Lowest	46	52	58	58	46	46
Variation	24	10	8	6	14	24



3.2 At London Guildhall

Readings taken in the studio using a wall-mounted Hygromat show that conditions are warmer and drier than the figure is used to, with the temperature rising as high as 25°C and relative humidity dropping as low as 38%.

Attempts are being made at present to rectify this.

4. EXAMINATION AND ANALYSIS

4.1 Summary of Object

A carved wood polychromed figure of St Tobias with glass eyes, possibly early 19th century. Possibly German or Spanish?

Fig 7: Figure of St Tobias, front view



Fig 8: Figure of St Tobias, back view



Fig 9: The two figures of St Tobias. The larger one from Sothebys complete with it's attributes of a fish and rod.



Fig 10: Detail of face of Sothebys' St Tobias



**DIAGRAMS AT PRESENT ONLY SHOWING POSITION OF MAIN AREAS
OF PAINT LOSS AND CRACKING**



4.2 Dimensions

Height (from top of head to bottom of base):	297mm
Width (across robe):	145mm
Depth (front to back of base):	70mm

4.3 Detailed Description

The figure is looking upwards and his head is inclined to the right. His right arm is bent at the elbow and raised, and would have originally supported the attribute, and his left arm hangs by his side with curling fingers. His weight is borne on his right leg and his left leg is resting with knee bent and just toes on the ground. The figure has been carved with a small, oval olive-green base in which there are two holes, one near to the front and the other close to the instep of his right foot (to accommodate fixings to another surface?).

The figure has brown hair falling in curls to his shoulders. The inserted glass eyes are blue, eye brows thin paint strokes, cheeks tinted with a deep pink and carved lips of deep pink.

He is dressed in an ankle length robe which appears to be an orange-ish red, with a gold cord around his waist. The robe is decorated with gold? swirling foliate patterns and the hem is edged in a gold border. The robe has a slit on the left side from the bottom hem up to thigh height, revealing the leg and a turquoise lining where the robe is flying back. It has long sleeves which are rolled up to the elbows beneath which can be seen a white? undergarment.

He wears a short orange cape over his shoulders fastened at the neck. The front opening is also edged in gold (or silver?) and the opening edges are folded back revealing a green lining. A scallop-style design has been painted on to his right shoulder.

On his feet he wears dark red toeless boots with gold borders and white leggings? visible at the tops. His exposed knee is tinted with deep pink.

4.4 Condition

There are no records or any visual evidence of previous conservation or restoration.

The main losses are the attributes, a fishing rod which would have been held in the right hand, and one/or two fish hanging from twine from the left hand (See Sotheby's figure as comparison). The fingers and thumb of the right hand are broken off, but the latest loss - the little, ring and middle fingers - have been saved.

Fig 11: Damage to the right hand



Fig 12: The detached fingers from the right hand



Other than this, loss of paint and gesso layers are the main concern, most significantly from the bottom of the robe at the rear, the hem of the cape, again at the rear, the exposed left knee, on the raised arm and fingers and the nose. There will continue to be paint/gesso loss from the edges of these damaged areas, as there is much cracking and raising of paint and gesso layers.

Fig 13: Paint and gesso loss on the right hand



Fig 14: Paint and gesso loss on the right arm

Fig 15: Paint and gesso loss on the left arm



Fig 16: Paint loss on the left knee

Fig 17: Paint and gesso loss to the back of the cape



are heavily crazed. Again there is a substantial layer of dirt over them

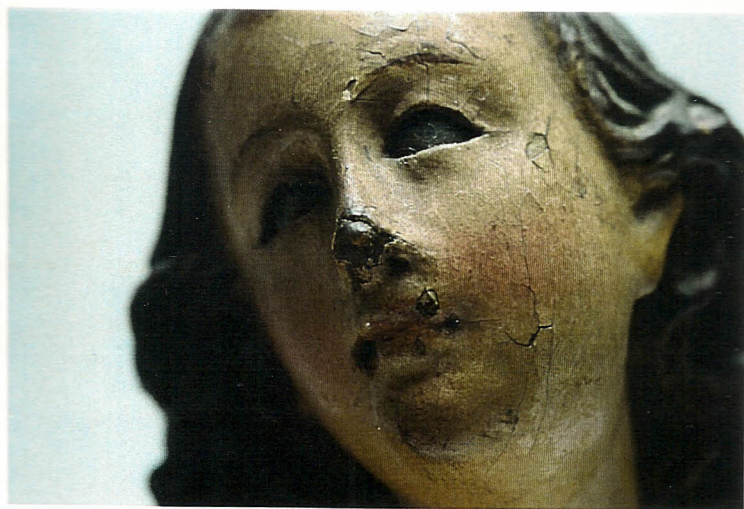
Fig 18: Paint and gesso loss to the back of the robe



Fig 19: Paint and gesso loss to the lining of the robe



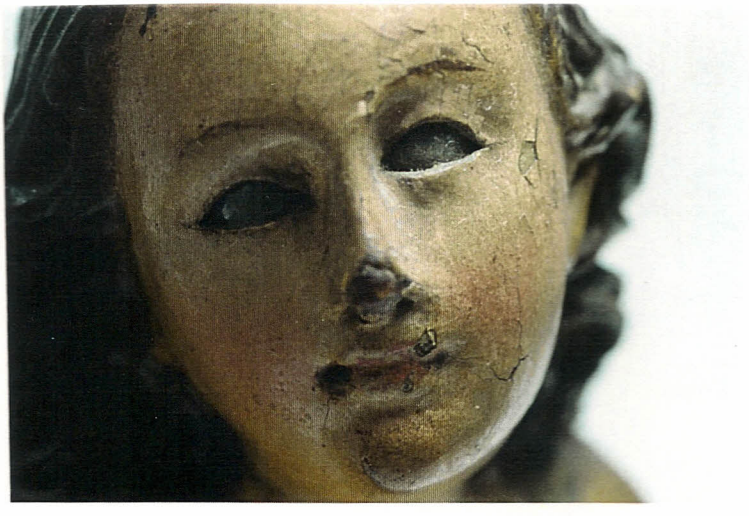
Fig 20: Paint and gesso loss to the face



There is craquelure on most of the paint, and areas of cracking, flaking and minor paint loss. A heavy, glossy varnish (see tests below) appears to be present over the clothing and hair, and this has discoloured and picked up a layer of dirt. The arms, face and legs have a matt appearance, and here flesh tones have been greyed by engrained surface dirt.

The inset glass eyes appear cloudy and examination under a microscope reveals that the surfaces are heavily crazed. Again there is a substantial layer of dirt over them.

Fig 21: Detail of glass eyes, clouded and covered in surface dust.



A ferrous nail protrudes from the back left shoulder blade of the figure. It does not appear to be part of any repair or structural support and is rusting.

Fig 22: Ferrous nail in back of figure.



There are small holes visible, under the arm on the left side. This may be indicative of woodworm attack, but they may also be pinholes in the gesso and, again, until this area is cleaned of surface dirt, it is difficult to say. Certainly, there has been no evidence of frass, suggesting live woodworm infestation. A number of old larval cases from Woolley Bears were found in the hole on the underside of the base, as well as a long dead small spider.

Fig 23: Possible woodworm attack under the left arm

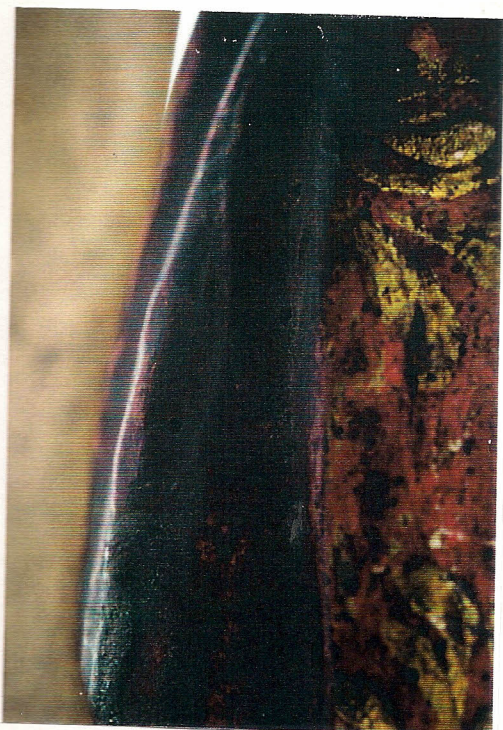


Fig 24: Larval case of the carpet beetle found in the base of the figure



Fig 25: Remains of a small spider found in the base of the figure



In summary, the surface of the figure is obscured by a heavy layer of oily dirt, and until this has been removed it is difficult to see clearly the condition of the paint and varnish layers beneath. It is proposed that a more in-depth survey is done of the figure, once a suitable cleaning method has been identified and carried out.

4.5 Examination of Paint and Varnish Layers

Samples of paint and gesso layers were taken from red, turquoise, black, orange and flesh-coloured pigments.

The samples were taken (where possible) from the back of the sculpture and from areas of significant surface damage, using a scalpel with a No 15 blade, and stored in pairs of labelled plastic contact-lens containers.

4.5.1 Preparing the samples for examination

The cells of a small ice tray were greased with silicone grease and then half-filled with 2-part clear casting polyester resin mixed with a liquid hardener (Butanox M50) at a ratio of 1% hardener to resin. The resin was allowed to set for 24 hours and then the samples were placed on top of the resin towards one edge of each cell with the tip of a small dampened paint brush. The orientation of each sample was checked under a stereo-microscope, to ensure that it was lying flat on the resin.

Using a plastic dropper a further layer of polyester resin was applied to fill the cells by gradually dripping in the resin just behind each sample until they were completely covered. The tray was then left to set.

The cubes were removed from the cells and the closest cube face to the sample was ground down, initially with wet silicone carbide paper graduating from grades 120, 320, 400 up to 1200, then with dry Micro-Mesh beginning with a coarser 1,500 and progressing to a fine 12,000. The aim was to create a highly optically polished surface, free from scratches that may interfere with the image under microscope examination. By the time the last grade of Micro-Mesh had been used, the edge of the sample was just exposed and level with the polished cube face. The cubes were then set on a microscope slide with the polished face uppermost, on a bed of plasticine. This was so that the face of each cube could be levelled horizontally under the objective. A cover slip was then placed on the top surface of the cube using White Spirit as a temporary mounting medium.

Each sample was then examined first under ordinary light and then under UV light, taking a photograph at each stage, using a Leica stereo-microscope fitted with UV and ordinary light, plus a polarising filter and mounted with an Olympus OM2 camera.

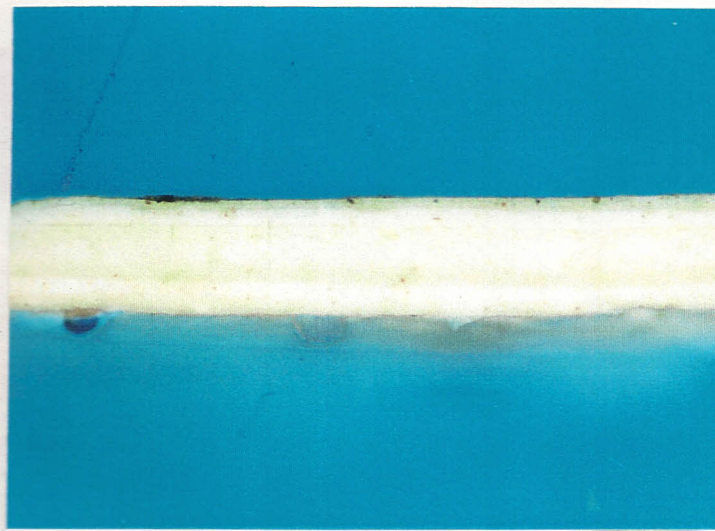
4.5.2 Flesh-coloured paint layer sections

Under normal light there appeared to be as many as four layers visible. It is possible that this area has been re-painted. Under UV light the varnish did not fluoresce, indicating that it may be an oil-based varnish, possibly Oleo Resinous. Or it may just be a drying oil brushed over the surface.

*Fig 26: Flesh Sample 1, x10 objective
Normal light.*



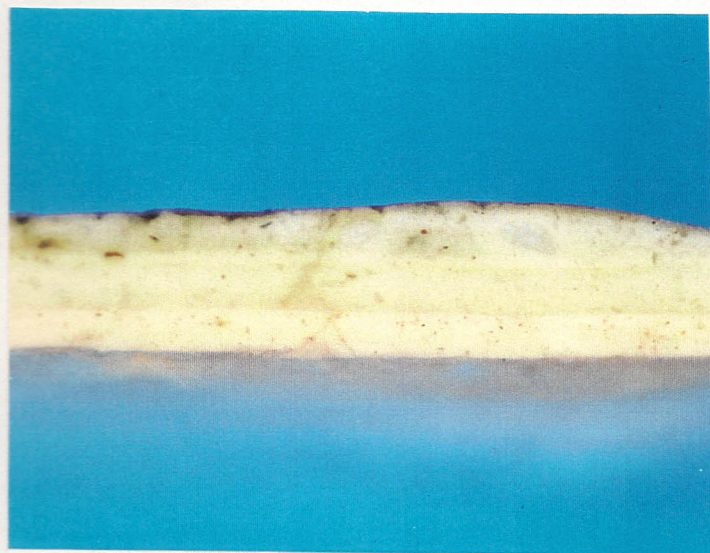
*Fig 27: Flesh Sample 1, x10 objective
UV light*



*Fig 28: Flesh Sample 2, x10 objective
Normal light*



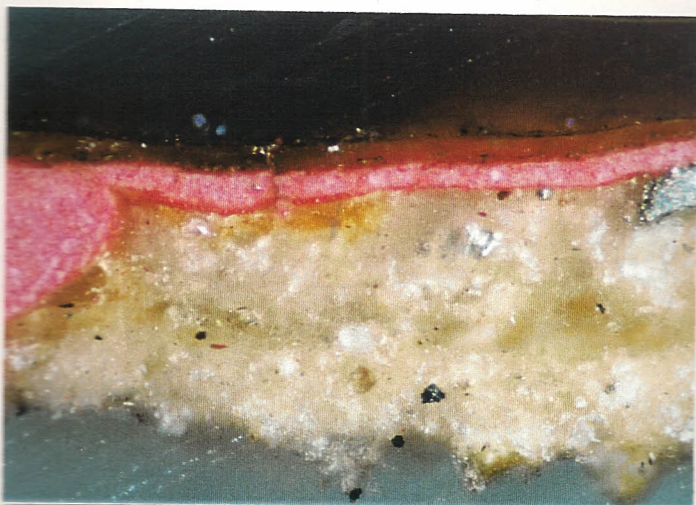
*Fig 29: Flesh Sample 2, x10 objective
UV light*



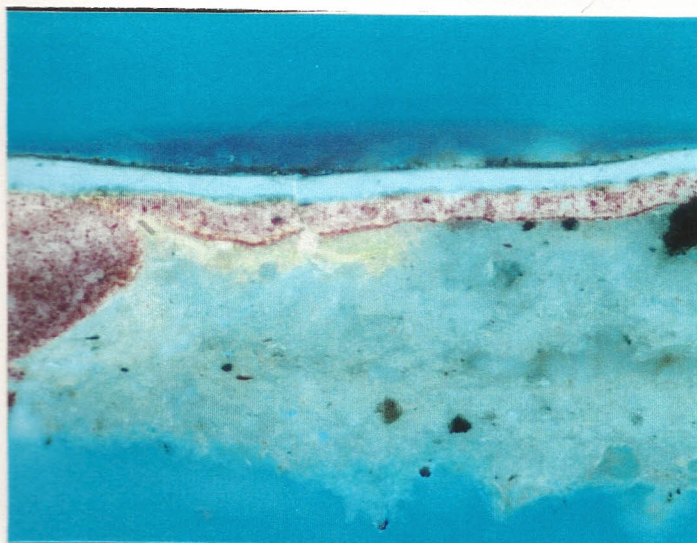
4.5.3 Red-coloured paint layer sections

Under normal light there appeared to be just one paint layer, plus several layers of varnish. Disappointingly there was no gold visible, although samples had been taken from decorated areas. Under UV light the layers of varnish fluoresced. This suggested that here the varnish was a natural resin.

*Fig 30: Red Sample 1, x10 objective
Normal light.*



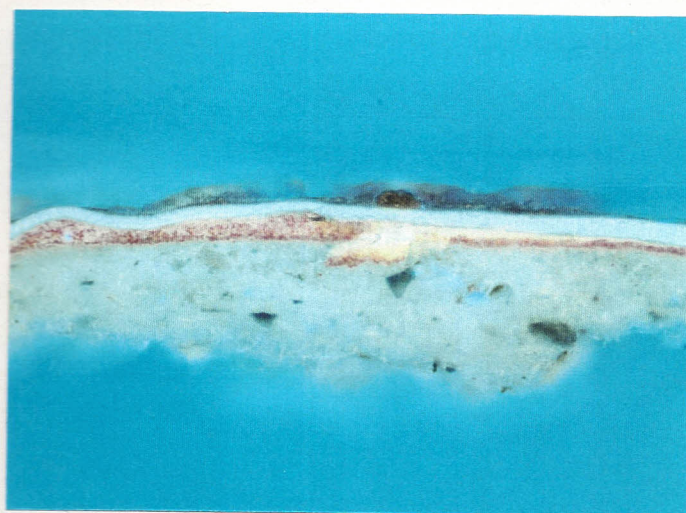
*Fig 31: Red Sample 1, x10 objective
UV light*



*Fig 32: Red Sample 2, x10 objective
Normal light*



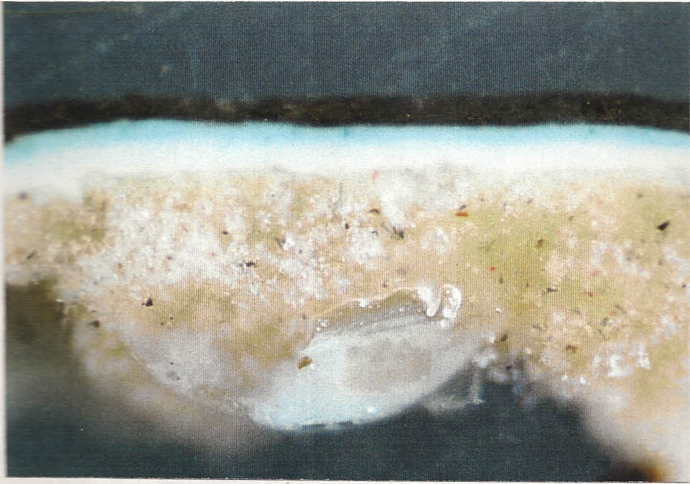
*Fig 33: Red Sample 2, x10 objective
UV light*



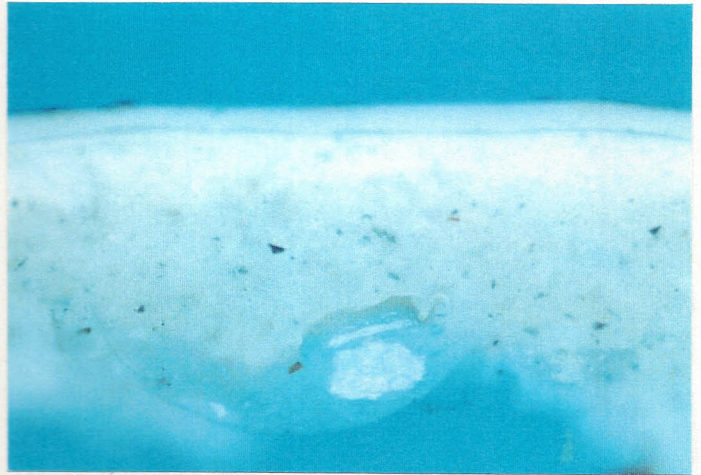
4.5.4 Turquoise-coloured paint layer sections

The turquoise lining of the robe appeared to have a sheen or to be slightly iridescent suggesting a coloured glaze over a metal. However, under normal light there were no signs of any metal. What was visible was a thin, pale blue paint layer, and then a thick layer of darkened varnish. Under UV light the varnish fluoresced, again indicating a natural resin.

*Fig 34: Turquoise Sample 1, x10 objective
Normal light.*



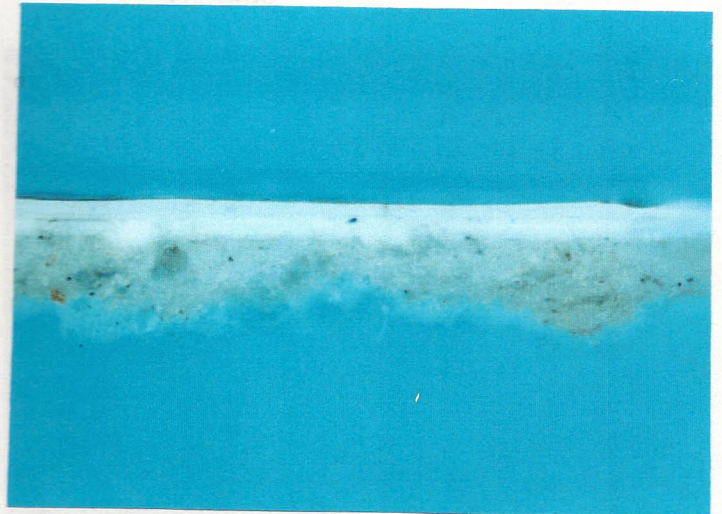
*Fig 35: Turquoise Sample 1, x10 objective
UV light*



*Fig 36: Turquoise Sample 2, x10 objective
Normal light*



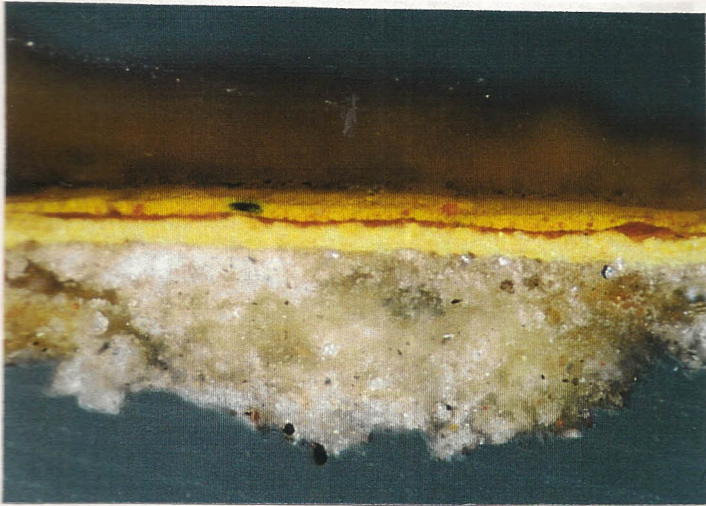
*Fig 37: Turquoise Sample 2, x10 objective
UV light*



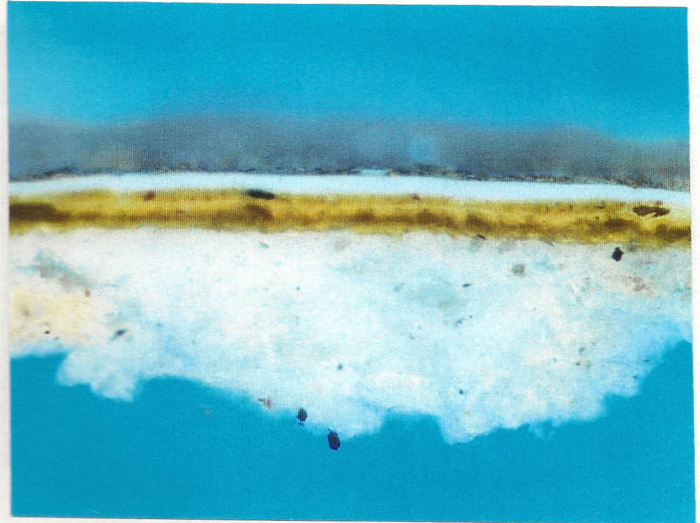
4.5.5 Orange-coloured paint layer sections

These samples had a complicated layer structure. On Sample 2 there was a distinct resinous, non-pigmented layer between the paint layers with black dirt on top of the lower layer. The resinous layer might be shellac, because there was a slight iridescence. The orange-ish colour may be an orange-ish shellac to give colour. It is possible that this area has been re-painted. Under UV light the varnish on Sample 1 fluoresced, but it was slightly different - a pale blue fluorescence. This may just be a localised variation.

*Fig 38: Orange Sample 1, x10 objective
Normal light.*



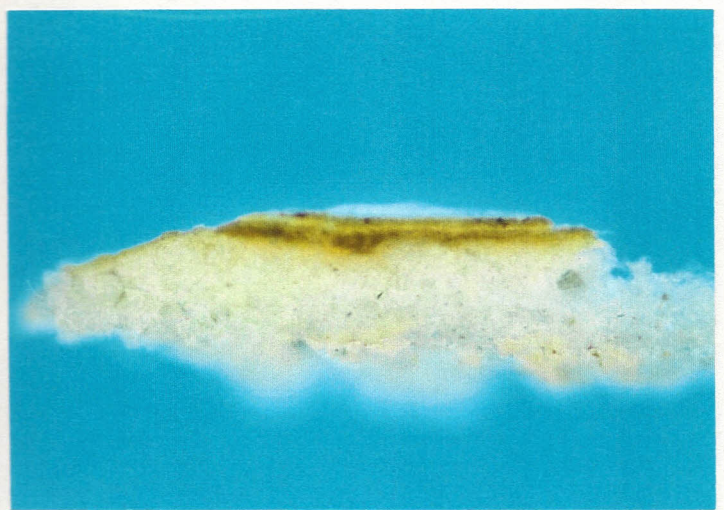
*Fig 39: Orange Sample 1, x10 objective
UV light*



*Fig 40: Orange Sample 2, x10 objective
Normal light*



*Fig 41: Orange Sample 2, x10 objective
UV light*

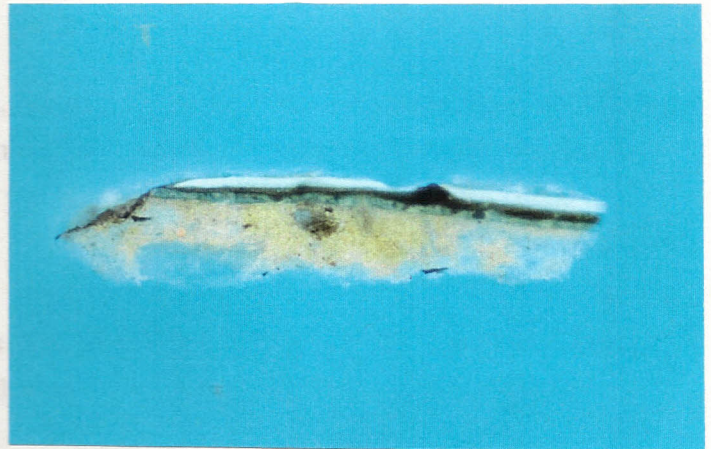


4.5.6 Black-coloured paint layer sections

Under normal light on Sample 1 the gesso base was yellowish, probably due to the absorption of oils etc from the paint. The pigment was actually not black but a blue - a different blue to the turquoise, possibly indigo or Prussian blue because the particles were very fine - with a green layer on top. On Sample 2 a black layer was visible, which did not appear to be dirt. So the base has possibly been over-painted. Under UV light again the varnish fluoresced again indicating a natural resin.

*Fig 42: Black Sample 1, x10 objective
Normal light.*

*Fig 43: Black Sample 1, x10 objective
UV light*

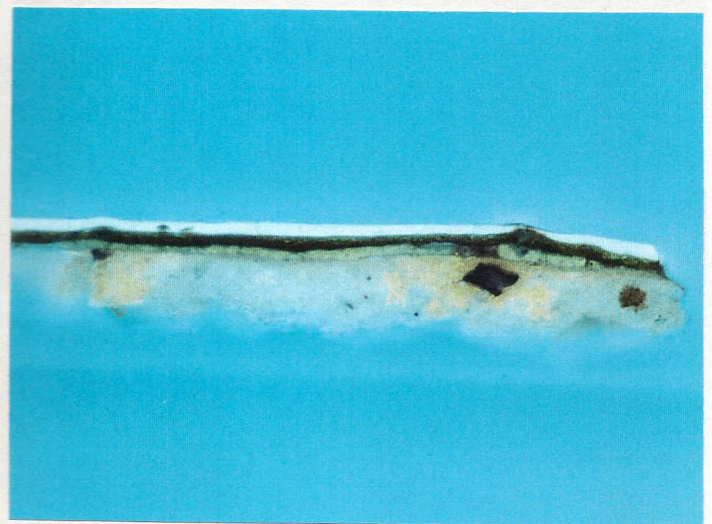
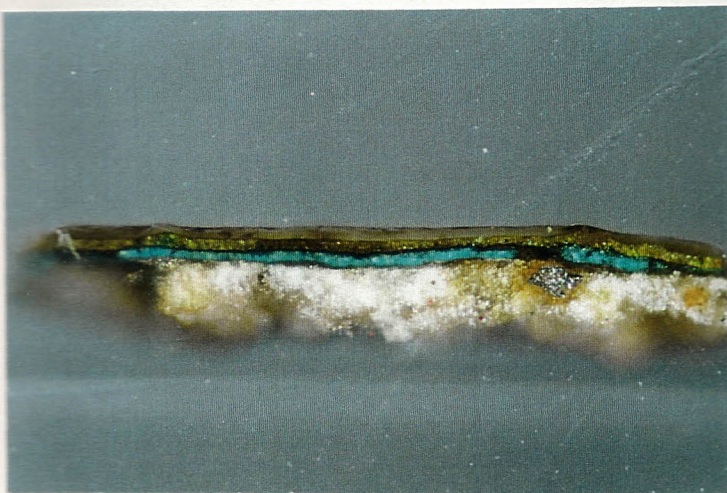


*Fig 44: Black Sample 2, x10 objective
Stained for protein under normal light*

*Fig 45: Black Sample 2, x10 objective
Stained for oil under UV light*

*Fig 44: Black Sample 2, x10 objective
Normal light*

*Fig 45: Black Sample 2, x10 objective
UV light*



4.5.7 Staining

Stains were applied to the exposed edge of Black Sample 2, firstly using a protein stain, Amido Black (AB2), which does not require UV light for examination. This was dropped onto the sample and left for a few minutes before flooding with dilute acetic acid to rinse and blotted dry.

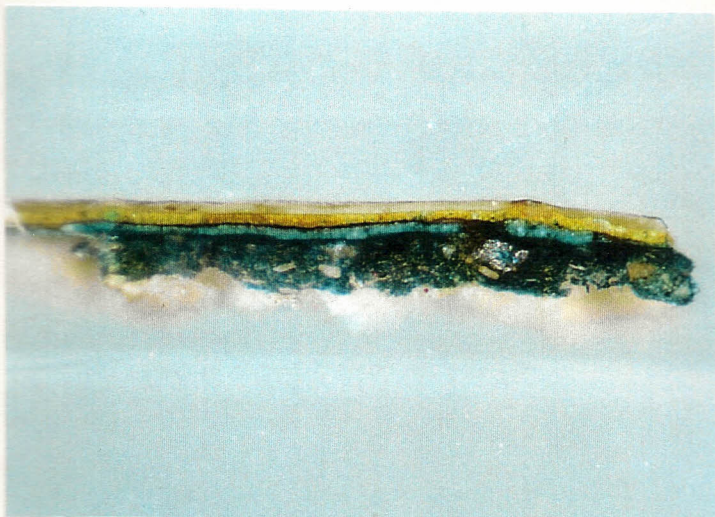
The same sample was then stained with Brodamine, to test for oil binders. This is a UV fluorescing stain so was viewed under UV light.

The protein stain coloured the gesso layer in the sample a dark blue confirming the presence of a protein-based binder such as animal skin glue. However, it did not stain the paint or varnish layers.

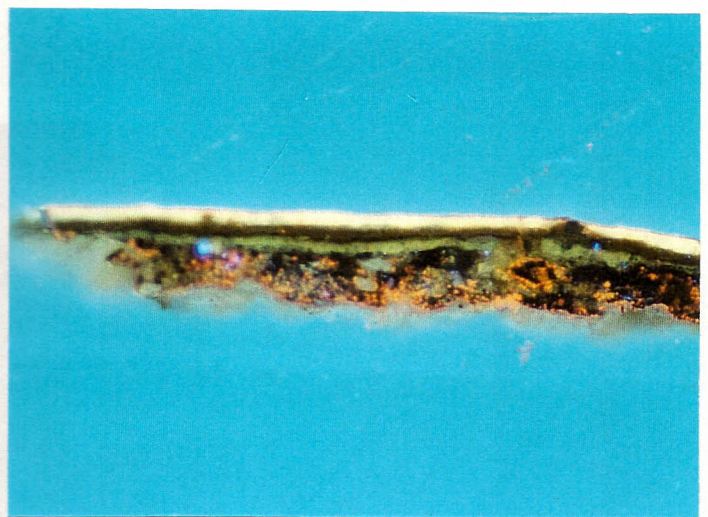
The oil stain did not fluoresce under UV light, initially indicating that the paints were not oil-based. However, this is inconclusive. The stain will only work if it dissolves into oils present in the pigment. In old paint layers (older than 150 years) the oils have largely evaporated and so the stain will not penetrate.

As it had been confirmed that the binder was **not** protein-based, and as the figure had been tentatively dated as early 19th century, the conclusion was reached that it was almost certainly an oil paint.

*Fig 46: Black Sample 2, x10 objective
Stained for protein under normal light.*



*Fig 47: Black Sample 2, x10 objective
Stained for oil under UV light*



4.6 Pigment Analysis

Particles of pigment were taken from the edges of damaged areas:

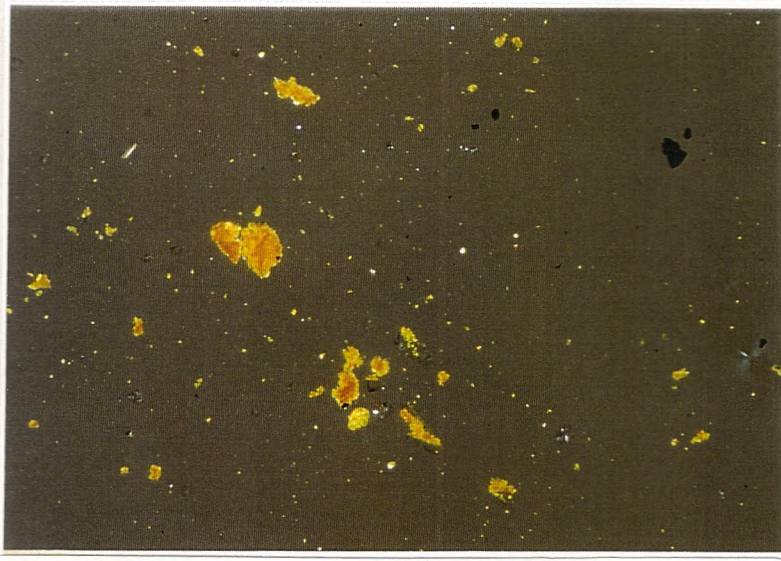
- | | | |
|----|-------------|-------------|
| 1. | Orange | Cape |
| 2. | Gold | Robe border |
| 3. | Dark green | Base |
| 4. | Crimson | Robe |
| 5. | Flesh tone | Arm |
| 6. | Brown | Hair |
| 7. | Turquoise | Robe lining |
| 8. | Cream/white | Sleeve |

These were placed on microscope slides and ground with a glass rod and a little alcohol to separate the particles and then mounted using Canada Balsam in xylene.

4.6.1 Orange pigment

Examination of the orange revealed two distinct pigments. Large particles were visible, possibly Orpiment and needle-like particles which were positively identified as lead chromate, for example chrome yellow. Modern lead chromates do not take a needle form. Dr Nicholas Eastaugh has paint samples from Turner's palette. Comparing the lead chromate from this - small needle-shaped particles - they are similar. It appears then, there are two separate layers making up the orange, the bottom being orpiment and the top lead chromate.

*Fig 48: Orange pigment, x10 objective
Partial cross-polarised light*



*Fig 49: Orange pigment, x40 objective
Partial cross-polarised light*

The remaining pigments are still to be examined.

4.7 Analysis of the Gesso

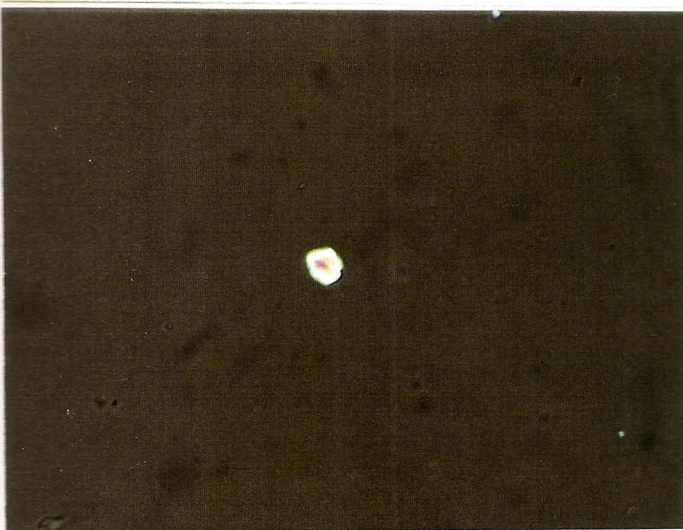
Fragments of gesso taken from a damaged area of the figure and made up into a microscope slide as before.

The gesso particles were examined under cross-polarised light and appeared to have a "halo" around them, which as the slide or platform is turned, disappears and reappears. This confirms them to be Calcium Carbonate has two refractive indices, one of which is very close to the Melt-Mount used (1.66). It can also be identified by its high Birefringence value which makes it appear as a reddish colour. Gypsum Sulphate for instance, would appear grey.

The gesso particles appeared to be a fine calcium carbonate with the possible presence of some quartz - translucent particles. This suggested it was a precipitated chalk, a bi-product of other chemical processes, for example, recovery of ammonium chloride. Precipitated chalk was not available until the middle of the nineteenth century. But the boundaries in this type of identification are hazy. It could possibly be lime-white or even a natural chalk.

There were also visible what appeared to be iron oxide particles, both yellow (Goethite) and red (Hematite), plus some black, probably carbon black (See Fig 35). This could either have been mixed into the gesso as toning or may simply have been picked up during the mixing of the gesso.

*Fig 50: Gesso particle, x100 objective
Cross-polarised light.*



*Fig 51: Particles of Goethite, Hematite and
carbon black, Normal light, x100
objective*



4.8 Analysis of the Wood

The figure appears to be carved from one piece of wood with the grain running from top to bottom. The figure is light in weight but initial examination using a hand-lens of the underside of the base where the end-grain of the wood is exposed, confirm it to be a hard wood - vessels could be seen.

Fig 52: The underside of the base



At this stage, comparing the pattern of the vessels across the growth rings, with photographs of end-grain sections, it may possibly be Walnut or Birch. An initial guess that it was lime wood now seems less likely as the vessels are too widely dispersed.

Further examination, removing a sample of wood, preferably from a radial or longitudinal section, will be necessary to reach a more accurate conclusion.

5. CLEANING TESTS

Tests were carried out on the back of the robe to establish a cleaning solution for removing the oily surface dirt without affecting the resinous varnish.

Fig 53: Small areas on the back of the robe marked up and tested with solvents



5.1 Tri-amonium Citrate at 5% and 2.5% aqueous solutions

Reduced from a stock of 20% to a quantity of 10 mls:-

$$\frac{20\%}{5\%} = 4. \quad \text{4 now becomes the diluting factor}$$

$$\frac{10 \text{ mls}}{4} = 2.5. = \frac{2.5 \text{ mls Tri-amonium citrate}}{7.5 \text{ mls distilled water}} = 10 \text{ mls solution}$$

The 5% solution was felt to be too aggressive. It cleaned well, but it also de-glossed the varnish. The 2.5% solution was gentler, but also slightly de-glossed the varnish.

5.2 Distilled water

This cleaned most of the surface dirt, but left more ingrained dirt. Where it did clean, a good high gloss surface was left on the varnish.

5.3 Saliva

Saliva had very similar results to distilled water.

5.4 Aqueous solution of ammonium hydroxide (NaOH) pH9 with 1% synperonic N

Raising the pH of a solution is a good way to cut oil and surfactants lower surface tension. Unnecessary to have any more than 1% of a non-ionic detergent because unable to form any further micelles. Alkaline surfactant solutions are excellent for oily layers. Old oil paint is well polymerised and so is pretty resistant to cleaning.

This removed most surface dirt well and left a good gloss on the varnish.

5.5 Conclusion

It was decided to use a sodium hydroxide solution for the varnished areas (the hair and clothing) which are now emerging through cleaning tests.

The skin is matt and backed up by observations in the paint layer analysis section this suggests it does not have a resinous varnish layer but has probably been brushed with a drying oil. Here the dirt is more engrained and the above method does not clean so well. It will be necessary to test other methods, possibly a gel.

6. SUMMARY OF FINDINGS

6.1 Structure

Wood Still to identify, but it is a hard wood and may be walnut or birch.
 Gesso Calcium carbonate (possibly precipitated chalk) bound with a protein-based binder, such as rabbit skin glue.

There is no bole layer present, the paints have been applied directly onto the gesso.

Paint layers Oil-based paints. In some areas - flesh colour on the arm, the orange from the cape and the base - there is evidence of several layers. This is perhaps re-painting, but may also be part of the original scheme of painting.

Pigments As yet, only the orange has been looked at in detail. This consists of two pigments, possibly Orpiment, and almost certainly Chrome Yellow.

Varnish A gloss varnish made from a natural resin such as shellac has been applied over the paint on the hair and clothing. However, over the face and limbs, which have a matt appearance, there is evidence of an oil-based layer.

6.2 Origin

It has been tentatively suggested by Alexandra Kosinova, Sculpture Conservator at the V&A, that the figure might be Spanish. They often used glass eyes. Historically, in the preparation of gessos, Italian craftsmen tended to use Calcium Sulphate, whereas in Northern Europe and Spain, Calcium Carbonate was used.

6.3 Dates

If the gesso was made with precipitated chalk, this was not available until the mid-19th century. Production began in Birmingham in the 1850's.

Modern lead chromates do not have a needle-like structure. Comparisons between samples of the chrome yellow from the figure and those taken from Turner's palette (after his death) show distinct similarity. Turner died in 1851. Chrome yellow did not come into commercial production until 1818.

The fact that the oil stain did not react, although it is almost certainly oil paint, could suggest old paint layers (pre-dating 1850?).

The above information is beginning to suggest that the figure is indeed 19th century, but perhaps more towards the middle of the century rather than earlier. The presence of calcium carbonate also suggests that it is from either Northern Europe or Spain, so this would certainly backup the theory that it is Spanish.

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MATERIALS INFORMATION**Material:**

Silicone grease M494

Clear casting AM polyester resin
 Cured with liquid hardener: Butanox M50
 Methyl Ethyl Ketone Peroxide 33% in
 Dimethyl Phthalate.
 H&S: Store in cool, dry place. Max temp
 25oC. Avoid exposure to naked flame etc.
 Ratio of 1% hardener to Resin.

Scalpel and No 15 blades

Plastic contact lens containers

2 mm Bookbinder's Millboard

Bookbinder's PVA

Acid Free Tissue Paper

Black washable Oxford Book Buckram

Brass D-rings and bolts

Supplier:

Ambersil Ltd, Bridgwater

1 kg can from Tiranti @ £10.60

Atlantis Art Suppliers

Boots the Chemist

Shepherd's Bookbinders

Shepherd's Bookbinders

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B&Q