

Tate AXA Art Modern Paints Project (TAAMPP)

Newsletter 4: September 2008

Welcome to the fourth Newsletter of TAAMPP!

Welcome to the fourth of six newsletters produced as part of TAAMPP; providing an update on activities from February to September 2008. During this period, a third case study surface cleaning treatment was carried out on Russian-American artist Alexander Liberman's painting *Andromeda*, dated 1962; which is the earliest confirmed acrylic emulsion painting in Tate's collection.

Other aspects of the project have also progressed including the: varnish study, dust study, the examination of acrylic paint films with Atomic Force Microscopy (AFM), the analysis of synthetic organic pigments in acrylic paints by Direct Exposure-Mass Spectrometry (DE-MS); as well as continuing dissemination by the TAAMPP team.

- ✓ [Addition to the Tate team](#)
- ✓ [Case study 3 – Alexander Liberman's *Andromeda*](#)
- ✓ [Other research – progress update](#)
- ✓ [Presentations – February to September 2008](#)
- ✓ [Publications and upcoming presentations](#)
- ✓ [The fourth case study](#)

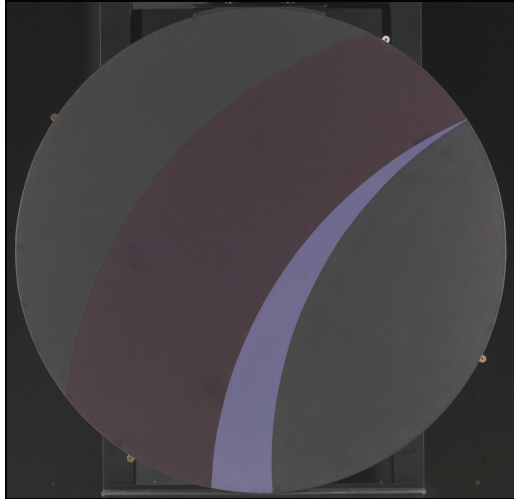
Addition to the Tate team

In addition to Drs. Bronwyn Ormsby (Senior Conservation Scientist) and Elina Kampasakali (AXA Art Research Fellow), the TAAMPP science team has now been joined on a part-time basis by semi-retired forensic scientist Dr. Mark Underhill. We are very pleased to have Mark on the team as he has a wealth of analytical experience, which he is applying to developing the Direct Exposure-Mass Spectrometry (DE-MS) analysis of synthetic organic pigments in acrylic paints.

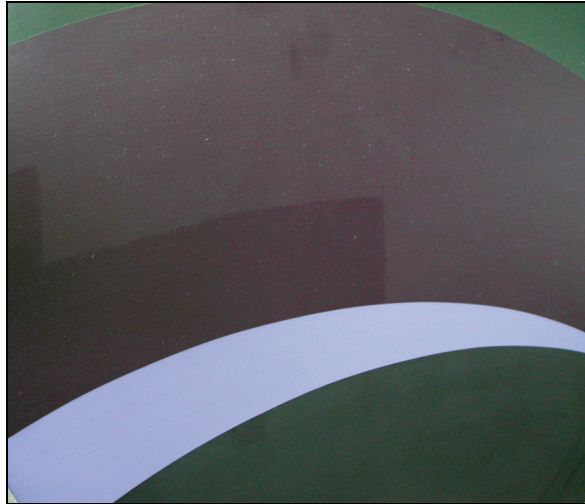
Mark joined us in June and has made good progress with method development and is starting to explore samples from acrylic paintings. He is also creating a library of standard pigments from which we can identify unknown pigments in paints. Until now, we have been limited in our ability to identify these pigments, and with a well developed DE-MS method in-house at Tate we will also be able to explore links between the paint surface, response to wet cleaning treatment and pigment type. This will contribute to the growing body of knowledge characterising changes to acrylic emulsion paints resulting from surface cleaning treatments using water and/or organic solvents.

Case Study 3 - Alexander Liberman's *Andromeda* (1962)

The third painting selected as a case study for TAAMPP was Russian-American artist Alexander Liberman's (1912-1999) painting *Andromeda* (1962), presented to Tate by the Montargent Foundation in 1964 and loaned in 2002. Liberman's paintings of 1961-2 were abstract, geometric and hard-edge. *Andromeda* has been described as having 'circles (that) stretch from the top to the bottom edge of the canvas while gigantic arcs (sections of circles) sweep across the picture plane..' (James Pilgrim in exh. catalogue *Alexander Liberman*, Corcoran Gallery of Art, Washington, DC, 1970). It is currently the earliest confirmed acrylic emulsion painting in Tate's collection and is painted on a circular canvas of dimensions: 1650 x 1650 x 40 mm.



Alexander Liberman's
Andromeda (1962). T00650
Overall - before cleaning.
Image: Tate
Credit: © 2008
The Alexander Liberman Trust



Raking light image of a section of dark purple
paint during cleaning with an aqueous solution.
Image: Tate
Credit: © 2008
The Alexander Liberman Trust

As with the *Moon* and Warhol paintings, initial examinations involved the identification of the painting materials, documentation of technique and an assessment of current condition. The painting was examined via photography, microscopy and ultraviolet and infra-red lights; and colour, gloss and conductivity measurements were taken of the surface prior to and after cleaning. The composition of the paint media and chemistry of the paint surface were characterised using: Pyrolysis Gas Chromatography – Mass Spectrometry (PyGC-MS); Electrospray Ionisation – Mass Spectrometry (ESI-MS); and various forms of infra-red spectroscopy (FTIR). Pigments were identified using a combination of EDX (Energy Dispersive X-ray analysis), ED-XRF (Energy Dispersive – X-Ray Fluorescence), infra-red microscopy and DEMS.

The painting consists of four areas of uniform colour – black, lilac, dark purple and dark green which were in relatively untouched condition as the surface had only ever been brushed in preparation for the 2002 loan. The medium for each colour was confirmed as an ethyl acrylate/methyl methacrylate (pEA/MMA) copolymer, which is appropriate for the date of the painting. The pigments were identified as: titanium white, Mars black, a synthetic organic purple dioxazine pigment PV23 (identified by Mark), chromium oxide green, and calcium sulphate as the main extender pigment. The priming layer is very thin and was not sampled due to restricted access to the edge of the painting.

The painting surface was covered in an obscuring layer of fine soiling combined with the whitish bloom characteristic of surfactant build up, which is particularly visible in the during cleaning image. Cleaning tests consistently revealed a more saturated and vibrant surface once this layer was removed. The presence of accumulated surfactant on the paint surface was confirmed via several analytical techniques and appeared to be thicker in some areas. Surfactant is a component of the paint that naturally migrates to the surface and its presence suggested that *Andromeda* would benefit from a water-based cleaning treatment to recover the saturation of the colours as much as possible and to enable the efficient removal of the soiling layer. Current research suggests that the removal of surface surfactant does not significantly contribute to changes in properties of the underlying paint film and in this case, dry cleaning methods resulted in a less satisfactory partial cleaning. This painting differs from previous case studies in that the paints contain little or no titanium white (apart from the lilac area) and *Andromeda* also consists of large areas of synthetic organic pigmented paint, which can be more sensitive to wet cleaning treatment than inorganic pigmented films.

A series of cleaning tests were carried out with both water-based (aqueous) and organic solvent (aliphatic) systems and the cleaning solution chosen was deionised water with the addition of 2% v/v. ethanol, adjusted to pH 6.0. Each section was carefully cleaned with two to three successive (blotted) swab applications, resulting in an evenly cleaned surface. Alternatively, the aliphatic systems - even with the addition of surfactant - removed very little surface dirt. As was the case for the Moon and Warhol paintings, the final stage of the treatment involved reassessing the surface for changes. In this case, gloss measurements indicated that a slight increase had occurred as a direct result of the removal of the soiling and surfactant layer.

Crosby Coughlin, a representative of the artist's estate, visited Tate in October 2007 to discuss the materials, techniques and ageing characteristics of Liberman's paintings and *Andromeda* was acknowledged to be in excellent condition - marred only by the obscuring layer on its surface. Crosby related that Liberman usually worked with Liquitex acrylic paints through this period, which is consistent with the analytical results and early use of acrylic emulsion paints in the United States.

Two external collaborative partners were involved in the evaluation of this painting. The *in-situ* non-invasive reflectance FTIR and portable Atomic Force Microscopy (AFM) were made available through the transnational access MOLAB - 6th Framework Programme and the ESI-MS analysis of cotton swabs that had been rolled across the surface of the painting was carried out by Frank Hoogland of the FOM Institute for Atomic and Molecular Physics (AMOLF) Amsterdam; supported by the approved FOM programme 49 granted by FOM (Utrecht), a subsidiary of the Dutch Organisation for Scientific Research NWO (The Hague).

Other research – progress update

Varnishing acrylics:

The group of varnished titanium white painted canvases were recently subjected to accelerated light ageing for four months. The first evaluation of these canvases is now underway, including both chemical and optical changes (such as colour and gloss). They were recently returned to the ageing boxes and a further evaluation will be carried out in November, including varnish removal tests to assess how easily the varnishes are removed from the underlying acrylic paint films. Once this is completed, the phthalocyanine green samples will be aged to the same degree to assess differences in response.

Dust accumulation on acrylics:

A similar group of acrylic titanium white and phthalocyanine painted canvases have been coated and/or cleaned with water and other solvents in preparation for display for dust accumulation (see image on next page). Prior to their recent installation on a wall in the paintings conservation department, each canvas was assessed for colour, gloss and surface character such as the presence of surfactant and surface conductivity. Elina is now researching ways of assessing levels of dust accumulation on the canvasses so that we can successfully monitor differences over time.

Other research:

As mentioned in the January 2008 newsletter, the Getty Conservation Institute (GCI) has funded an Atomic Force Microscopy (AFM) study into acrylic paints at Imperial College, London. The imaging of the surface of acrylic paint films on a micro-scale commenced in September 2007 and will be completed by the end of September 2008. So far the images have helped to characterise differences in acrylic paint surfaces with pigment type, brand, substrate and surface cleaning treatments with water and/or aliphatic solvents.



Dust study: group of titanium white and phthalocyanine green painted canvases including acrylic emulsion, alkyd, water mixable oils, and oil paints. Some acrylic emulsion samples were coated and others were cleaned with aqueous and solvent systems to assess whether coating and/or cleaning affects dust deposition and accumulation. Clear Mylar was applied to a section of each canvas to create unsoiled 'control' areas.

Credit: © 2008, Tate.

Collaboration with DOW-GCI-Tate:

Since the last newsletter, Tom Learner and Alan Phenix of the Getty Conservation Institute have initiated a collaboration between the GCI and the Dow Chemical Company in the United States and have invited Tate to be a partner in research aimed at improving the ability of wet-cleaning solutions used on acrylic emulsion paints to remove soiling. Bronwyn will also use this opportunity to complete the TAAMPP cleaning efficacy study in parallel with research being carried out at DOW.

Presentations – February to September 2008

- 13 February – Tate Britain, London, UK
- 7 March – TEFAF Art Fair, Maastricht, The Netherlands
- 26 March – Infra-Red Users Group meeting (IRUG), Vienna, Austria
- 5 June – Cleaning unvarnished paints - ICN, Amsterdam, The Netherlands
- 25 July – Conservation Science - Royal Institution, London, UK
- 26 September – ICOM-CC Conference, New Delhi, India

Publications and upcoming presentations

Published papers:

- Ormsby, B., Hagan, E., Smithen, P., and Learner, T. 'Comparing contemporary titanium-white based acrylic emulsion grounds and paints: characterisation, properties and conservation.' In *Preparation for Painting: The Artists' Choice and Its Consequences*. Eds. J.H. Townsend, T. Doherty, G. Heydenreich and J. Ridge. Archetype, London, 2008: 163-171.
- Ormsby, B., Hoogland, F., Smithen, P., Miliani, C., and Learner, T. 'A scientific evaluation of surface cleaning acrylic emulsion paintings.' *Pre-prints, ICOM-CC Triennial Conference*, New Delhi, September 2008, Vol. II: 857-865.

Submitted papers/In press:

- Ormsby, B., Kampasakali, E., Miliani, C., and Learner, T. 'An FTIR-based exploration of the effects of wet cleaning artists' acrylic emulsion paints.' 8th International Meeting of the Infra-red and Raman Users Group (IRUG), Vienna, March 2008. Submitted to *e-Preservation Science*, June 2008.

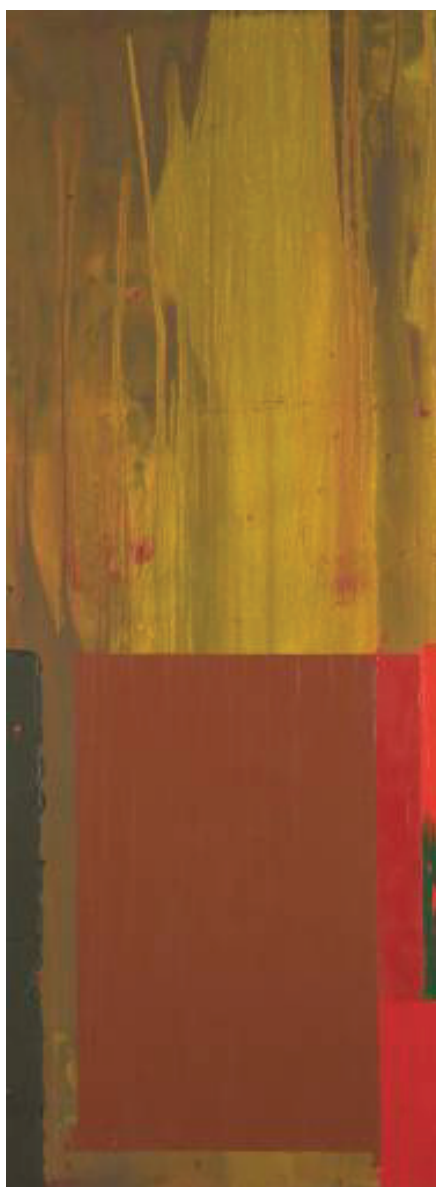
Upcoming presentations:

- 22 November 2008: University of Perugia, Perugia (lecture).
- 23 January 2009: Courtauld Institute of Art, London (lecture).
- 6 March 2009: Courtauld Institute of Art, London (workshop).
- 13 March 2009: Courtauld Institute of Art, London (public lecture).

Please contact Frances Fogel of AXA Art UK (frances.fogel@axa-art.co.uk) and/or visit the TAAMPP website for further details.

The fourth case study

25.4.69 by John Hoyland (1969)



25.4.69 by British artist John Hoyland (b. 1934) was presented by the Friends of the Tate Gallery in 1969 soon after it was painted. It was briefly studied for *The Impact of Modern Paints* book published by Tate where Hoyland is quoted as stating that during the time *25.4.69* was painted, he was interested in ‘..the magic of what paint can do by taking advantage of the way paint behaves naturally.’ (Crook and Learner, 2000, 103)

Subsequently, this work has two distinct areas: the upper section consists of thin, heavily diluted paint rolled and dripped onto the cotton canvas resulting in an uneven, lean paint film consisting of blended colours with visible canvas weave; the lower section consists of separate, mostly non-blended colours applied as a relatively thick buttery material in rough rectangular motifs.

This painting now has a fine layer of soiling and surface surfactant that are obscuring fine details and affecting the saturation of the colours; particularly in the more thickly applied areas in the lower section. The surface cleaning process will involve addressing the different surfaces presented by the upper and lower sections; dictating a need for different approaches.

Reference: *The Impact of Modern Paints*, J. Crook and T. Learner. Tate Gallery Publishing, London, 2000.

25.4.69 by John Hoyland, 1969
2438 x 914 mm
Image: Tate, 2008
© John Hoyland