An evaluation of cleaning methods for modern and contemporary paintings

A short note by Bronwyn Ormsby

The removal of surface dirt and/or discoloured varnish from the surface of paintings is one of the most commonly executed treatments by conservators. For paintings executed in traditional media such as oil or egg tempera, an appreciable body of knowledge is available to assist conservators with their decision on which cleaning method(s) to use. However, most of this material is inapplicable to understanding the effects of various cleaning methods on modern and contemporary works of art because 'modern' paints have been formulated with such an assorted range of materials, including an array of synthetic polymeric binding media.

This diversity has important implications for the conservation of artworks, since each type of paint used is likely to display its own unique set of physical and chemical properties, as well as responses to ageing, environmental conditions, and conservation treatments. This is further complicated by the presence of "additives," which have been incorporated into many modern paint formulations to improve specific properties of the paint such as drying time, pigment wetting, adhesion, consistency, and resistance to mold growth, and are particularly prevalent in emulsion systems. Many of these are thought to remain within the paint film on drying and therefore have the potential to exert an influence on paint properties and response to cleaning agents.

In addition, the nature of the cleaning process itself has changed, as most modern and contemporary paintings are predominantly unvarnished, and the treatments are performed directly on the paint surface.

There is virtually no information or data on the short- or long-term effects of cleaning modern and contemporary paintings. The following described project, initiated by the Tate, is a collaborative venture between the Tate, London, the National Gallery of Art, Washington, and the Getty Conservation Institute, Los Angeles. For fuller descriptions please see *GCI Newsletter* Volume 17, Number 3, Fall 2002 (or visit http://www.getty.edu/conservation/resources/newsletter/17_3/news_in_cons1.html) and a recent addition to the GCI website at (http://www.getty.edu/conservation/activities/modpaints/). This project aims to address directly these issues through a combination of scientific examination and analysis, as well by gathering historical and contemporary information on paint formulations, the continued documentation of the use of paints by artists, and through interviews with modern art conservators.

The analytical component will include the development and optimisation of a number of chromatographic methods for the qualitative and quantitative characterisation of the common classes of modern paints, such as acrylic emulsion, acrylic solution, alkyds, modern oils, PVA emulsions, and nitrocellulose. More specifically, a detailed study on the extractable components of acrylic emulsion paints, using chromatographic methods including GC-MS, HPLC-MS, SEC/GPC, and pyGC-MS will form a major component. In addition, several other forms of analysis and examination will be explored to assess changes in the physical, chemical, and optical properties of modern paints on exposure to various cleaning agents and as a result of ageing.

To date, pilot research has been carried out at X-at, located at Exeter University, England, using a number of thermal and imaging techniques such as DMA (Dynamic Mechanical Analysis) and AFM (Atomic Force Microscopy) amongst others. These techniques have proven useful in assessing changes in the mechanical and optical properties of paint films after exposure to various cleaning agents.

Characterisation of changes in surface chemistry using FTIR, FTIR-ATR, and HPLC-MS will also be explored, particularly in relation to the migration of surfactants and other low molecular weight species to the surface of acrylic emulsion paint films. In addition, several well known methods of characterising surface and optical changes such as microscopy, ESEM (Environment Scanning Electron Microscopy), and gloss and color measurements will be used to assess further the visual effects of the cleaning treatments.

While initially focussing on artists' acrylic emulsion paints, the project will consider a wide range of paint manufacturers and pigments and will also encompass acrylic solution paints and examples of commonly used artists modifications, such as dilution and the addition of gloss medium. A comprehensive range of test samples will be prepared and a number will be allowed to accumulate dirt. A further representative selection will be submitted to accelerated ageing techniques to assess changes that may occur with time, and a number of naturally aged samples will also be assessed.

A significant amount of useful information is expected to be produced from this research, which will be disseminated widely. Any information and other contributions to any aspect of the research are most welcome. Please contact Tom Learner or Bronwyn Ormsby at the Tate Britain.

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