

Collections of paint colour charts, paint tins and paintings as a source for developing an understanding of paint making history.

Paula Dredge

Art Gallery of New South Wales

Abstract

A project looking at a collection of painting items from a studio used by the artist Sidney Nolan (1917-1992) from 1951 to 1953 is beginning to grapple with the subject of house paint technology from the pre World War II period up to the mid 1950s. Sidney Nolan was particularly engaged with house paint as an artist's medium, and it seems sought information from paint makers to obtain a deep technical understanding of these complex paint systems.

A number of additional collections of paint material held in Sydney museums have been identified that hold potential to provide new information on paint resins and pigments. A collection of historic paint colour charts which use the paint itself in the swatches of colour, and a collection of early synthetic paint resins from 1934-1937, are both valuable sources for analytical standards and the dating of technologies in Australia.

Paper

"The twentieth century in paint" is an Australian Research Council (ARC) Linkage grant, currently in its second year. This research project will be looking at twentieth century developments in paints used by artists in Australia and the Southeast Asia and Pacific regions. Project members from the University of Melbourne include: the Centre for Cultural Materials Conservation and the Centre of Excellence for Free Radical Chemistry & Biotechnology and the School of Chemistry. The University of Queensland is also a partner with the Centre for Microscope and Microanalysis and the eResearch Lab both contributors. Conservators from a number of Australian art galleries are involved: the Art Gallery of New South Wales, the National

Gallery of Victoria, Artlab Australia, the Queensland Art Gallery, and the Tasmanian Museum and Art Gallery. International contributors include: the Getty Conservation Institute, National Art Gallery of Malaysia, the JB Vargas Museum at the University of the Philippines, Silpakorn University in Thailand and the Tate in the U.K.

One nominated area of research for the ARC group is the use of commercial paints such as: car, house, industrial, and sign writing paints, by Australian artists. The paintings by Sidney Nolan up to his departure from Australia in 1953, has been identified as a significant case study. This has been assisted by the gift from Sidney Nolan's daughter, Jinx Nolan, of 120 paint items from Nolan's Wahroonga (Sydney) studio in use from 1951 to 1953. This material was donated to the Artists' Materials Archive in the Conservation Department of the Art Gallery of New South Wales in 2006 (Figure 1). A small number of cans from Sidney Nolan's Wahroonga studio were also given to the National Gallery of Victoria by Jinx Nolan in 2006. The Art Gallery of New South Wales material includes over 30 tins of paint made by Ripolin® Ltd., (U.K.) a significantly large quantity of this high quality oil-based enamel of a known date. Ripolin® was used by a number of European artists including Pablo Picasso (1881-1973) and Georges Braque (1882-1963), Francis Picabia (1879-1953) from the early 1910s, and in Australia, Sidney Nolan in the early 1940s.

Oil-based commercial paints, called enamels, produce a finish that is attractive to some artists, and not obtainable by artist's tube paint. Enamel is extremely liquid when applied, but dries quickly to form a smooth finish, without showing the texture of the brush (self levelling). Most early enamel paints were high gloss finishes, but they could also be matte. In the first half of the twentieth century glossy commercial paints underwent a series of significant changes moving from natural oil and resin based enamel formulations to nitrocellulose lacquers and then into alkyd resins (an oil-modified polyester). The rapidly changing technology of these paints was driven by the commercial pressure of the car industry and its desire for fast drying, high gloss and enduring paint finishes. These new paint

types were shortly afterwards modified and developed into paints for houses. The rapid take up of synthetic materials in these attractive gloss finishes ensured they were the first types of synthetic paints used by artists.

Until recently it has not been easy to analytically distinguish commercial paints from artist's oil paints. Identification of enamel type paints on paintings has been by visual appearance and archival reference alone. In the case of Sidney Nolan's oeuvre this has led to erroneous medium descriptions for his paintings, and in the work of other artists it has meant a lack of recognition of the use of commercial paint. However international historical research on the production of commercial paints and an increasing availability of instrumentation within art galleries that can analyse paintings either without the need for sampling or with the use of microscopic-sized samples, is beginning to unpack the complex paint structures we find on many paintings from the first half of the twentieth century.

The building of collections of artists' studio materials is increasingly critical as we unfold our understanding of the complex multi-component paint films of the twentieth and twenty-first centuries. They provide important context for artist's processes as well as standards of known material for analytical work. The Conservation Department of the Art Gallery of New South Wales has been actively growing a collection of artist's materials over the last ten years, but the earliest in the Artist's Materials Archive is a collection given by the artist Frank Hinder (1906-1992) of pigments donated in the 1970s and a group of experimental paint boards and extensive written documentation he gave in the 1990s. Other significant groups of materials held in the Artists' Material Archive includes a collection of Elwyn Lynn's (1917-1997) art materials gifted from his estate in 1997, and a recent gift of material from Sydney Ball (1933-). In addition there are artist's materials held in other locations within the Art Gallery of New South Wales including material contained within the Brett Whiteley (1939-1992) studio. A group of palettes used by Roy de Maistre (1994-1968) and pigments and painting comb donated by Pedro Wonaeamirri (1974-) are acquisitioned items held

within the collection of the Art Gallery of New South Wales. Other material held in the Research Library and Archive of the Art Gallery of New South Wales is associated with artist's papers.

The location and acquisitioning of this type of material within the Art Gallery of New South Wales has been inconsistent and dependant upon the initial contact staff and how the material was viewed at the time of acquisition. This acquisition anomaly with regards to artist's materials is probably replicated in art galleries throughout Australia and is not necessarily a problem as long as the relevant information can be recalled through cataloguing systems. However the unclear role that these materials have within art collections has lead to loss and disassociation of parts through incomplete cataloguing and multiple uses of the material for display and research. It is hoped that by describing some of the ways that these materials might be used to further our understanding of artist's making and associated issues of preservation, clearer strategies for acquiring and caring for this material might emerge.

Historical studies of technical developments in paint are also critical tools for the interpretation of analytical results. These studies can provide indicators for identification of their use by artists, but also extend our understanding of the complexity of materials and their components, enabling the development of experimental protocols to fully capture the individual parts. Initial work in this area was undertaken at the Tate Gallery by Crook and Learner in *The impact of Modern paint* (2000). Looking at the use of commercial paints by European artists in the early twentieth century for example, three parallel projects were developed by the Royal College of Art, London, the Tate Gallery and the Victorian and Albert Museum. These studies covered the historical development of gloss paints in the twentieth century (Standeven, 2006), the development of analytical systems for their identification (F. Cappitelli, 2002), and a case study of the use of commercial paints by Pablo Picasso as evidenced on paintings in the collection of the Tate (Koussiaki, 2003). It was the combination of the three projects which gave outstanding results for the understanding and recognition of the importance of these paints and

their use by artists. In her research on Picasso and the Ripolin® paint company Koussiaki dispelled the myth commonly held in Australia, that Ripolin® gloss enamel was an alkyd (synthetic) paint. In fact she contends Ripolin® paint was not put onto an alkyd system until the late 1950s. Prior to that date it was made from natural oils and resins. Initial analytical results from the tins of Ripolin® from Nolan's Wahroonga studio confirm that these paints are natural oil based enamels. This suggests that prior to Nolan's departure from Australia in 1953 the medium of his Ripolin® paintings are unlikely to be synthetic polymer paint, as they have often been catalogued.

A large international project looking at house paint used by artists, and Ripolin® in particular, is currently underway at the Art Institute of Chicago (Gautier, Bezur, Muir, Casadio, & Fiedler, 2009). One of the sources for known standards for analysis of Ripolin® paint that this team has identified are old paint colour charts of the French and Dutch made Ripolin®, in which the paint itself has been used on the colour swatches. Nolan's Ripolin® paint was however made in England, and uses a different coding system to the French and Dutch Ripolin®. A colour chart for the English Ripolin® range is held in the State Library of South Australia, (Figure 2). Future analysis of the Nolan tins and the South Australian chart will, it is hoped, give further information on the English line of Ripolin® thus providing useful comparison with the Chicago work on European Ripolin®. These colour charts also demonstrate one of the features of Ripolin® paints that must have been attractive to Nolan; it was available in a huge range of colours, 72 on the South Australian chart, many bright and intense. Other locally made enamel paints were produced primarily for house and car painting and their colour ranges tended to neutrals and earth colours.

In Sidney Nolan's letters to Sunday Reed, written while in the Australian Army from 1942 to 1944, he discusses his purchase and use of DUCO® and DULUX® (manufactured in Australia by British Australian Lead Manufacturers B.A.L.M.) and Dynamel® (manufactured in Australia by Taubmans) prior to and after receiving a consignment of Ripolin® in January 1943 (Reed & Reed, 1924-1981). There are several tins of

DULUX® made by B.A.L.M. within the Nolan Wahroonga studio materials, although unfortunately no DUCO® or Dynamel®. Ironically, as DUCO® is a nitrocellulose lacquer, DULUX® is an alkyd and Dynamel® may have been an alkyd, it seems that synthetic polymer paints were used by Nolan. While both Kubik (Kubik, 2006) and Klepac (Klepac, 2007) have previously acknowledged Nolan's use of DULUX® paint, neither had identified the conflict in the medium descriptions which apply to these materials.

A paper looking at the development of car paints in Australia provides critical information about locally produced enamel paints (Todd, 1998). Todd outlines the close relationship between B.A.L.M. in Australia and Du Pont in the U.S.A. in the local manufacture of nitrocellulose lacquers, DUCO®, from 1927 and alkyd resin paint DULUX®, from 1931. Other Australian paint makers were quickly able to begin purchasing imported DUCO® resin and manufacturing nitrocellulose lacquers themselves, but the alkyd resin did not begin manufacture in Australia outside the B.A.L.M. monopoly until 1939 when Reichhold Chemical Company (U.S.A.) in partnership with an Australian resin importer and distributor, A.C. Hatrick began production of alkyd resin first at Rosebery then at Botany in Sydney to supply local paint makers.

There is evidence in the Nolan Wahroonga studio material that Nolan directly sought information on paint-making from Reichhold/A.C. Hatrick in 1952. A receipt for linseed oil and turpentine purchased from A.C. Hatrick, includes a notation in Nolan's hand with street directions to the Botany plant. Further hand written notes on the same receipt give a recipe for a lead white based oil paint which includes a drier, suggesting that Nolan may have been experimenting with making his own enamel paint. A bottle of cobalt naphthenate, a drier commonly used in commercial paints after the Second World War and manufactured in Australia by A.C. Hatrick, also forms part of the Nolan studio material. The range of material aside from the Ripolin® paint found within the Wahroonga studio, is beginning to suggest that Nolan's engagement with commercial paints went far beyond the use of

Ripolin® to the use of other prepared paint products, and extending into the manipulation of binders, pigments, solvents and driers. This has the potential to increase the challenge of interpretation of the analysis of his paintings.

A number of instrumental developments have facilitated the recent development of analytical capabilities within art galleries in Australia. Analysis of inorganic metallic pigments has been common practice for conservators using polarising microscopy and Scanning Electron Microscopy (SEM) with Energy Dispersive X-Ray Analysis (EDX). Recent development of Portable X-ray Fluorescence (PXRF) instruments and their purchase by a number of Conservation Departments within Australian art galleries has enabled fast collection of inorganic information from paintings without the need to sample.

Analysis of the organic (paint binders & organic pigments) component has been more difficult. This is in part due to the low proportion of binder found in artists' paints in comparison to the pigment, and the difficulty in obtaining a large enough sample for analysis. Gas Chromatography coupled with Mass Spectroscopy (GC-MS) has been a standard setup for organic analysis in art museums.

In looking at twentieth century paints, and in particular commercial paints, the proportion of organic materials to pigments is considerably reversed. Powerful tinting pigments developed that required less volume of pigment and glossy oil-based house paints did not need large amounts of bulking agents as they were fairly liquid. These features increase the potential for minute samples to give information on binders in oil based commercial paints compared to artists' oil paints.

Fourier transform infrared spectroscopy (FTIR) has been a common analytical technique used to identify organic materials in paints. However the coupling of the instrument with an infrared microscope and a lowering of setup cost, has made an enormous impact in our ability to analyse paintings where sample size is a critical factor. An FTIR microscope was purchased by the Conservation department at the Art Gallery of New South Wales in 2001, from money raised by

the Conservation Benefactors. It has become a day to day tool used by the Conservators to answer analytical questions. In looking at complex organic mixtures as found in house paints, it can identify the presence of alkyds and nitrocellulose resins, but is less effective at differentiating natural oils and resins, such as those in Ripolin®. It does however provide a fingerprinting system which may be effective enough in comparison with known standards such as those provided by the Nolan studio material from the paint cans, to be able to identify Ripolin® on Nolan's paintings.

This ARC project has also been making use of the Infrared beam-line at the Australian Synchrotron. Initial experiments looking at several samples of Ripolin® paint from the Nolan studio material support further studies into the formation of metallic soaps in these paints. These soaps have formed as a reaction between the oil and metallic components of the paint. They have the potential to be mobile within the dried film and may cause issues with development of large aggregates forming lumps in the paint film and possibly problems of solubility when exposed to solvents during cleaning.

More detailed analysis of the complex organic mixtures in paints are however provided by GC-MS. Using GC-MS with a pyrolyser, the breakdown of the alkyd components becomes possible making it even more effective as a tool for date marking paints when compared to changes in production ingredients. The analysis of alkyd resins using pyrolysis GC-MS coupled with a methylation reaction was pioneered by an Australian Forensic scientist, Dr Challinor in the 1990s (Challinor, 1991), and the technique as applied to samples from artwork further developed by Cappitelli, Learner, and Chiantore (Francesca Cappitelli, Learner, & Chiantore, 2002). It is hoped that such a system might be able to be put in place for use in Australia as a result of this project.

While the current ARC project is an opportunity to begin to examine the material history of paint used by artists in Australia and its region, it is hoped that a longer term strategy for undertaking detailed research and analysis emerges for Australian art galleries. Art Historians and

Curators are intensely curious about issues of materiality and often seek the assistance of Conservators to investigate artworks, but limited resources and time available mean that this work is rarely prioritised. Developing historical frameworks for technical developments on which to substantiate and support the analytical results is critical to the process, as is the further development of analytical tools and operators experienced in working with artworks. This research informs Conservators and Art Historians about the making of artworks and their ageing characteristics to assist in the informed decision making about their conservation and care.

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About the Author

Paula Dredge has been paintings Conservator at the Art Gallery of New South Wales since 1990. She has undergraduate degrees in Art History (University of Sydney) and Conservation of Cultural Material (University of Canberra) and is currently an Australian Postgraduate Award recipient working towards a PhD with the Centre for Cultural Materials Conservation at the University of Melbourne. Her research is based at the Art Gallery of New South Wales and the subject of the thesis is Sidney Nolan and house paint (1941-1953).

Contact: paulad@ag.nsw.gov.au