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Letters to the Editors
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Letters to the Editors

From Charles S. Tumosa, Marion F. Mecklenburg and David Erhardt
Smithsonian Center for Materials Research and Education, Washington DC

The recent article by Carr et al. [1] on the development of a physical model of canvas paintings raises issues, some of which we would like to address.

First, the aging of oil paints by thermal treatment has been shown to produce results very different from natural aging. Thermal treatment of pigmented oil films has the effect of volatilizing the lower molecular weight components. The observed increases in stiffness and brittleness are due to this loss of plasticizing components, rather than to any change of the bulk oil polymer as speculated by the authors. In fact, thermal aging causes increases in stiffness and brittleness much greater than those produced by natural aging [2, 3]. This alters the ratios of the components of paint films in directions opposite to those seen during the natural aging of oil paint films. Heat treatment does not correspond to natural aging for pigmented oil films. In fact, thermal aging not only does *not* mimic the natural aging of oil paints or grounds, but produces films less like naturally aged films than the original films before thermal aging.

The aging conditions chosen for the gelatin are near or above its glass transition (which is lower than the melting point the authors quote). Such extreme conditions should be avoided, since the aging of materials in the gel state is quite different from that in the glassy state.

The relevance of soaking linen in sulfuric acid to natural aging is questionable, at best, and would seem unnecessary if the subsequent thermal aging of the composite were valid.

The glue, ground and design layers are of primary importance in determining the behavior and appearance of a painting. The linen layers are of limited importance in determining the behavior of the painting since it is the glue layer that is the stiffest and strongest component except at extremely high relative humidity. The glue layer supports the ground and paint, and it is the movement of the glue layer(s) relative to the paint that produces the RH-related physical damage (cracks) seen in paintings. The breaking strain of the linen measured in this article is about 12%, which is well beyond that produced by any possible environmental change of RH or temperature or hopefully any conservation treatment. The authors focus on what happens during this extension, rather than on the first 1–2% extension which is relevant to real-world effects. The breaking of the ground layer first is expected and represents the failure that would be seen in environmentally damaged paintings.

The part of the experimental design that we find most problematic is the underlying philosophy that 'specimens needed to be prepared within the lifetime of the project' [1]. This is not a valid justification to use artificially 'aged' materials that do not reflect the physical or chemical properties of naturally aged materials. Just because materials are different than before treatment does not mean that they are 'aged'. Heating does not age paint (it does other things) and a ground (or paint) layer should be years old before

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testing since significant chemical and physical changes continue for years. It takes years of natural aging before characteristics such as the amount of extractable low molecular weight material and mechanical properties level off [4]. In fact, the aging protocols for each of the three materials are either wrong or highly questionable. The model presented does not represent a system aged under normal conditions, but perhaps that of a very new painting exposed to excessive heat.

It is often taken for granted that 'aging' can be readily simulated in the laboratory by any process that induces change or deterioration, and that no effort need be made to demonstrate that the changes simulate, or are relevant to, natural aging. This article is simply the latest example.

REFERENCES

1 Carr, D.J., Young, C.R.T., Phenix, A., and Hibberd, R.D., 'Development of a physical model of a typical nineteenth-century English canvas painting', *Studies in Conservation* **48** (2003) 145–154.
2 Erhardt, D., Tumosa, C.S., and Mecklenburg, M.F., 'Can artists' oil paints be accelerated aged?', *Polymer Preprints* **41**(2) (2000) 1790–1791.
3 Erhardt, D., Tumosa, C.S., and Mecklenburg, M.F., 'Natural and accelerated thermal aging of oil paint films' in *Tradition and Innovation: Advances in Conservation*, eds. A. Roy and P. Smith, International Institute for Conservation, London (2000) 65–69.
4 Mecklenburg, M.F., and Tumosa, C.S., 'Traditional oil paints: the effects of long-term chemical and mechanical properties on restoration efforts', *MRS Bulletin* **26**(1) (2001) 51–54.

14 January 2004

From D.J. Carr, C.R.T. Young, A. Phenix and R.D. Hibberd

We would like to thank you for this opportunity to reply to the comments made to you by Tumosa, Mecklenburg, and Erhardt regarding our paper in *Studies in Conservation*. The paper represents a small part of a larger research project conducted during the period 1999–2001.

In case it was not fully apparent from the text of the paper, we wish to make it clear that work described therein concerns the development of a **physical** model of a typical nineteenth-century English painting. The work discussed in this paper was *not* intended to mimic exactly the chemical processes occurring during natural degradation. This point was clearly made in both the abstract and the introduction of the paper. The aims of the paper (as stated in the introduction) were to create a model that had comparable **physical** and **mechanical** properties to a particular type of prepared artists' canvas, which could then be subjected to various mechanical tests in order to gain a better understanding of the physical degradation processes of such composite structures, and of the influence of structural treatments. We maintain that this a valid and reasonable thing to do in order to elucidate factors pertaining to the physical, mechanical (not chemical) deterioration of such materials. No claim has been made that the ageing processes used, or the model structure produced thereby, necessarily created a *chemical* replica of a naturally aged painting on canvas. Contrary to what your correspondents imply, we must stress that the significant physical, mechanical properties that we were seeking to reproduce had actually been determined by measurement of samples of real, old archival material in the form of loose-lining canvases

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removed from nineteenth-century paintings in the course of conservation treatment. This information is reported in detail in other papers by members of our group, which are appropriately referenced in the paper, specifically references [1] (Carr, 2001), [15] (Young & Hibberd, 1999) and [17] (Young, in preparation). Against that background, it is our opinion that the implication contained in the closing paragraph of your correspondents' letter – that we have made no effort 'to demonstrate that the changes simulate, or are relevant to, natural ageing' – is unjustified. We feel that we have properly demonstrated the relevant properties of both these real and simulated painting composites: the crucial point, however, is that we have chosen to describe these properties in mechanical, not chemical, terms.

16 April 2004

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