The GeTTysburg College Cross-Disciplinary Sciences Seminar Series and The Chemistry Department presents

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X-Ray and Infrared Fluorescence Imaging Studies of Cadmium Yellow Alteration in Paintings by Edvard Munch and Henri Matisse in Oslo, Copenhagen, and San Francisco

Cadmium sulfide (CdS, cadmium yellow) alteration in turn of the 20th century paintings by such artists as Vincent Van Gogh (1853-1890), Henri Matisse (1869-1954), and Edvard Munch (1863-1944) has been documented in numerous works from the period. CdS degradation typically manifests severe symptoms: fading or darkening of the yellow paint as well as spalling and crumbling of the paint layers. The CdS pigment particles have been found to undergo photochemical oxidation and it is thought that one or more of the reaction products attacks the binding medium. Analysis of the pigment alteration process is complicated by, among other things, the use of cadmium carbonate (CdCO3) and cadmium sulphate (CdSO4) in period syntheses of cadmium yellow. Thus, the presence of these and other cadmium-containing products in degraded cadmium yellow is not sufficient by itself to implicate mechanistic pathways with certainty. Various synchrotron-based methodologies and laboratory-based microanalytical methods have been applied to spatially resolve cadmium-containing species and thus help elucidate their role or bystander status in the degradation sequences.

In spite of the attention paid to this critical area of painting degradation, surveying the extent of this problem in iconic works that are not amenable to sampling remains vital to identifying works at risk, understanding the factors involved in the degradation pathways (such as the presence of chlorine) and to assessing museum conditions that might mitigate the ongoing loss of cadmium yellow passages. Toward this end, non-destructive analysis of Munch’s c. 1910 The Scream in The Munch Museum, Oslo, and Matisse’s oil sketch of Le Bonheur de vivre at the Statens Museum for Kunst in Copenhagen. The methods used for cadmium yellow characterization and imaging were handheld x-ray fluorescence spectroscopy and infrared fluorescence imaging.

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