

**When Masterpieces Meet X-Rays:
Recovering Hidden and Vanishing Images in Paintings**

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The scientific analysis of objects of art is carried out to address questions about a work's authenticity, construction, state of preservation, and mechanisms of degradation. Given the irreplaceable nature of the works studied, this research must be conducted either totally nondestructively or on microsamples alone. A confocal X-ray fluorescence microscope was designed at Cornell's High Energy Synchrotron Source (CHESS) and has been used with conventional microanalytical methods to nondestructively reproduce a buried painting by N.C. Wyeth. N. C. (Newell Convers) Wyeth (1882-1945) is an iconic American artist best known for his famous illustrations for the works of Robert Lewis Stevenson and for popular magazines like the *Saturday Evening Post*. Several of his most valued illustrations have been lost from view because they were painted over, either by N.C. himself or by his son, groundbreaking 20th century American artist Andrew Wyeth. The first virtual reproduction of one of Wyeth's buried works is presented here.

Other studies include *The Armorer's Shop* (1644), attributed to Flemish genre painter David Teniers the Younger (1610-1690). Confocal data, along with dendrochronological and infrared reflectography data, provided a chronology of construction suggesting that the painting is the only surviving collaboration of Teniers with Flemish Baroque painter Jan Brueghel the Younger (1601-1678). Current research includes a XANES study of Henri Matisse's masterpiece *Le Bonheur de vivre* (*The Joy of Life*, 1905-6) which was undertaken to identify the origin of the fading, darkening, and flaking of its yellow paints. These alterations were identified in the painting's cadmium yellow pigments, and current data suggests the type of oxidative cadmium sulfide degradation that has been observed in turn of the 20th century works by Picasso, van Gogh, Seurat, and Leger. The implications of this phenomenon for the preservation and interpretation of Matisse's seminal work will be discussed.