

NON-INVASIVE IDENTIFICATION OF VAN GOGH'S DRAWING INKS

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Abstract

To clarify his working practice, brown and purple inks on 48 drawings, executed by Van Gogh during the period 1878-1890, were identified by applying a non-invasive, portable technique: Fibre-Optics Reflectance Spectrophotometry (FORS). The shapes of the spectral reflectance curves of the brown inks on the drawings closely matched those of applications on paper of iron gall and chrome logwood ink. The latter ink is a writing ink, introduced in 1847 by the German chemical scientist Ferdinand Friedlieb Runge, as a non-corrosive replacement for iron gall ink. Besides the drawings, also brown inks on 26 letters were analysed by FORS. The spectral reflectance curves on contemporary letters strongly resembled those obtained from the brown inks on the drawings, indicating that Van Gogh used the same ink for writing and drawing in a certain period.

The spectral reflectance curve of a purple ink on the drawing *Montmajour* (1888) matched that of an application on paper of crystal violet, a synthetic dye. This dye was marketed from 1866 on in admixture with structurally related dyes under the name "Methyl violet". It still is in use as a component of modern black and purple ballpoint inks. It also matched that of the ink on a contemporary letter. HPLC-analysis of the ink extracted from a paper sample, taken from the drawings' edge, indeed showed this to contain crystal violet, in admixture with its de-methylated derivatives.

XRF-analysis of the brown metal-containing inks confirmed the results obtained by FORS. With this technique, the elemental composition of the inks could be clarified, e.g. the presence of chromium or iron. These results indicate that Van Gogh used both types of brown ink: iron gall, as well as chrome logwood ink. While the latter type seems to prevail in drawings and letters from his French period, the former type seems to prevail in drawings and letters from his Dutch period.

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