

CASE REPORT

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Identifying the Order in Which Blood and Handwriting Were Deposited on a Document

REFERENCE: Black, D. J., "Identifying the Order in Which Blood and Handwriting Were Deposited on a Document," *Journal of Forensic Sciences*, JFSCA, Vol. 41, No. 4, July 1996, pp. 703-705.

ABSTRACT: As a consequence of a murder investigation, it became necessary to determine whether blood was present on a note prior to the handwritten entries being deposited on the paper. A simple and non-destructive technique using a profile projector was developed to allow such a determination to be made and photographed.

KEYWORDS: forensic science, questioned document examination, blood, ink, deposition order

As a part of the investigation into a murder/attempted suicide, the question arose as to whether a suicide note had been written after human blood had been smeared across the paper or whether it had been drafted prior to the victim being shot. Using a profile projection microscope equipped with coaxial illumination, differences between blood resting over ink and ink resting over blood become immediately apparent and able to be readily photographed.

Equipment

Nikon Profile Projector, Model 6C. A 20 times objective lens was used with a half silvered mirror attachment applied to allow coaxial illumination.

Leitz Aristophot 5 × 4 inch camera equipped with a similar half silvered mirror attachment to allow coaxial illumination.

Experimental

A note was submitted to the Document Examination Section of the Victoria Forensic Science Centre bearing handwritten entries in blue ball-point pen and a number of brown stains. Other workers had already established that these stains were blood by using a hemochromagen test. The note was initially examined under low power magnification in an attempt to determine whether the blood had been deposited before the ink. This did not yield any satisfactory results.

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A test comparison was conducted where human blood was placed over ball-point pen ink entries. A similar type of paper was used to that of the note (approx. 50 g.s.m. and containing optical brighteners). A period of approximately 1 hour was allowed between applications to allow sufficient drying time for the blood and ink.

Using a profile projector operating with coaxial illumination (Fig. 1), it became immediately apparent that where the ink entries overlay the blood, specular reflections were seen on the ink entries (Fig. 2, as indicated by *arrows*). Conversely, where the blood overlays the ink there were no such specular reflections present (Fig. 3).

Results

The specular reflections seen on the ink overlaying the blood appear very similar to the "bronzing" effect (1) commonly associated with the examination of ink by reflectance microspectrophotometry. Once noted, the reflections or the absence of them can be recorded on a camera equipped with a similar coaxial illumination arrangement. As expected, the "bronzing" is displayed much more prominently on color film than it is on black and white. This effect

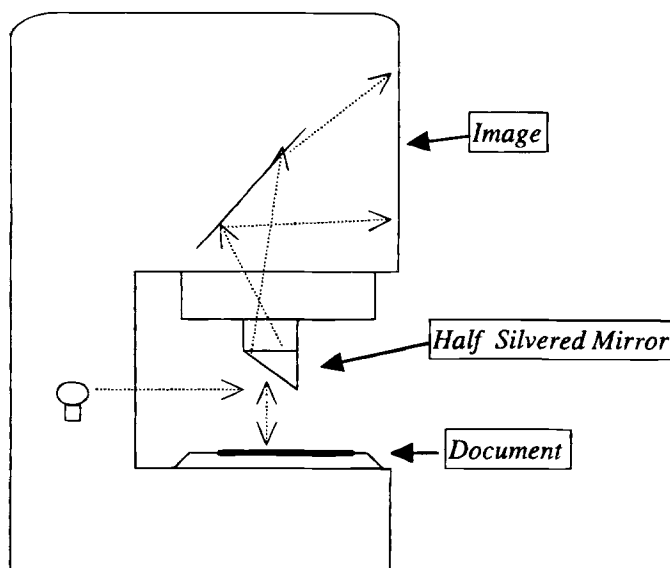


FIG. 1—Cutaway of profile projector using coaxial illumination.



FIG. 2—*Specular reflections on ink overlaying blood.*



FIG. 3—No specular reflections on blood overlaying ink.

is apparent with layers of blood that are quite thin. However, the author is unable to quantify any differences caused by variations in the thickness of the layer of dried blood.

A further test was also carried out simultaneously with the other two tests in which the ink was written over fresh blood. In this case, the hydrophobic nature of the paste ink caused the blood to be pushed out to the side of the ink line. Very heavy indentations were also made due to the sodden nature of the paper.

Discussion

The orthodox document examination techniques used for the determination of the sequence that pen lines were placed on a document were not applicable in this case. The “bronzing” effect noticed here gives a quick, simple and non-destructive method of determining the order of deposition of the blood or the ink.

A limitation of this technique is that only one type of ink and one type of biological fluid have been tested in relation to each other. Future work might possibly involve testing all the various combinations of inks and biological fluids as the cases arise.

Reference

- (1) Zeichner A, Levin N, Klein A, Novoselsky Y. Transmission and reflectance microspectrophotometry of inks. *J Forensic Sci* 1988; 33:1171–84.

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