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POLICE SCIENCE TECHNICAL ABSTRACTS AND NOTES

M. Edwin O'Neill

The Decipherment of Writing on Charred Documents

The widespread destruction of important documents by fire, resulting from repeated air attacks on London and other English cities, has stimulated research by British experts on the problem of decipherment of writing on charred or burned papers. Two new methods which have been developed are reported in recent numbers of *Nature* (London).

In an article entitled "A New Method for the Decipherment of Charred Documents," W. D. Taylor and Henry J. Walls of the Metropolitan Police Laboratory at Hendon describe a process, which, because of its simplicity and general applicability, they believe represents a distinct advance over any method previously described.¹ The process consists of treatment of the charred document with chloral hydrate, which was found to exert a "clarifying" action on the written matter, although its exact physical or chemical effect has not as yet been determined. The technique is described as follows: "The chloral hydrate is applied in a 25% alcoholic solution; after several applications, the document being dried at 60° C. between each, a mass of chloral hydrate crystals will form on the surface, and at this stage a similar solution containing 10% glycerine is applied and the document dried as before." The document is then photographed on a "contrasty non-color sensitive plate." It was found that the method is especially valuable for the restoration of typewriting and

printing, and, with certain modifications, handwritten matter also.

G. A. Jones, of the Kodak Research Laboratories at Middlesex, has found that a simple photographic method was successful in some cases where no results could be obtained by previously described methods.² In regard to the photographic principle involved, he states that "the method depends on exaggerating photographically the difference between the specular reflectivity of the remains of the plain paper and of the ink. Essentially, the charred paper surface can be regarded as a mirror, the surface of which can be made to reflect an intense source of light close to the camera lens and on which the original writing stands out as a dark shadow, presumably due to the disturbance of the paper fibers by the pen and to the presence of some residual salts from the ink."³ The sheet is made absolutely flat and is illuminated with an arc lamp, placed close to the camera, with the lens of the lamp so arranged that it throws a narrow beam of light onto the paper. The photograph is made on a blue-sensitive high contrast plate. The author does not make exaggerated claims for this method, stating that it is "probably practicable only with a fairly limited number of combinations of ink and paper," but this technique was found to give excellent results in some cases where all the methods described in the literature had failed.

The Development of Invisible Writing with Sulphocyanic Acid

Ralph Turner†

On March 10, 1941, a small white rectangular shaped piece of paper measuring 2½ x 8 inches was brought to the Technical Laboratory. The paper was blank

with the exception of the date "March 20, 1938" which was faintly visible in the upper left hand corner and appeared to have been written with a light brown col-

¹ Taylor, W. D. and Walls, H. J., "A New Method for the Decipherment of Charred Documents," *Nature* 147 (3727):417 (1941).

† Technical Laboratory, Kansas City (Missouri) Police Department.

² Jones, G. A., "Decipherment of Charred Documents," *Nature* 147 (3735):676-677 (1941).

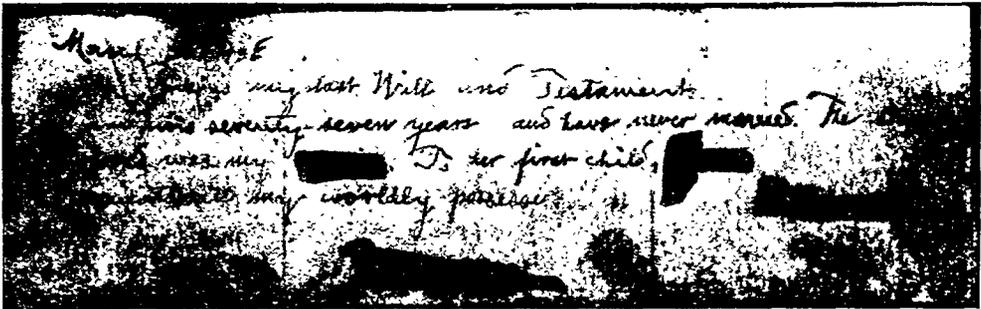
³ For a similar technique see Tyrrell, John F., "The Decipherment of Charred Documents," *J. Crim. L. and Criminology* (Police Science Section) 30 (2):236-242 (1939).

ored liquid. Subsequent investigation revealed the fact that the owner of the document had exposed it to a gas flame and caused the date to appear. This suggested the possibility that there was more writing on the page, and that it may have been written with lemon juice, a common type of invisible ink which becomes visible when treated with heat. Nothing more, however, was visible on the piece of paper submitted for examination.

The document was first examined with parallel light rays which revealed the presence of a slightly "raised" or "embossed" substance on the paper, which appeared in the form of writing. This

The document was then exposed to the vapors of sulphocyanic acid formed by moistening potassium sulphocyanate with 10% hydrochloric acid.¹ A modification of an iodine fuming tube was used for this purpose. This treatment caused the invisible writing to turn a red-brown in color and become relatively permanent. Continued treatment made the writing stable enough to photograph it satisfactorily.

The document was photographed using Eastman Process Film, exposure 4 seconds, diaphragm opening f4.5, illumination two 12 amp. single carbon arc lights. (See illustration.)



INVISIBLE WRITING DEVELOPED WITH SULPHOCYANIC ACID

(The names on the document have been blocked out in compliance with the owner's request.)

material was colorless and faintly translucent.

The document was then examined with ultra-violet light using a General Electric 100 watt Mazda Mercury Vapor Lamp of the CH-4 type, equipped with a Corning No. 936 ultra-violet filter. Several fluorescent areas were visible, and it was positively determined that there was additional writing on the paper. The nature of it, however, could not be determined.

An iodine fuming tube was next used, and this treatment brought out the invisible writing sufficiently to note the content of the paper, but because of the transitory nature of the iodine deposits, a satisfactory photograph could not be made.

This case has been cited because it represents an adaptation of a well known process to a slightly different problem. It was definitely proved that the document was written in 1938 thus making it approximately three years old, and in all probability was written with lemon juice. The sulphocyanic acid method has been used with remarkable success in the restoration of faded or chemically erased inks of the blue-black, blue, or jet black types. No record, however, has been found in the literature of it having been used in the restoration of invisible or secret writing, thus, this note is reported for whatever value it may be to examiners of similar documents.

¹This method was suggested by M. Edwin O'Neill, of the Chicago Police Scientific Crime Detection Laboratory, in an article on "The

Restoration of Obliterated Ink Writing," J. Criminal L. and Crim. (Police Science Section) 27 (4):574-577 (Nov.-Dec., 1936).