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THE DECIPHERMENT OF CHARRED DOCUMENTS

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The examination of fire-charred documents with a view toward deciphering the writing thereon constitutes an interesting though somewhat difficult problem. Such cases demand a careful application of certain scientific methods and techniques not generally known or used in the profession of document examination.

In attempting to decipher charred documents the examiner should bear in mind the fact that such documents may vary considerably in their physical and chemical composition, depending upon the type of paper and ink and also upon the conditions under which they were burned. For this reason it may be necessary to resort to any one of several different methods or techniques of decipherment. In this article is contained a description of three of the simpler methods, together with illustrations of decipherments obtained in an actual case.

Several years ago the writer was consulted in a matter involving the examination of a number of charred documents contained in an iron "strong" box recovered from the ruins of a fire. It so happened that the box had been opened immediately after its removal from the smouldering ruins, whereupon the contents burst into flame. The lid had been quickly shut and the fire extinguished, but only after the documents had been reduced to a thoroughly carbonized state.

When the box and its contents were presented to the writer, whatever writing that may have been present on the documents

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was for the most part entirely illegible. Since the box was known to have contained a number of bonds, mortgages, and other valuable papers, the writer was requested to make an effort to decipher the writing on the charred contents of the box. (See Figure 1 which shows the charred state of these documents as they appeared when submitted for examination.)



FIGURE 1

Charred Documents and Iron Box Container Recovered From Ruins of Fire

Three different methods and techniques were used in this case. One consisted of contact exposures of the documents to photographic plates. Another involved filter photography. The third consisted of the photography of the documents in oblique light.

Research conducted as far back as 1899 disclosed that a photographic plate is sensitive to the action of certain gases and vapors and that this action takes place without the exposure to light.¹ Further studies, principally the one published by Davis of the United States Bureau of Standards,² indicated that gases capable of fogging photographic plates are emitted by charred documents but

¹ See Proceedings of the Royal Institute for May 5, 1899; also the Journal of the Royal Photographic Society, November, 1908.

² See Scientific Papers of the Bureau of Standards, 18 (454), issued October 18, 1922, by the United States Government Printing Office.

that the ink present on a charred document acts somewhat as a protective film which hinders the escape of gas in that particular area. Because of this latter fact a charred document, when placed in contact with a photographic plate, will fog the plate except in those portions of the document upon which any writing or printing may be present. The resulting contrast between the fogged and the unfogged portions of the plate will render visible a negative reproduction of the contents of the document, from which negative a positive print of the deciphered writing can be made.

Taking advantage of the foregoing phenomena, the writer used the procedure described by Davis in a U. S. Bureau of Standards publication³ in deciphering a number of charred documents submitted to him in the previously mentioned case. While thus engaged it occurred to the writer to experiment with ultra violet ray treatment. Charred documents selected for decipherment were first subjected to an exposure of approximately five minutes to the rays of a quartz mercury Hanovia lamp equipped with an ultra violet filter.⁴ The documents were then arranged between ordinary commercial photographic plates and placed in a light-proof wooden box, under a heavy weight so as to insure the greatest possible contact. After a contact period of two weeks duration, the plates were developed in an ordinary photographic solution (Eastman's, now replaced by their 61a), and followed with the usual hypo fixation. Using the plates thus developed, photographic prints were obtained such as the one illustrated in Figure 2.

Considerable care should be exercised in handling the charred documents and in placing them between the photographic plates. The recommended procedure, carried out in the darkroom, consists in placing the charred document on a plain sheet of glass and then placing a photographic plate on top of the document or its fragments. With the one photographic plate thus in position both plates may be turned over so that the plain glass being uppermost may be removed and a second photographic plate substituted for it. In this way a simultaneous exposure may be made of both sides of the charred documents.⁵

³ *Supra* note 2.

⁴ So far as the writer knows, this is his own variation of the usual technique.

⁵ According to Davis' research, by washing a film in filtered water for a short time and drying before placing in contact with the charred paper, results like those given by photographic plates may be obtained. See Davis, *op. cit. supra* note 2.



FIGURE 2

Decipherment of Charred Document by Contact Exposure to Photographic Plate

- (A) The charred document as it appeared on visual inspection when photographed by ordinary process
 (B) Print made from photographic plate to which A had been exposed

Obviously, these charred fragments were exceedingly brittle and the greatest care was necessary in separating each calcined sheet from its fellows. Frequently separation resulted in several fragments and it became necessary that each of these be lifted with forceps and fitted into place in the ensemble on the glass. For instance, the example shown was one of twenty certificates of deposit which, having been folded when placed in the strong box, stubbornly retained that condition after charring, and consequently the separation into two pieces when pried apart was inevitable.

Although some very successful results were obtained by the above described technique (see Figure 2), there is one very decided disadvantage to this contact procedure, and that is the time element. Very often results are desired much sooner than the two

or three-week period necessary for decipherment by this process.

With a view toward expediting the decipherment of some of the charred documents in this case the writer resorted to a second method. In order to accentuate the differences in the actinic power of the charred document background as compared with those portions of the paper upon which the ink or printing had been deposited, a photograph was made with the aid of a Wratten No. 48 blue filter and on Eastman commercial film. The result of this method is illustrated in Figure 3.



FIGURE 3

Decipherment by Means of Filter Photography

A third method was tried on various documents in this case. The writing on some of the papers had been printed with ink of such density and quality that a distinct sheen was observable when viewed in oblique light. Because of this fact an attempt was made to decipher the writing by photographing such documents in oblique light. To do this the document to be photographed was carefully mounted on a sheet of glass with small touches of gum. The glass was next fastened to the object board before the camera and the board so tilted forward that the illumination produced by the source of light, a 500 Watt Mazda lamp placed below the camera lens,

registered distinctly on the ground glass of the camera. Exposures were made on orthochromatic films, but any ordinary plate or film will answer the purpose. The final result is illustrated in Figure 4.

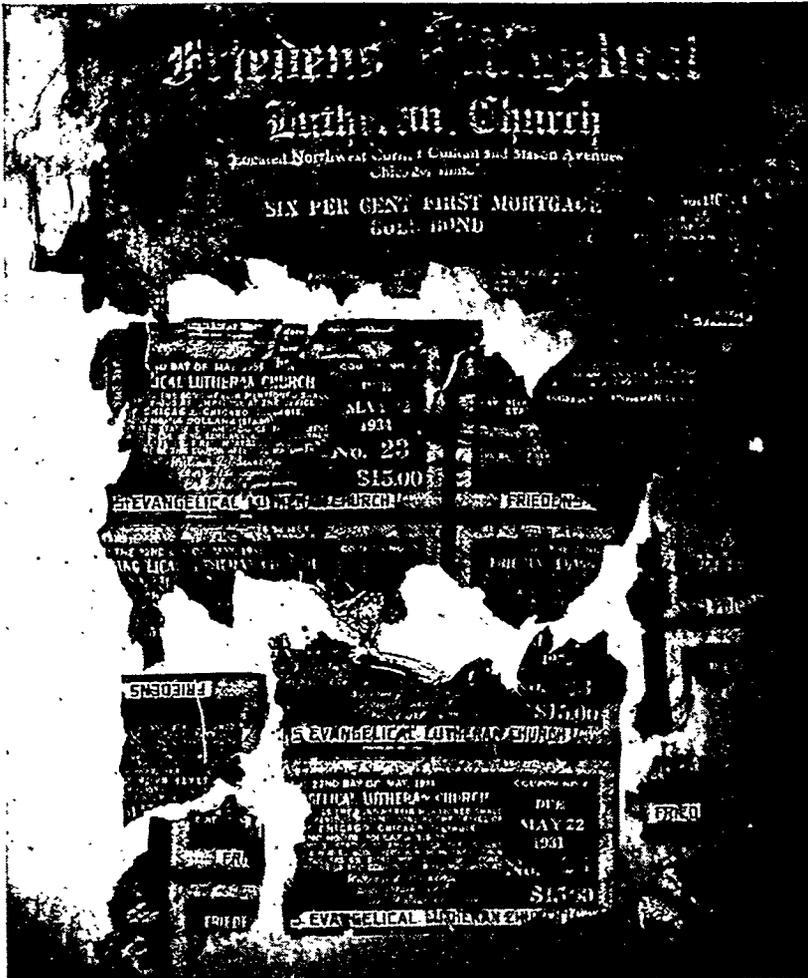


FIGURE 4

Decipherment by Means of Photography in Oblique Light

If greater contrast is desired a print of the negative thus secured may be photographed. The result will be a better reproduction. With each repetition of such process the writing becomes more distinct and the background clearer.

All three of these methods and techniques are relatively simple and they may be employed without the aid of any elaborate equipment.⁶

⁶ Many recent advances have been made in infra-red photography, but how far infra-red photography has been successful in charred document decipherment by other investigators the writer is unable to state. From knowledge at hand, however, it appears that infra-red photography does not equal the contact process in the degree of definition obtainable.