

1948

## Decipherment of Charred Documents

David A. Black

Follow this and additional works at: <http://scholarlycommons.law.northwestern.edu/jclc>

 Part of the [Criminal Law Commons](#), [Criminology Commons](#), and the [Criminology and Criminal Justice Commons](#)

---

### Recommended Citation

David A. Black, Decipherment of Charred Documents, 38 J. Crim. L. & Criminology 542 (1947-1948)

This Criminology is brought to you for free and open access by Northwestern University School of Law Scholarly Commons. It has been accepted for inclusion in Journal of Criminal Law and Criminology by an authorized administrator of Northwestern University School of Law Scholarly Commons.

## DECIPHERMENT OF CHARRED DOCUMENTS

David A. Black

David A. Black is an Examiner of Questioned Documents at Los Angeles, California, and a member of the American Society of Questioned Document Examiners. A graduate of the University of California at Los Angeles, Mr. Black has since 1937 been actively engaged in this field as an associate of Clark Sellers. Recently he was confronted with the task of rapidly deciphering large numbers of charred papers and after experimenting with all reported methods of decipherment devised the procedure described in his present article.—EDITOR.

Problems involving the decipherment of charred documents are so varied and result from such differing circumstances that, so far as is known, no one "best" method has been established applying to all types. Differing conditions require different treatments. This paper will describe a method developed for the decipherment of a great quantity of documents charred in a closed container.

Two inquiries, both involving numerous documents, were submitted to this office in the past year. In the first, a box was submitted about three times the size of an ordinary men's shoe box, filled with the charred but well-preserved remains of what were once the contents of a bank safe-deposit box in the Philippine Islands. The client desired to know what securities were among the charred remains, which consisted of all sorts of papers including insurance policies, deeds, leases, receipts, letters, a will, and many other documents. The information desired from the stock certificates included the name of the company, the serial number of the certificate, number of shares, par value, name of owner, and date of issue. There were, as it proved, about 60 stock certificates in the box.

The second case, submitted later in the year, involved detailed examination of the entire contents of a stockbroker's safe-deposit box from the same bank. This box measured 5" x 10" x 22" and was full of charred documents, mostly securities. The same kind of information was wanted, plus the exact contents of type-written, ink, and pencil lists and memoranda.

The condition of the charred documents in both cases was one of complete blackening, though not to an ash. The bank burned following bombing, near the end of the war. The contents of its vaults probably had not actually been ablaze, due to being enclosed; but intense heat apparently drove all the moisture out of the paper and broke down the cell structure to leave only black carbon.

Any rough handling in transit would of course have reduced

the entire contents of the boxes to illegible small fragments. In case No. 1 the contents of the safe-deposit box had been padded with absorbent cotton, in such a way that the flimsy pieces were gently held immovable. In case No. 2 the fragments were left in their original box without further padding. However, this box was completely filled with documents. Thus the fragments were held fairly firm. This box was brought from the Philippines by special messenger with the utmost care.

Since the time available on certain security issues was short due to a limitation date for claims, it was necessary to find a quick means of picking out the fragments representing those issues. Fortunately, seals or large printing on certificates identified them as such almost at sight. The procedure decided upon therefore was first to sort the entire contents of the box, putting aside all fragments that had any appearance of being part of a stock certificate.

In both cases the pieces were intact for the most part, although there was a quantity of small, loose, disintegrated pieces which it was of little use to examine. The bulk of the material was intact due to lying flat. Most of the documents were folded; when unfolded, they came apart at the line of the fold, producing three or four adjacent sections of a complete document.

There was very little curling because the documents were tightly stacked. There was a certain amount of crinkling or buckling. There was virtually no splitting due to shrinking.

The documents were handled by removing them carefully one at a time with flat, long bladed tongs and laying them flat on a table for unfolding and study. Practice enabled handling large fragments without breaking them. It was necessary to control the flow of air in the laboratory; drafts might be destructive. Documents partly examined were sorted by stacking the parts of each document together with light weights on top.

The next step was to find a quick, effective method of rendering the fragments readable—one that would serve for as many types of writing as possible: Printing, typewriting, ink, pencil, carbon copy, mimeographing, etc. Various chemical treatments were tried. Photography by daylight, incandescent, infrared, and ultraviolet light was used. But these all proved either ineffectual, too restricted in use, or too time-consuming.

One remaining recourse was the method developed during the war in England, making use of chloral hydrate, alcohol, and glycerin.<sup>1</sup> It was decided to try this method. It consists in successive immersions of the charred fragments in a 25% chloral

<sup>1</sup> Taylor, W. D. and H. J. Walls: "A New Method for the Decipherment of Charred Documents," *Nature* (London), April 4, 1941. Abstracts in *Scientific American*, Dec. 1941, 340 and *Paper Industry and Paper World*, May 1942, 222.

hydrate solution in alcohol and then drying it at 60°C. The fourth or fifth immersion is in the same solution with 10% glycerin added; then dry as before. This process is supposed to result in a gradual accumulation of chloral hydrate crystals on the charred paper, accompanied by a differentiation in reflectivity between reading matter and bare paper, making it possible to read the writing at the proper angle of reflected light.

The British, according to the report, have had good success with this method. But the treatment did not have the desired results in our case.

It was discovered during the treatment, however, that at different stages between immersion and drying, some reading matter was temporarily legible due to differences in reflectivity. This led to experimentation to determine if there was some solution which would enhance this reflective difference even more.

After considerable experimentation it was found that the following solution served this purpose quite well: 20 parts water, 3 parts glycerin, 5 parts alcohol 70% (rubbing alcohol). Small variations in proportions affected the performance of the solution negligibly.

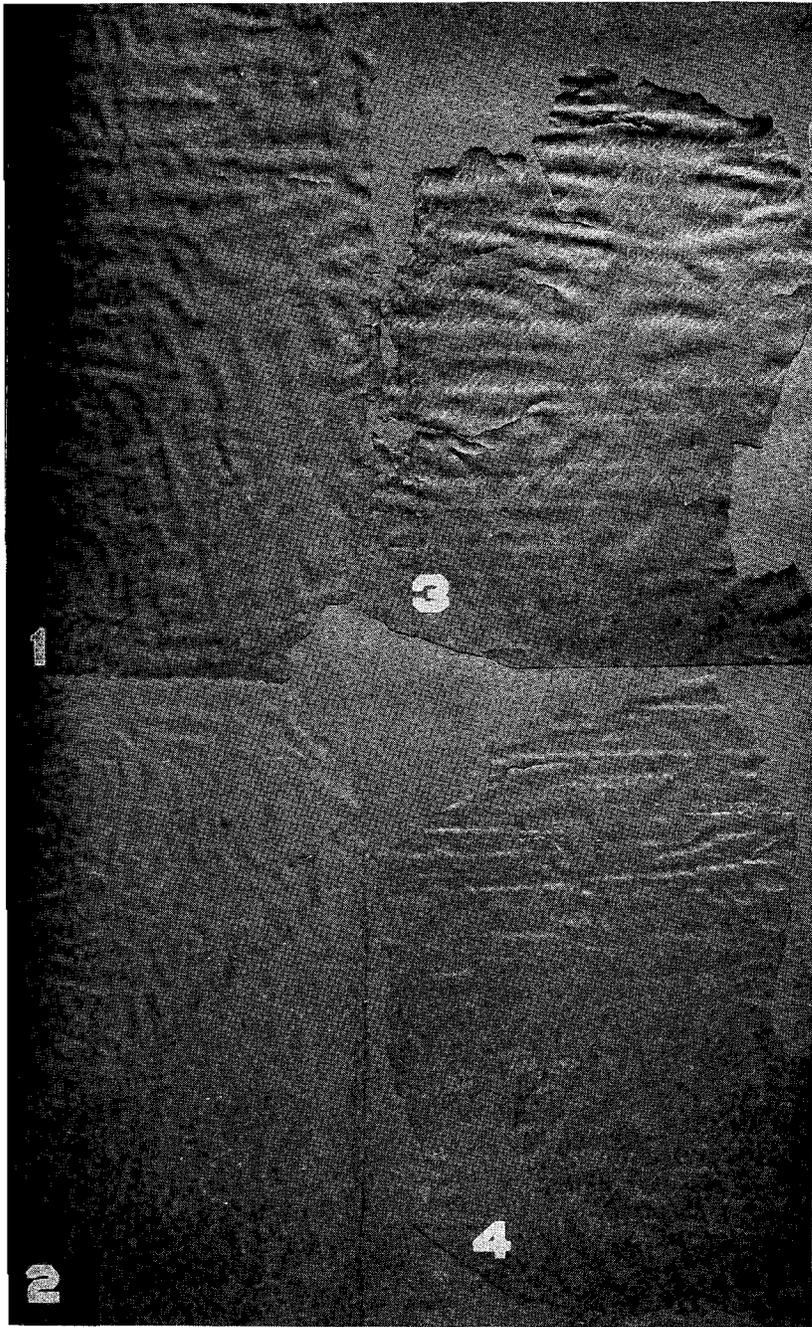
In using this solution, the charred fragment is immersed, and readings of the fragment are made during each stage in the treatment as follows: (1) Before immersion; (2) during immersion,—that is, while the fragment is lying on the surface of the solution soaking it up, and before the fragment is completely soaked; (3) under solution; (4) while dripping wet; (5) after blotting.

In this way no chance is missed during the entire process to pick up reading matter. What is not readable at one stage may be at another.

An important point in each stage is to hold the fragment at various positions relative to the source of light (in this case, window daylight), since differences in reflected light values are what enable decipherment.

If the fragment is dropped flat on the surface of the solution, reading matter will sometimes suddenly pop out on the upper surface. The written or printed portion soaks up the solution through the charred paper much faster than the bare paper does.

The solutions apparently serve as follows: The water imparts varying reflective values. The alcohol serves as a wetting agent,—the charred fragment sometimes looks almost as though it were sucking the water in. And the glycerin, a hygroscopic substance, retains part of the water content in the fragment during and after drying—in effect, permits a partial drying.



*Figure 1.*

1. Treated fragment of document containing typewriting and printing. 2. Untreated fragment of the same document as 1. 3. Treated fragment of a second document. 4. Untreated fragment of the same document as 3.

Black blotting paper was used for drying, as any lint from the blotter left on the fragment thus corresponded in color to the fragment itself. Light-colored lint was found to be a distracting element, a "mental hazard." The dripping fragment was laid flat on one piece of blotting paper and pressed dry with another laid on top.

In addition to being simple and rapid, this alcohol-glycerin-water treatment does not permanently change the appearance of the charred fragment. The hygroscopic glycerin imparts a certain amount of flexibility and softness to the fragments and reduces brittleness for a time, and eventually evaporates completely.

This process, moreover, is repeatable at any time, with practically the same deciphering effects. This proved an advantage especially in the second case. A preliminary examination of all fragments was made and a list of all documents discovered was submitted to the clients. They then indicated precisely what detailed information was desired. Then the documents were re-examined in detail.

It was found that the method was effective on different types of reading matter including printing, since it was physical rather than chemical in nature. Other advantages included the use of readily available materials, and these not particularly messy to work with.

In the first case, using this method it was possible to decipher the corporation names on every one of 60 stock certificates; the par value of every one; the certificate number, owner's name, and number of shares on all but a few; and the issue date on about five-sixths of them. In the second case, about 80% of all reading matter on about 400 documents, including securities, currency, memoranda regarding clients' accounts, and various agreements was deciphered.

The various enumerated advantages recommend the use of this method to anyone confronted with the problem of deciphering a great quantity of charred documents well preserved in flat pieces in the blackened state.