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VISUALIZATION OF WRITING ON CHARRED PAPER

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There have been many methods proposed for making pencil or ink writing visible on charred paper. The relative degree of success of each method depends on the extent of charring and the physical condition of the material under examination. Thus, relatively flat slightly scorched papers may be handled by several non-destructive methods involving little else than photography under optimum lighting conditions,^{1, 2, 5} or sensitization-desensitization reactions when pressed against a suitable photographic emulsion.^{3, 4, 5} When the paper has been folded, crumpled, and thoroughly charred the problem becomes more difficult, because (1) the remains are quite friable, difficult to separate, difficult to flatten, and (2) photographic and chemical processes are less productive of satisfactory results. Ultimately, the first problem is usually solved by manipulating under water or other suitable medium; while the second problem is solved by ashing under controlled conditions. The resulting white or gray ash is then photographed, revealing iron ink writing as a red deposit and pencil writing as black deposit. In general, washable ink and ball-point pen writings leave no deposits recognizable by these methods.

A major defect in the ashing procedure occurs when the paper is of high quality and contains little ash. The mechanical strain produced in the process of ashing results in severe fragmentation, and the fragments shrink to such small size that they must be examined under a microscope. In 1909, Habermann⁶ suggested immersion in 10% aluminum acetate or thorium nitrate solution to enrich the ash content under these circumstances. The principle is sound, but the results were not entirely satisfactory. Some aluminum acetate-treated documents fragmented badly. The nitrate-treated documents when burned destroyed pencil writing in some cases and fragmentation continued to be a problem in many instances.

We have found that alternate immersion in sodium silicate and cal-

cium chloride solutions offers certain advantages to the above, and recommend the following procedure:

- a. Immerse the charred paper in a 10% solution of sodium silicate contained in a porcelain evaporating dish of adequate size. Tease the sheets apart or disintegrate into suitably-sized fragments by means of small spatulas or wooden tongue depressors. Lift the fragments from the solution by means of wire gauze. Drain briefly.
- b. Immerse briefly in 10% calcium chloride solution. Remove on wire gauze.
- c. Wash with a gentle stream of water to remove loosely-adhering calcium silicate.
- d. Re-immerses briefly in 10% sodium silicate solution. Remove on wire gauze; drain; and dry in a warm oven.
- e. Transfer the char from the gauze to a microscope slide, lantern slide glass, or cleaned photographic plate of suitable size; gently cover with a second similar plate, using a spatula to lower the cover on the char. Do not press the plates together but allow the weight of the top plate to be supported by the charred paper. Place in a cool electric muffle furnace; allow the temperature to rise for approximately 2 hours to 500°C., or until a white ash is obtained. The ashed paper will then be flat between the two pieces of glass, and the writing will be essentially of original size.

Of course, photographic and other non-destructive methods should be considered before ashing is attempted.

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