

*D. A. Crown,<sup>1</sup> D.Crim.*

## New Developments in the Japanese Questioned Document Laboratories

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It is the purpose of this paper to introduce just a few of the new developments coming out of the Japanese laboratories and to open the door to a wealth of research findings available in one of the more advanced centers for forensic science.

In the field of handwriting identification, the Tokyo Metropolitan Police Department Crime Laboratory has introduced a new dimension into handwriting examination. They have developed and evaluated a device for measuring psychological stress involved in the act of writing. While many document examiners feel they can detect intentionally distorted writing most of the time, the profession lacks an objective method of making such a determination. The Tokyo Metropolitan Police Department Crime Laboratory utilizes a specialized writing table upon which a subject writes [1]. The pressure exerted in writing a series of words and the time interval involved is electrically amplified and then recorded on a drum recorder. Their research shows that intentionally distorted writing displays an irregular tempo and there is a gross change in the usual writing pressure [2]. Machida and Yamashita [3] have found that normal writing displays a constancy in the relative writing pressure and writing time for each individual. Individual differences in writing pressure relate to the characteristic movements employed by an individual in forming characters and that handwriting pressure has no definite relationship to the size of the letters being formed [4]. Figure 1 shows a series of signatures written by the author. The first and third signatures are normal signatures and the second and fourth are intentionally distorted signatures.

Figure 2 reproduces the graphs made of the handwriting pressure and time lapse in writing these signatures. Note the increased time span involved in the distorted signatures and the increase in pressure differentials.

This technique is used by the Tokyo Metropolitan Police Department as an interrogation tool and for purposes of determining which names cause psychological stress, that is, increased pressure differentials and time lapse in the writing of an individual.

The Han mark, commonly referred to in the West as a chop mark, is used in Oriental society as a means of authenticating a signature. The Han is similiar to a rubber stamp in that it is inked and then pressed onto a document. The normal mode of signing a document in Japan is to write an ideographic signature and then place a Han mark over it. Frequently, questions arise as to whether a Han mark is over or under a written signature. The Osaka Police Prefecture Crime Laboratory [5] uses an interesting technique to make such a determination. A sticky lifter, of the type used to lift latent fingerprints is placed

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<sup>1</sup>Director, Questioned Documents Staff, External Documents Division, Department of State, Washington, D. C.

David A. Crown  
 David A. Crown  
 David A. Crown  
 David A. Crown

FIG. 1.

over a questioned Han-ideograph signature. If the Han is over the signature, it will lift off in its entirety. On the other hand, if the signature is over a Han, the Han lift will be interrupted in each place by the superimposed ink line. The majority of Han inks are cinnabar based; however, the Osaka Police Prefecture Crime Laboratory states that the technique works as well for cinnabar inks as for organic dyestuff inks. This technique appears to have utility in other sequence of stroke problems encountered in this country.

The Tokyo Metropolitan Police Department Crime Laboratory has developed a simple but highly effective technique for circular chromatography of dried ink on a document [6]. A needle threaded with medium thickness white cotton thread is used to pierce an ink line with sufficient uninvolved area around the ink line. The thread is then cut approximately one inch below the ink line and one inch above, so that the thread can be used as a wick. A small cup containing the chromatographic solvent is placed below the document and the wick inserted. This technique enables the Questioned Document Examiner to make comparative studies without trying to remove the dried ink from the document. The problem of dissolving dried ink has been a troublesome problem for the examiner.

Recent work in Japan at the National Research Institute of Police Science on estimating the age of iron gallotannic inks is worthy of review. Ebara [7] found that the solubility of the blue dyestuff in the ink and the solubility of the ferrogallotannic ink lines themselves decrease with elapsed time. He found that the blue dyestuff will dissolve in plain water up to seven days after writing. Between 10 and 14 days it will dissolve in a 0.01 percent solution of phosphoric acid in ethyleneglycol:water (1:9). Henceforth, the strength of the phosphoric acid solution must be increased to dissolve the blue dyestuff. Resistance to solubility increases with age. Solubility of the ferrogallotannic ink line itself also follows the same trend with certain differences. Both the blue dye and the ink line show a slow change for the first three years. An abrupt change is seen after the third year for the blue dye while the ink line itself does not change drastically until the sixth or seventh year. Changes continue after the 10th year for both the blue dyestuff and the ink line. Using the data developed by studying one ink (Pilot Ink) over a long period of time. Ebara predicts that the technique could be used for determinations up to five years and for rough estimations over five years.

The subject of removing obliterating inks is occasionally encountered in the questioned documents laboratory. Arai and Ishihara of the National Research Institute of Police Science [8] found a technique that worked in a number of cases involving ballpen ink over ballpen ink and fluid ink over fluid ink. They were able to transfer overwriting by different inks of the same color onto a sheet of filter paper enabling the examiner to decipher the obscured writing. The document bearing the overwriting is placed face down on sheets of filter paper. Filter paper soaked in solvents are placed over the document followed by a flat weight. Ethylene chloride, ethanol, and acetic acid were found to be most effective for blue ballpen overwriting. In the case of black aqueous writing inks, 5-10 percent sodium

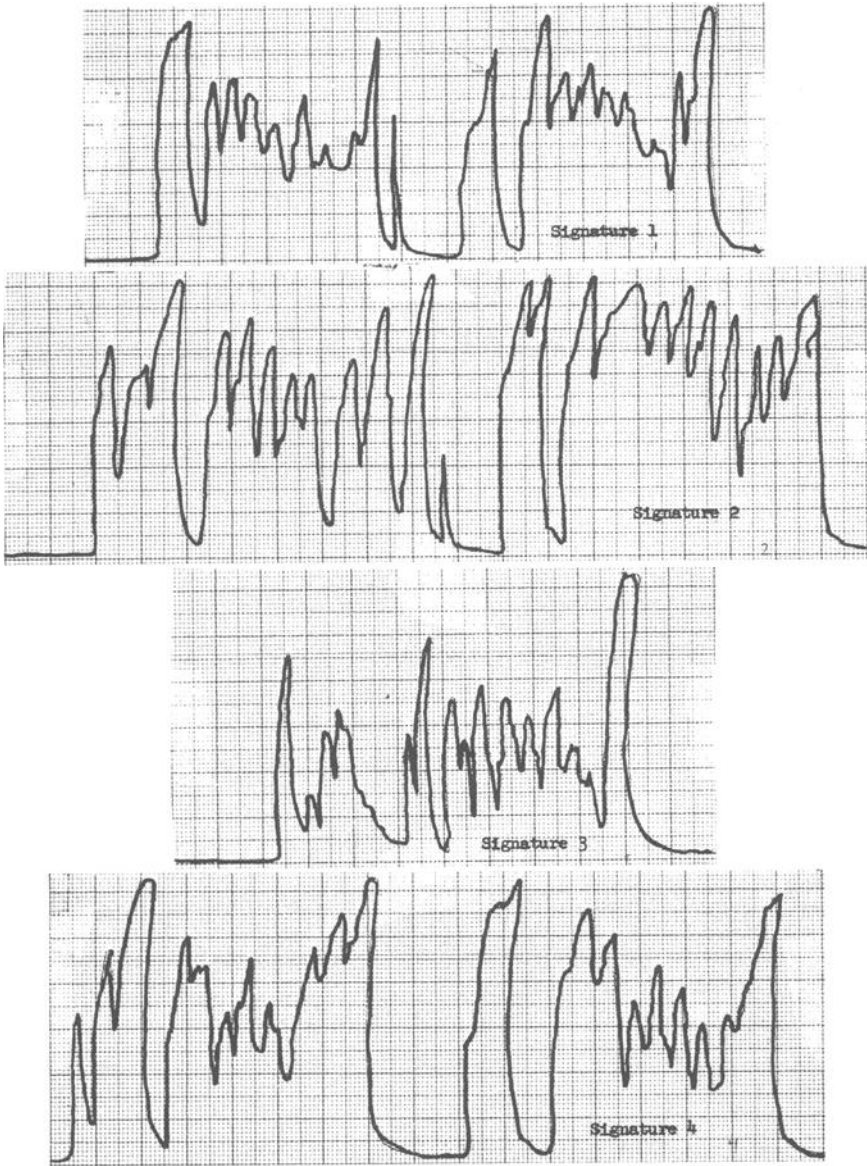


FIG. 2.

carbonate solutions worked best to transfer overwriting. Blue aqueous writing inks showed positive results with 5-10 percent potassium hydroxide solutions.

The restoration of chemically eradicated ferrogallotannic inks is usually accomplished using O'Neill's thiocyanic acid technique [9]. Arai [10] in a series of experiments, found that a 0.8 to 1 percent solution of 8-hydroxy-quinoline in chloroform was quite effective in producing a color reaction where traces of iron exist. A 2 percent solution of alpha-alpha-dipyridyl in methanol containing 1 percent sodium bisulfite was also found to be effective in restoring eradicated writing.

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3103 Jessie Court  
Fairfax, Va. 22030