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Readable Fingerprints from Mummified or Putrefied Specimens

The problem of obtaining satisfactory fingerprints to establish identification of mummified, decomposed, water immersed, or burned bodies is encountered by police agencies, coroners, and medical examiners throughout the world. Our efforts at investigation of this problem were initiated by the following case.

In August of 1969, the nude body of a 33-year-old female was found by a passing motorist alongside a winding road in Ventura County, California. The body of the victim had apparently been deposited off the roadway at least 10 days prior to discovery, judging by the advanced state of postmortem decomposition and extensive putrefactive deterioration. At the time of autopsy, the distal segments of the ten shriveled and mummified fingers were removed by transecting each through the middle phalanx. Five of the finger specimens were placed in glycerin to soften, the other five in a formalin solution for preservation and all were retained for later attempts at fingerprint classification.

Meanwhile, other efforts at identification continued and the name of a possible victim was obtained by checking records of local police agencies of persons recently reported missing. The victim was positively identified through finding unequivocal corresponding characteristics in comparing X-rays of the decedent's pelvic area [1] with films taken of the missing woman when she visited a radiologist for investigation of a back complaint. Identification was further verified by comparison of the decedent's teeth with dental records.

With this aspect of the problem solved, the ten soaking fingers were forgotten while more than a month passed. When the finger segments in the solutions were re-examined, the texture was found as hard, dry and, "unprintable" as when first removed. With the identity established and the body having been long since interred, we decided to utilize these specimens to evaluate the effectiveness of various techniques of restoration for obtaining satisfactory fingerprints, knowledge which would be invaluable in dealing with some future case where identification by fingerprints might be essential.

Upon review of the literature, the earliest reference we found available on this subject was in the 1904 *American Anthropologist* when Wilder [2] restored mummified tissue using caustic potash. Other methods recommended over the years involve injecting liquid vaseline, hot water, glycerin, melted paraffin [3], and isotonic saline [4]. Other reports advise soaking in solutions such as formalin [5] and trisodium phosphate [6].

The manual "The Science of Fingerprints," revised in 1968, by the F.B.I., makes some procedural suggestions but no optimum or definitive method is indicated [7]. For hard, mummified fingers, the treatment of soaking in potassium hydroxide (caustic potash),

Received for publication 11 Oct. 1971; accepted for publication 22 Nov. 1971.

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first recommended in 1904, was reiterated with repetition of Wilder's original warning that this may cause disintegration. Inquiry to the Office of Chief Medical Examiner, New York City, for the most effective method which they currently employ did not elicit further specific or helpful information.

Initial efforts using the injection procedures described in the FBI manual failed since the specimens retrieved from formalin and glycerin remained as impervious as wooden twigs and resisted penetration by a hypodermic needle.

"Artificial smoothing" of the deep wrinkles and crevices was then attempted by taking an impression of the inked finger in a plastic putty, straightening the folds by stretching the putty and "lifting" the inked print on Scotch tape. This method was successful, to a degree, but not consistently reliable because of problems of achieving uniform "inking" within the creased portions.

An attempt at boiling one of the fingers to loosen the epidermis, as suggested in one of the early reports, resulted in a greasy broth, with floating flakes and fragments of loosened skin.

Next, attempts were made to record the fingerprints by X-ray, after filling the grooves with silver amalgam powder used by dentists in filling teeth. This method had some merit but also suffered from the same handicaps of uneven surface and lack of clarity in the deep crevices.

At this point we sought the advice of a local taxidermist, Webb McKelvey, of Fillmore, California, who stated that the problem seemed similar to those encountered by taxidermists in softening dried, shriveled hides, and especially animal tails. He suggested softening might be accomplished through use of a "tanning solution" consisting of two ounces of saturated salt solution with two drops of 50 percent sulfuric acid added. After removing the bony central portion of a "glycerin resistant" finger, the remainder was immersed in this solution for 72 hours. The tissue, on removal, was sufficiently softened to permit satisfactory "print rolling," by placing the specimen over the index finger of the person making the print and rolling in the normal manner. After working with approximately fifty specimens over the past two years, it has been found that the solution retards further decomposition and acts as a preservative, much as the "tanned hide" for which it was intended.

Although the finger regains a pliable resilient texture, wrinkles may continue to be a problem; however, the softening process permits the skin of the finger to be stretched. The method for stretching found most satisfactory is to cut indentations on each side of a cork, put a foam rubber backing under the finger and pin the finger to the cork by use of *T* pins, stretching it until all wrinkles are removed. After this process, the finger can either be photographed or rolled.

Figure 1 demonstrates the inherent problem of wrinkle crevices in postmortem fingerprints. Figure 2 shows the same finger after being stretched over the cork.

The duration of the preservative effect of the tanning solution has not been fully determined, but periodic inspection is advisable to detect growth of mold or fungus.

It is obvious that no success can be anticipated with any method if the soft tissue bearing the ridges of the fingerprint has been destroyed.

Summary

Many methods have previously been reported for restoring decayed or mummified fingers of deceased persons to a condition making fingerprinting possible.

Some of the difficulties encountered with these techniques have been reviewed. An innovation has been described for softening and eliminating wrinkles and crevices.



FIG. 1—Softened finger and print prior to stretching.

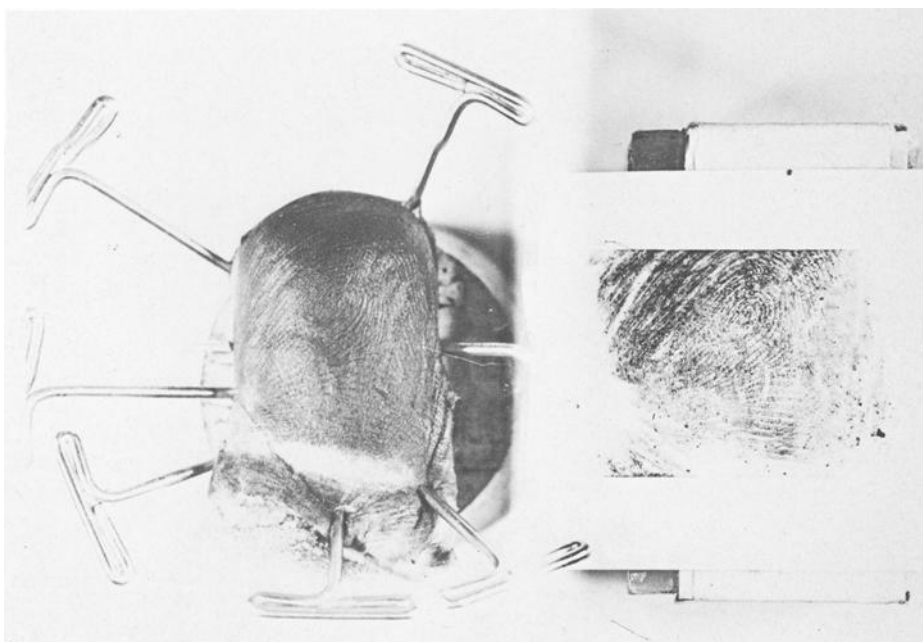


FIG. 2—Technique of stretching and improved print.

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