CASE REPORT

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A Technique for Developing and Photographing Ridge Impressions on Decomposed Water-Soaked Fingers

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ABSTRACT: One of the most challenging tasks confronting a crime laboratory technician is the fingerprinting and subsequent identification of an unknown homicide or drowning victim whose fingers have been subjected to a long period of exposure to water and the effects of decomposition. If the fingers of the individual have not been exposed to the erosive effects of water and decomposition for a long period of time, they may be allowed to dry, and suitable impressions are often obtainable. In other cases the fingers may have to be removed, with the permission of the Medical Examiners Office, and processed by the Crime Laboratory in an attempt to develop suitable ridge structure for inked impressions or an exact photographic copy of the individual's fingers. In extreme cases the effects of water and decomposition make the fragile ridge structure appear to be nonexistent to the naked eye.

The procedure used in this case report, combines the use of cyanoacrylate vapor, commonly called "super glue fuming," and the ninhydrin process in conjunction to develop fragile ridge structure into discernable ridges that are easily seen and photographed for the purpose of making an identification of the individual.

KEYWORDS: forensic science, human identification, human remains, super glue, ninhydrin

In late August of 1991, the remains of an unidentified subject were found floating in a lagoon in Chicago. The hands of this individual were completely water soaked and the ridge structure on the fingers had been subjected to the effects of decomposition.

After drying, several attempts were made to fingerprint the fingers of both hands by crime laboratory technicians. Conventional inking methods were unsuccessful in developing ridge impressions suitable for examination. The ridge structure was faint, fragile and not discernible to a visual examination. With the permission of the Medical Examiner's Office, the fingers were surgically removed, placed in individually marked vials and transported to the Chicago Police Crime Laboratory for a photographic examination [*1*].

It was determined that the #6 finger (left thumb) appeared to have some definable ridge structure. The left thumb was photographed with a one-to-one fingerprint camera using Kodak Technical Pan Film, and the negative was printed in reverse to simulate an

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inked impression. Since the ridge structure in the photograph appears white, the negative, in which the ridges appear black, was also submitted to compare to an inked impression. These were then submitted to the Bureau of Identification, Latent Fingerprint Section (Fig. 1).

After an evaluation of the left thumb, it was determined by the Latent Fingerprint Section that the finger only contained six characteristics and was not suitable for submission to the Automated Fingerprint Identification System (AFIS). The decision was made to attempt to build up the remaining latent ridge structure on the left thumb by the use of cyanoacrylate vapors or super glue fuming. The practice of developing latent fingerprints on hard, smooth nonporous materials by the use of super glue fuming has been used since the early 1980s [2]. It was believed that if ridge structure could be developed on nonporous items with the aid of moisture, water soaked fingers may produce the same effect and thereby enhance any latent ridge impressions not readily visible.

It should be noted that the fingers should be treated as a biohazard; therefore, the use of strong rubber gloves is recommended. Diseases such as AIDS and hepatitis remain active even after the host victim has expired. After use, all disposable materials should be placed in a biohazardous disposal receptacle and treated as medical waste.

With disposable plastic tongs, the #6 finger was placed in a disposable plastic petri dish and then placed in a 10 gallon super glue fuming tank. A beaker containing 500 mL of warm water was placed in the fuming tank for added moisture and five drops of super glue were placed in an aluminum tear dish. The dish was placed above a 60 watt light bulb that produced the heat within the fuming tank. The light was turned on immediately, allowing the super glue to fume for a period of 5 min.

Due to the experimental nature of this procedure, the finger was checked every 5 min. The major concern of the technicians was an overconcentration of super glue deposits

FIG. 1—*Photograph of #6 finger (left thumb) in stage #1, prior to procedure.*

covering the finger and masking the ridge structure. It became apparent after each successive exposure that a marked improvement could be seen. The finger was exposed to the super glue fumes for a total of 35 min.

At this point of the process, the ridge structure appears more prominent on the front surface (Fig. 2), as well as the left and right sides of the finger (Figs. 2a and 2b). The finger was again photographed with a one-to-one fingerprint camera using Kodak Technical Pan Film at F22 for 1 full s. The photograph was again printed in reverse and, along with the negative, submitted to the Bureau of Identification. An examination by the Latent Fingerprint Section of the Bureau of Identification revealed 16 points of identification in the finger.

The photograph was traced with the additional ridge structure and submitted to the AFIS section. While enough points existed to make a comparison in AFIS, the search proved negative.

The technicians wanted to enhance the contrast of the ridge structure present in the finger, to provide the best print possible for submission to the FBI's AFIS. It was believed that the ninhydrin process [*3*], would aid in contrasting the super glued ridge structure by producing a dark background in the furrows of the finger.

The petri dish containing the finger was placed under a fuming hood. A cotton swab was used to apply a small amount of ninhydrin onto the finger. While still wet, the finger was subjected to the heat and steam from an electric steam iron. The iron was held approximately 3 inches above the finger and allowed to steam for 20 to 30 s. The purple color associated with the ninhydrin process develops slowly at first, then the process speeds up rather quickly. The results were dramatic, the ridge structure of the entire finger became visible.

The finger was removed from the fuming tank and allowed to cool for 1 min. The

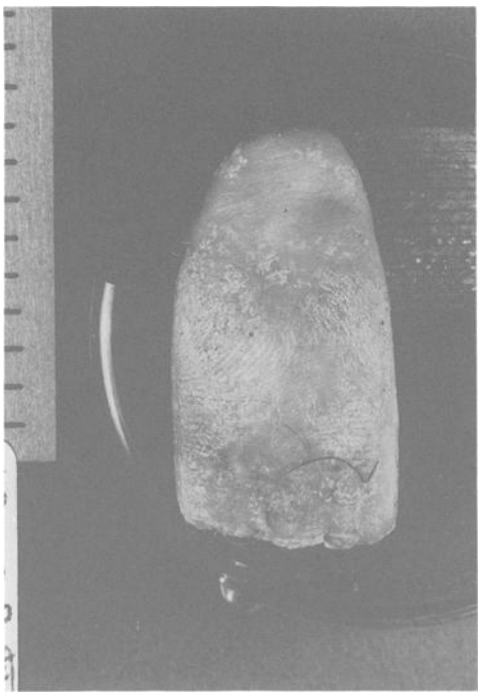

FIG. 2—*Photograph of #6 finger (left thumb) in stage #2, (Superglued).*

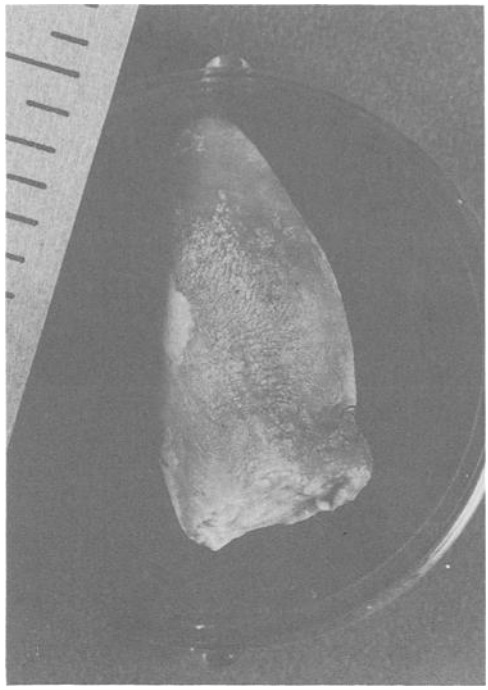

FIG. 2a—*Right profile of #6 finger (Superglued) in stage #2.*

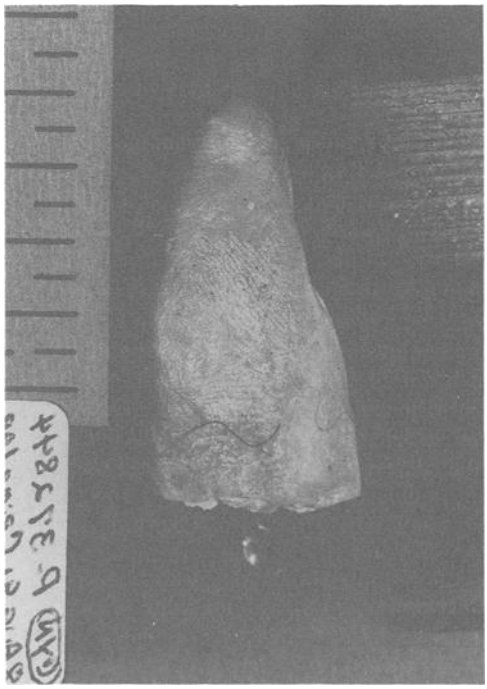

FIG. 2b—*Left profile of #6 finger (Superglued) in stage #2.*

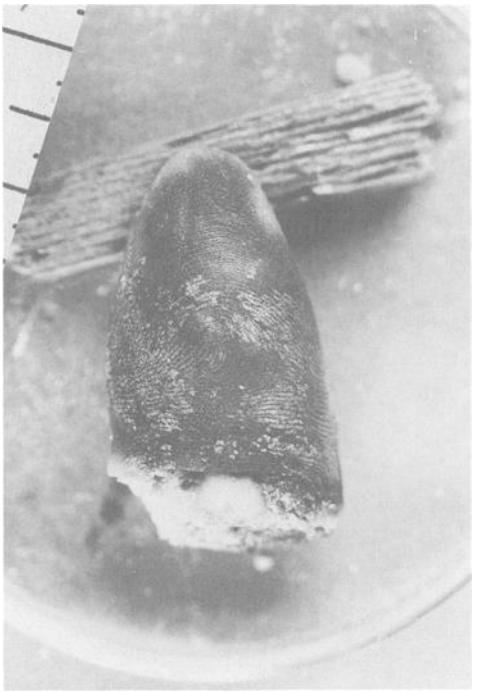

FIG. 3—*Finger #6 (left thumb) in stage #3 (Superglued and Ninhydrin).*

finger was then photographed again, using the one to one fingerprint camera with a Kodak Wratten #60 filter on the lens. Two 500 watt lights were placed on each side of the finger to illuminate it. The camera was set at F16 and the exposure time was again 1 full s. The results of the illumination and contrast provided a brilliant picture of the #6 finger (Fig. 3). The high contrast quality of the print was the result of using high contrast Pan Film; underexposing the F Stop by one setting and over developing the print for a period of ten minutes in Kodak HC 110 solution B at a temperature of 68°F.

Prior to forwarding the information to the Federal Bureau of Investigation, the results were examined by the latent fingerprint examiners of the Chicago Police Department. The photograph revealed a total of 70 identifiable ridge characteristics after being exposed to the super glue and ninhydrin processes. The procedures were performed on the #7 figure (left index) with virtually the same success (Fig. 4).

Conclusion

The "building" effect of cyanoacrylate vapor coupled with the "tonal contrast" developed by the reaction of amino acids to the ninhydrin process helped to develop ridge structure in areas of skin tissue ravaged by the effects of water erosion and decomposition. This process was performed on fingers that conventional inked fingerprinting and photography failed to produce a legible identifiable fingerprint. While this was an extreme case, it depicts the success that can be achieved by applying this technique.

FIG. 4—*Finger #7 (left index) in stage #3 (Superglued and Ninhydrin).*

References

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