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A Conventional Method for Lifting Latent Fingerprints from Human Skin Surfaces

Because the perpetrator of a physical offense often places his hands on the victim during the commission of the crime, the successful recovery of identifiable latent finger, palm, or other prints from the victim's body would in many cases constitute the most conclusive physical evidence possible. Investigators of crimes against persons, therefore, have long sought physical evidence techniques that would allow such an identification, thus definitely indicating the criminal's presence and perhaps suggesting the criminal's activity during or after the crime. Historically, such techniques have only been successful under experimental conditions.

Two methods for obtaining latent fingerprints from human skin are being investigated in many parts of the world. They are electronography and the iodine-silver transfer method. Electronography, also called electron-emission radiography (EER), requires X-ray equipment and the application of lead powder to the skin. The process has been studied by Graham and Gray [1]. Significant additional research has also been accomplished by Lail.² The second method, iodine-silver transfer, involves the reaction of iodine fumes with the fats and oils of the skin. The iodine is applied to the skin with a fuming pipe and a polished silver plate is employed as a lifting medium.

We know of no criminal case in which a print recovered from a victim's skin surface was successfully used to identify the assailant nor, in fact, a criminal case in which any thoroughly identifiable print was recovered.

In an official publication of the International Association for Identification, Mooney [2] thoroughly described techniques for developing prints from skin and hinted at the reason for the lack of success in this endeavor—not enough involvement. More particularly, the processes have not been afforded adequate field exposure even though controlled experimentation has proved their potential for success.

Nationally, large-scale case work experimentation is very limited and in most areas of the country it is nonexistent. The use of electronography and the iodine-silver transfer method is generally reserved for the more notorious crimes because of the specialized procedures and equipment involved. Perhaps these two methods lack the portability and practicality needed for widespread usage.

A New Approach

A third method, which is the subject of this paper, was developed by one of the co-authors (E. G. S.). The Kromekote lift technique offers the forensic scientist and the evidence

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technician an inexpensive and practical approach to the recovery of the fingerprints from human skin. The method is highly successful under controlled conditions. However, being new, it has received very little field exposure. Use of the method on actual cases by evidence technicians from our department has yielded encouraging results.

In March 1976, a Dade County Public Safety Department crime scene team responded to a robbery scene and found an elderly woman bound and gagged. She was freed, made comfortable, and the team then lifted a latent print with six identifiable points from her wrist. Although the six points were not identified as the perpetrator's, this incident was encouraging to the researchers.

Later that same month a different team of crime scene technicians responded to a homicide report. The technique was again employed and resulted in the development of an identifiable latent palm print on the anterior surface of the victim's right calf (Fig. 1).



FIG. 1—Identifiable latent palm print recovered from the leg of a homicide victim.

The print, however, remains unidentified although three suspects were convicted based on their consistent statements and much other physical evidence.

Two months later, a burglar murdered a young woman. Crime scene technicians responding to the scene developed a latent fingerprint lifted from the victim's thigh. The fingerprint was later positively identified as the victim's. Although this result was not useful in the investigation of the case, it did substantiate presumptions that prints will remain on skin for prolonged periods of time.

The Kromekote Lift Technique

Basic latent fingerprint recovery equipment is all that is needed for the process. Equipment should include a fiberglass filament brush, a magnetic brush, fingerprint powders, lifting tape, and 140 by 178-mm (5½ by 7¼-in.) Kromekote cards (Fig. 2). The Kromekote card, an 80-pound paper with a high-gloss cast-coated surface made by Champion Paper Co., Hamilton, Ohio, is similar in appearance to photographic paper. Kromekote processed paper can be obtained commercially from local printing companies. As a crime scene processing material, the Kromekote card is generally used as a surface to which a section of fingerprint tape is transferred after a developing impression has been lifted. The particular benefits of this method are that the materials are readily available and are portable. A good deal of practice is recommended to develop technique prior to actual use on cases, although the simplicity of this method will probably make extensive practice unnecessary.



FIG. 2—The materials necessary to lift a print from human skin include a fiberglass brush and black fingerprint powder (left), Kromekote paper (center), and a magnetic brush kit and lifting tape (right).

A latent fingerprint impression on the surface of human skin may be lifted prior to being developed by pressing a clean Kromekote card against the skin. The latent impression will transfer to the surface of the Kromekote card after 2 to 3 s of firm pressure. The Kromekote card should then be lifted carefully to avoid smearing the undeveloped print. It is best to lift one side of the card first, holding the rest of the card in place to prevent slippage, then continue to lift in a continuous motion until the entire card is free of the skin surface.

After the Kromekote card is lifted, it is processed with fingerprint powder to develop the latent impression. It may be desirable to place the card on a flat surface and tape the corners to prevent movement of the card. To get a proper amount of powder on the fingerprint brush, one should allow the tips of the bristles to touch the powder in the reservoir and rotate the handle between the thumb and forefinger in a back-and-forth motion three or four times. The brush should then be held free of the powder and rotated rapidly an additional three or four times to clear the excess powder from the brush. If white striations appear in the graying background, one is brushing too briskly. The print may be slow to develop, and 5 to 20 s of brushing is frequently required to develop a fingerprint. Once developed, the graphite impression may be preserved for analysis and courtroom presentation by placing a strip of cellophane tape over the surface of the Kromekote card (Figs. 3 and 4).

It should be remembered that the fingerprint obtained will be the mirror image of the standard inked fingerprint impression on file cards. The mirror image can be reversed

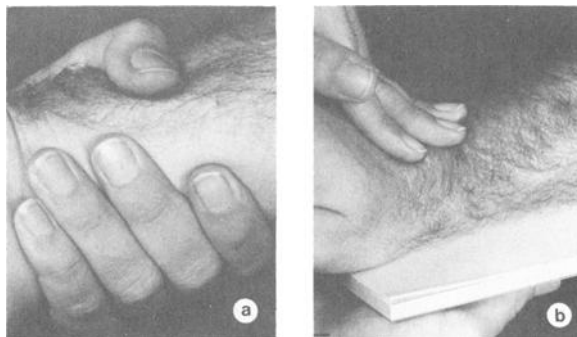


FIG. 3—(a) Fingerprints being placed on a wrist. (b) Kromekote card being pressed against the wrist.



FIG. 4—*Photograph of prints after development on Kromekote paper with a fiberglass brush and black fingerprint powder.*

by photographing the print and using appropriate darkroom techniques. If the print is sent to an outside agency for comparison without reversing the image, an explanation should accompany the print to prevent a technician who is unaware of the circumstances from having difficulty identifying the print.

Development of Latent Prints on Human Skin

After the latent fingerprint has been located with the Kromekote lift technique, the skin may be dusted with fingerprint powder. Black fingerprint powder distributed with a fiberglass filament brush often yields high-quality fingerprint impressions on the skin's surface. The magnetic brush kit, if used in place of the fiberglass filament brush and fingerprint powder, yields prints of surprising clarity and contrast (Fig. 5). Laboratory

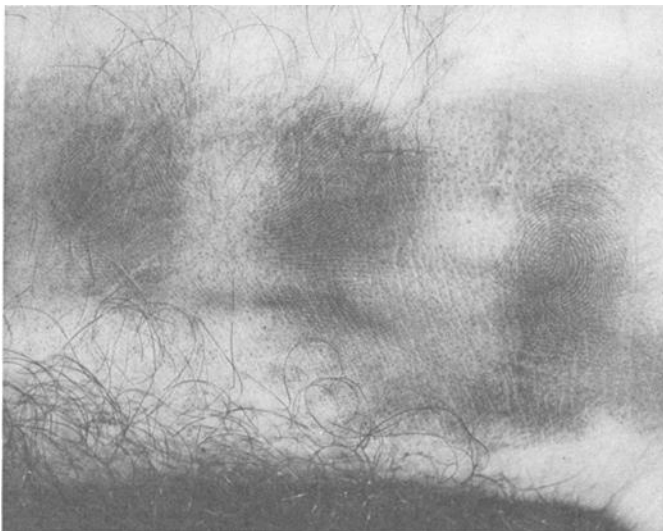


FIG. 5—*Photograph of prints after development on skin with a magnetic brush.*

experiments indicated circumstances where latent fingerprints could be developed with the Kromekote lift technique that could not be developed with other methods.

Once a fingerprint has been developed on the surface of the skin, the impression should be photographed with a scale marker before any attempt is made to preserve the impression. After the impression has been photographed a strip of cellophane tape may be securely sealed over the print and lifted. The tape may then be placed on a fingerprint backing card in the conventional manner.

If large pores, flexure creases, or other irregularities are present on the skin, silicone rubber casts are effective in lifting the developed impression. General Electric RTV 41 liquid silicone rubber cured with Pepsco Nuocure 28 makes an effective cast for this purpose. Approximately 45 ml (3 tablespoons) of silicone rubber may be placed in a mixing dish and mixed with eight to ten drops of the Nuocure 28 until it is about the consistency of soft margarine. This mixture may be spread over the developed impression and allowed to harden. The cast will harden after 5 to 10 min and may be easily peeled away from the surface of the skin. The quantity of body hair in the area of the print may dictate careful clipping of the hair to facilitate the easy removal of the hardened silicone cast. Other substances of similar nature may be used, although they should be tested before use in an actual case.

Fingerprints from Living Victims

Tests on living humans have indicated that latent impressions on the surface of the skin can be lifted on Kromekote cards and developed up to 1½ h after the print is placed on the skin. Some individuals may retain prints longer because of the condition of the skin and environmental conditions. Pronounced heavy perspiration may have an undesirable effect on latent impressions on the surface of the skin of living victims, although comfortable temperatures do not produce sufficient perspiration to greatly harm a print. Low-level secretions of the sebaceous glands and sweat glands tend to have no noticeable effect on the skin's ability to retain latent fingerprint impressions over a reasonable length of time. Under some circumstances the buildup of secretions may reach a threshold that will mask any print present on the skin. Cosmetic oils and body lotions on the skin seriously affect the ability of the skin to retain latent fingerprint impressions. However, the lifting of latent prints from living victims of physical crimes is practical.

Fingerprints from Deceased Victims

A body may have a tendency to collect moisture on the surface of the skin if it is chilled in a morgue and then taken to a warmer area. Damp or noticeably clammy skin may seriously interfere with the print-lifting process. For best results, the skin must be as dry as possible. Ideally, the body should be examined before it is refrigerated.

In practice, it would be preferable for the medical examiner to conduct his external or gross body examination of the victim before the fingerprint powder is applied. If this is not done, the medical examiner should be advised before the autopsy that a latent fingerprint recovery process was performed. The Kromekote lift technique should aid in locating prints so that large areas of the body would not need to be processed with fingerprint powder. It is desirable to examine a body as soon as possible during an investigation.

Success Notes

The areas of the body that most successfully yield latent fingerprints are the underside of the biceps, the sides of the torso, the sides of the neck, and the tops of the feet. Prints from other areas may be quite successful. Success will be governed by the amount of sur-

face hair and the oiliness and elasticity of the test area. The Kromekote lift technique may be repeated several times on the same latent impression without apparent damage to the print. Subsequent lifts are often of better quality than the original lift, perhaps because the initial lifts have a sponging effect on the excess oils in the background around the print.

One phenomenon that occasionally occurs is that the skin surface is covered with secretions and other residue to the extent that a sebaceous print may be masked by the secretions on the skin, and a perfectly clean friction ridge area may contact the skin and cause the fingerprint pattern of secretions to be lifted from the skin rather than being placed on the skin. When the Kromekote lift technique is used on such prints the developed print will appear to have white friction ridge detail with dark valleys. Therefore, the general context of the print should be studied to avoid confusing the ridges with the valleys during the identification process.

An interesting occurrence is the development of a latent fingerprint on the friction ridge area of the skin. If the friction ridge area of the skin is perfectly or nearly perfectly clean, it is possible to place a sebaceous latent fingerprint on the friction ridge area that can be developed by processing the friction ridge area with fingerprint powder and brush (Fig. 6).

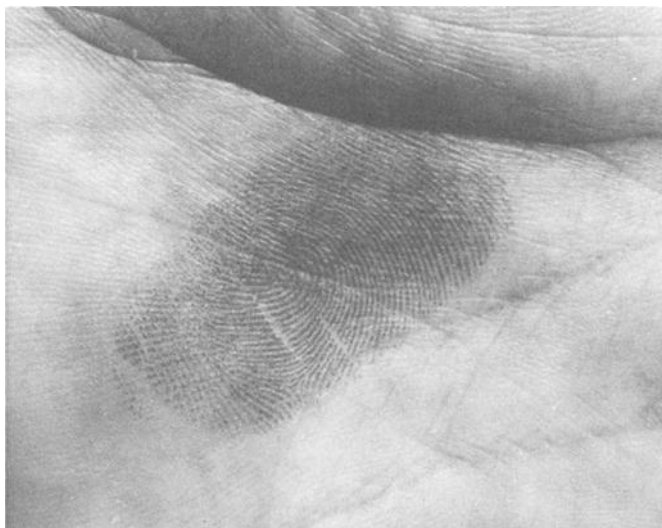


FIG. 6—Normal, oily latent print experimentally deposited on a clean friction ridge area and then developed.

In the course of an investigation the practitioner must be aware that while processing the elastic skin on limbs, neck, or abdomen best results are achieved when the skin is stretched to the limit of its natural range. Occasionally, when the sebaceous latent print has been placed on stretched elastic skin and the print is lifted when the skin has relaxed, the print will be dark and without friction ridge detail. When the skin is stretched, friction ridge detail will become visible (Fig. 7).

Occasionally a victim may be immersed in water during or after a crime. This does not necessarily obliterate a sebaceous fingerprint. Laboratory tests have indicated that a sebaceous print on the skin may be developed with excellent ridge detail if the surface is allowed to air dry even if it has been immersed for more than half an hour.

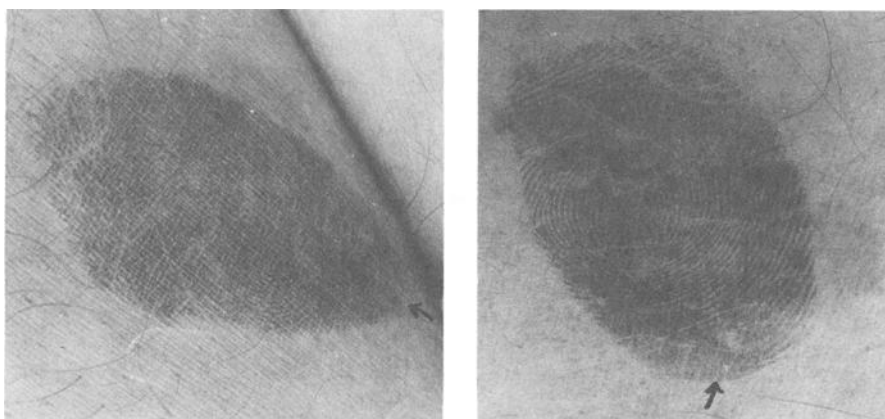


FIG. 7—Retracted (left) and stretched (right) skin bearing a developed latent fingerprint.

Efforts should not be confined to fingerprints alone. Cloth or rubber glove impressions, shoe impressions, or impressions from any distinctive object may be lifted and used to further investigations. This technique is still experimental and will not be proved until it is in common use by all agencies capable of applying the techniques. It is hoped that this method will be actively applied to further the ends of justice and identify the perpetrators of crimes against persons.

References

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