

Technical Report

Which Was First – Fingerprint or Blood?

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Background

When asked whether a fingerprint in blood was from a bloody finger or from a fingerprint already on the surface that was developed by the blood, there is almost no literature to support an answer. There are almost no documented experiments or references regarding this subject. The only reference discovered regarding blood on prints was by Jon Creighton [1]. He had dripped blood and allowed it to flow over fingerprints. He also splashed it on the prints. In his experiments the blood was ‘repelled’ by the fingerprint and no development occurred.

In the current instance a light swipe of bloodstained cloth across the fingerprint was of primary interest. Several experiments were designed to determine if such a light swipe could develop fingerprints.

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Purpose

The following questions were formulated to determine if answers could be obtained:

Is there a difference in previously deposited palmar (eccrine gland) sweat prints and sebaceous oil prints as to the manner in which blood deposits on them?

Is it possible to develop previously (24 hours) deposited prints using a swipe of a bloody cloth?

Can it be determined if the blood was on the finger or a clean finger touched a small amount of blood on the surface?

Can the analyst tell if a wet bloody finger has touched a dry surface?

What characteristics are exhibited which can be used to determine how the print was made?

Experimental design

Materials

Several glass sheets, soda cans and a large painted metal sheet were cleaned to ensure that there were no fingerprints or greases present. The following substances were used to coat the fingers prior to being deposited on the various surfaces:

1. Anti-perspirant (Arrid “Extra Dry”)
2. Butter
3. Corn chip oil
4. French fries (McDonald’s)
5. Gunn turpentine
6. Hamburger fat (McDonald’s “Big Mac”)
7. Hand lotion (Vaseline “Aloe & Lanolin”)
8. Grease from car
9. Motor oil
10. Silicon oil

In addition, the surfaces received the following substances as transfers:

11. Sebaceous prints
12. Eccrine prints

The prints were allowed to dry overnight at room temperature (74° F) prior to adding blood. Beef blood* was soaked onto a large swab, which was pulled to create a "tail". The end of the swab was dragged over the prints.

Method

1. A single blood drop was deposited onto a dry surface then touched and a single drop was placed on a finger and applied to the same surface.
2. Fingerprints were deposited on the painted metal sheet using a finger wet with blood in varied amounts.

Results

The blood over the prints on paper in grease, oil and excretions did not show up as the material had absorbed into the paper. However, the print in the hand lotion did show ridge detail when coated with blood.

As expected, eccrine prints were not revealed with blood as reportedly there are no undissolved organic solids in eccrine prints [2] (figure 1). The sebaceous prints were visualized with the blood (figure 2).



Figure 1

* - Beef blood from disease-free cattle was used to conduct the experiments, and is considered a food product, not biohazardous material. As a food product, the blood may be discarded in the trash. The physical properties of beef blood are essentially the same as human (see Raymond, et.al, "The Physical Properties of Blood—Forensic Considerations, *Science & Justice*, 36(3), 1996, pp 153-160).

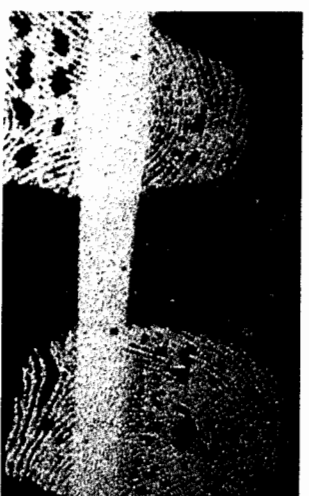


Figure 2

The eccrine print (figure 1) was revealed by reflected light, not visualized by the blood as was the sebaceous print (figure 2).

The prints on the non-porous surfaces showed ridge detail. The blood does not adhere to the organic solids but runs in the channels between the ridges. The appearance of the print is sharp and well defined with some blood spots where it "pooled" (figure 3).



Figure 3

Fingerprint in grease after blood was swiped over it

These prints can be easily distinguished from prints placed into a blood smear. Touching a blood smear leaves a "halo" around the print and the print is not as "clean" as the organic solid prints (figure 4).



Figure 4

Dry fingers placed into a blood smear

Experiments were designed to reproduce the results obtained by Jon Creighton by allowing blood to run over grease prints. Results determined that blood dripping down a non-porous surface will not stick to the surface where there is a grease print. The blood will skip over the print. This suggests that when looking at a surface with blood trails, these "skips" should be noted as locations to dust for fingerprints.

A finger was coated with blood and fingerprints were left on dry surfaces. The resultant print is a patent print (figure 5). The quantity of blood on the finger will determine whether or not the print is "reversed".



Figure 5

Fingerprint deposited in blood on a dry surface

A small drop of blood was placed on a non-porous surface and a porous surface. A finger was pressed onto the blood; then the same size drop was placed on the finger and the surfaces were touched with the same pressure. *No difference was detected in the resultant impressions, which showed blood going to the side of the print revealing trails or ridge buildups.*

Conclusions

Based upon the experiments conducted the following questions and answers were concluded:

Will blood visualize previously deposited eccrine prints?

No. There is not enough organic material present to influence the manner in which the blood wets or adheres to the surface.

Can blood smeared across a greasy fingerprint visualize the print?

Yes. However, the ridge structure and furrows will be reversed. The previously deposited print is visualized when the blood is repelled into the furrows away from the ridges. In some areas the blood will pool, causing a speckling, so visualization is not consistent throughout.

Is there a difference in a grease print on a horizontal surface and a vertical surface?

Yes. As the plane of the surface is moved from horizontal, less blood stays in the furrows. At an angle defined by the substance and the surface, all blood will be repelled and no visualization of the fingerprint will occur.

Can it be determined if a single drop of blood was on the surface or was on the finger?

Not always. The finger print detail produced is the same when the blood is wet and just deposited. If the blood has dried somewhat on the surface, a "ghost" image of the blood drop circumference may remain.

Can the print left by a bloody finger be distinguished from a light blood smear over a grease print?

Yes. There is a distinct difference. The bloody finger will leave a clear area or "halo" around the fingerprint resulting from the pressure repelling the liquid.

Can a fingerprint deposited by a finger with blood on it be distinguished from a fingerprint left in grease or oil and re-vealed by brushing it with blood?

Yes. A light smear of blood on the fingers will leave the classical "inkpad" print when applied to a smooth dry surface. The print will not be reversed unless there is a sufficient amount of blood to be forced into the furrows by pressure.

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References

1. Creighton, J. T., "Visualization of Latent Impressions After Incidental or Direct Contact with Human Blood", *Journal of Forensic Identification*, 47(5), 1997, pp 534-541.
2. Home Office, *Scene of Crime Handbook of Fingerprint Development Techniques*, Hearnor Grate, Derbyshire, 1988, p 10.