B168 The Formation and Examination of Bloody Friction Ridge Patterns on Common Textile Materials Using Different Enhancement Techniques

Kaitlyn Chetney, Shorewood, IL 60404; Ralph R. Ristenbatt III, MS, Pennsylvania State University, University Park, PA 16802*

Learning Overview: After attending this presentation, attendees will better understand which chemical and dye enhancement techniques can be used to enhance patent (blood) friction ridge patterns on various fabrics.

Impact on the Forensic Science Community: This presentation will impact the forensic science community by providing criminalists with information as to which techniques are best suited for the enhancement of fingerprints composed of blood on fabrics that may be found at crime scenes.

The presence of fingerprints at a crime scene has proven to be useful during an investigation due to the great variability of ridge features. Finding and analyzing fingerprints may provide criminalists with information allowing an individual to be linked to an incident. It is common to find fingerprints, along with other friction ridge patterns, at crime scenes on a multitude of surfaces. For example, textiles of various types and complexity are often present at crime scenes. If a textile contains differentiating pieces of evidence, such as fingerprints composed of blood, it could be instrumental in the resolution of the investigation. However, bloody fingerprints on textiles may often be difficult to observe or locate, causing them to remain undetected or be deemed unsuitable for comparison. The enhancement of bloody fingerprints on fabrics could be crucial in increasing their probative value in an investigation.

There are several techniques that may be used to enhance fingerprints generated by blood-contaminated friction ridge skin. Criminalists must first characterize the fabric containing the pattern. Composition, structure, color, and textile porosity must be considered before selecting an appropriate chemical or dye. Three different classes of compounds that can be used to enhance fingerprints made primarily of blood are protein dyes, heme-reactive compounds, and amino-reactive compounds.

A series of five bloody fingerprints created with a blood-covered finger were deposited onto a variety of textiles. This was accomplished by depositing 20µL of defibrinated ovine blood onto the fingertip of the index finger (palmar surface of the distal phalange) and redistributing the blood with a Teflon® spatula, followed by placement of the fingertip onto the substrate. Four subsequent fingerprints were deposited onto the substrate without applying additional blood. The fingerprints were deposited onto both washed and unwashed fabric swatches of different colors with different backing materials.

The fabric swatches were allowed to dry for a specific amount of time (1 hour, 5 hours, 10 hours, or 24 hours), then fixed and/or enhanced using a variety of different dyes and chemicals (Amido black, Coomassie blue, Leucocrystal Violet, DFO, Hungarian Red, or Acid Yellow 7). After enhancement, a Nikon® D810 Digital Single-Lens Reflex (DSLR) camera was used to record the results of each trial. Different optical techniques were employed in an attempt to provide further enhancement.

The enhancement of patterns of friction ridge skin composed of blood on different fabrics may be important in forensic investigations. If better understood, criminalists may be able to decide which technique would provide optimal results for the enhancement patterns of blood on fabric.

Blood, Fingerprints, Enhancement

*Presenting Author