Visualization of Bloodstains on Dark Surfaces using Polarized Light

Why Visualization is Important

- Accurate visualizing and documenting bloodstains and patterns is an integral part of crime scene documentation.
- Provides crucial information for both the analysis of evidence in the laboratory and crime scene reconstruction efforts.
- A significant number of cases knowing how the bloodstains were formed is more important than knowing the biological source of the stains.
- In most cases the two types of information are complementary.

- Bloodstains are visible mainly on white or lightly colored surfaces. On darkly colored or black surfaces, they can be extremely difficult to visualize.
- There are three main aspects of the analysis and interpretation of bloodstains that visualization and documentation contribute to:
  1. The presence of blood may not be recognized at critical stages in the investigation.
  2. The presence, location, and morphology of bloodstains are often of great importance in any investigation, and the accuracy of this information is available, the better.
  3. Where the presence of blood is not recognized, handling of the evidence may disrupt and compromise the bloodstain evidence.

Polarized Light Method Setup

- Case Example

Bloodstain (A), Red Acrylic fiber (B), Glass shards (C), Green Olefin fiber (D), Blue Rayon fiber (E)

Blood on Leather

- Stains that were absorbed into the substrate and did not leave a thin film on the surface of the substrate were harder to visualize.
- Thick stains are not enhanced, but can be visualized using oblique light
- Stains that were absorbed into the substrate were also less apparent with crossed polarized illumination, making the stains more difficult to visualize

Contact Swabbing for DNA:

- Seven-year-old girl stabbed multiple times
- Father accused, stabbing occurred in a public area but there were no witnesses
- Seven-year-old girl stabbed multiple times
- Father: Daughter had “frequent nosebleeds” and “liked to take naps on dad’s jacket”
- Jacket was swabbed, positive reaction with presumptive test for blood and DNA profiles from both parents

Orientation of Incident Light

- The effect of the orientation of the incident polarized light is substrate dependent.
- This change in substrate appearance is not readily apparent through the viewfinder

Materials other than Blood

- This enhancement is not unique to blood, other brightly colored items are also enhanced.
- This is particularly useful for documenting fibers and small glass fragments that can be visualized using oblique light but are difficult to photograph

Light Source

- Full spectrum white light needed
- Fiber Optics and Xenon lights work well but cause significant heat damage to the polarizing filter in a short amount of time
- LEDs do not cause heat damage to the polarizer
- Not all LEDs output a suitable spectrum, “white” LED’s performance is significantly inferior to that of RGB LEDs

White vs RGB LED Technology

For further information or a PDF of this presentation, please contact Rebecca Bucht at rbucht@gc.cuny.edu