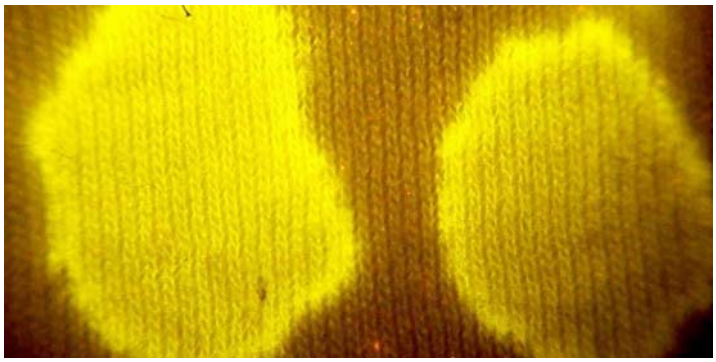

Detection of Body Fluids with an alternate light source

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Since body fluids like semen, saliva, and vaginal fluids are naturally fluorescent, the use of a light source offers a unique method for locating them. A crime scene investigator can narrow down the specific locations of stains for collection instead of testing entire, large pieces of evidence such as a mattress, a carpet, a sheet, an article of clothing, etc. The dried body fluids will actually glow under the light source illumination.

Because nearly all body fluids are inherently fluorescent, the more powerful and more tunable your light source, the more evidence you will uncover, a good example being the Mini-CrimeScope Advance (https://spexforensics.com/products/item/mini-crimescope-advance).

Although the body fluids will fluoresce under an ordinary UV black light, many articles on which you would find them including clothing and sheets will also glow and deter their detection. It is therefore necessary to tune to visible wavelength (color bands) to eliminate the background interference. Considering you will be searching for body fluids on high profile, capital crime cases, and the increased proliferation of the use of DNA, the more body fluid evidence you can reveal the better.

Example of Fluorescence of Body Fluids using a Mini-CrimeScope (https://spexforensics.com/products/item/mini-crimescope-advance);

Applications (https://spexforensics.com/applications

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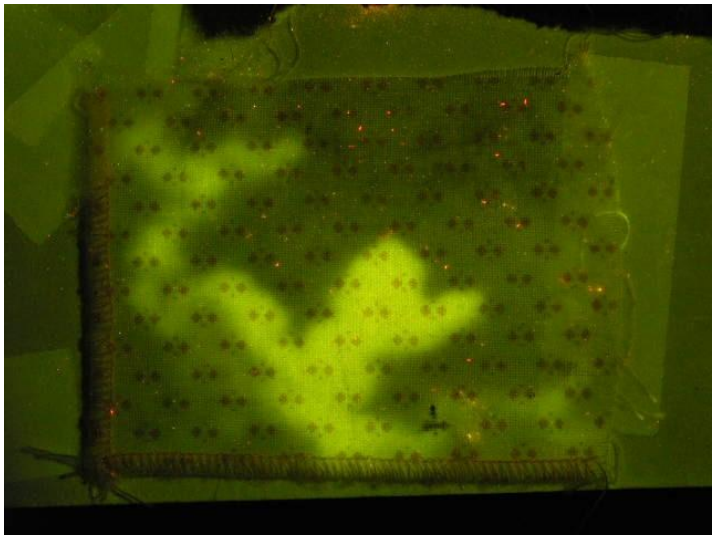
Questioned Documents (https://spexforensics.com/applications/questioned-documents)

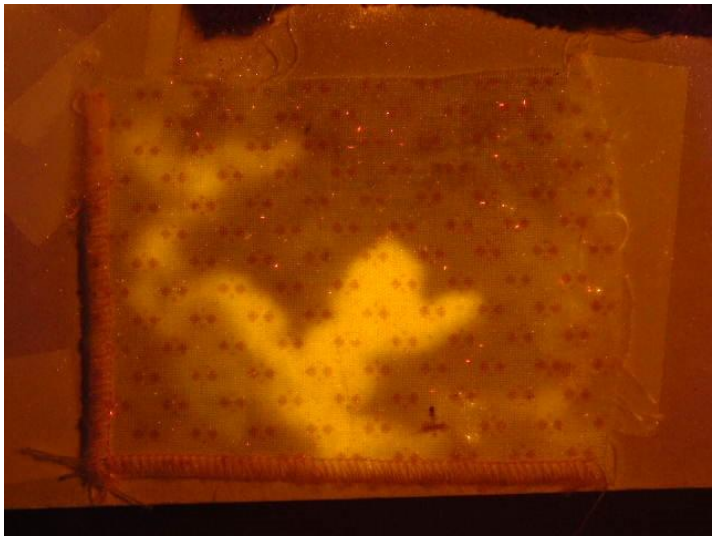
Tips and Tricks for Photographing Images with a forensic light source (https://spexforensics.com/applications/tips-and-tricks-for-photographing-images-with-a-forensic-light-source)

Suspected body fluid on cloth. Visualized in White light.
Stain is old and as such has begun to oxidize (turn brown) under room light conditions

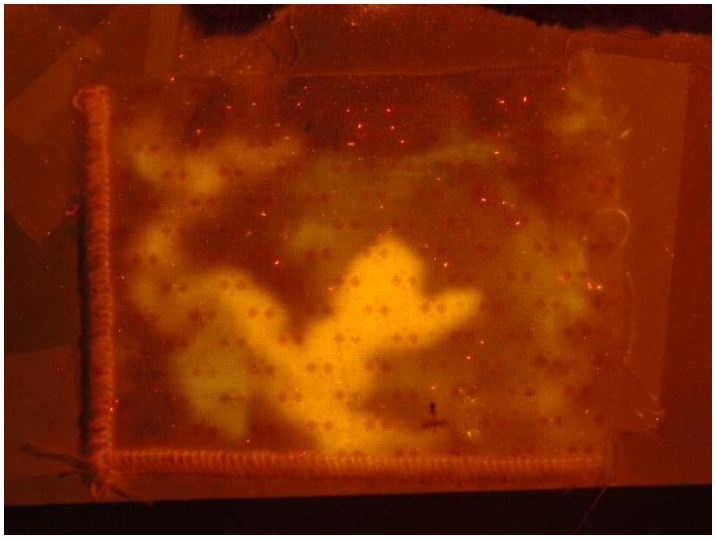
Suspected body fluid on cloth. Visualized in UV light without a filter on the camera.
The stain has begun to fluoresce but, the weak fluorescence is not visible because of the much brighter light from the forensic light source and the fluorescence of the background material.



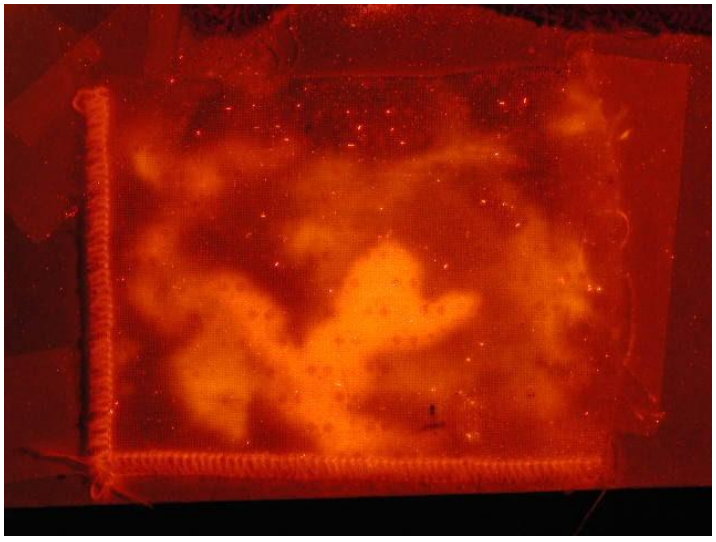
Suspected body fluid on cloth. Visualized in Violet light (415nm) with a Yellow camera filter.
With the introduction of the camera filter, the forensic light source illumination is now blocked and the weak fluorescence of the stain can be seen.



Suspected body fluid on cloth. Visualized in Blue light (450nm) with an Orange camera filter.
Using a longer wavelength illumination and its appropriate camera filter starts to reduce (reject) the background and increase the fluorescence of the stain.



Suspected body fluid on cloth. Visualized in Blue-Green light (495nm), Orange camera filter.
Using an even longer wavelength illumination allows for the detection of a second stain, one that only fluoresced at longer wavelengths.



Suspected body fluid on cloth. Visualized in Green light (535nm) with a Red camera filter.
Using a still longer wavelength and longer wavelength camera filter reduced the background and increased the fluorescence of both stains.
In this case the cloth has both semen and vaginal fluid stains overlapping, which could only be seen by using a multiple wavelength forensic light source.

Most fluids must be dry before they exhibit fluorescence. A possible exception would be urine. Depending on the composition and quantity of nutrient intake, certain compounds could be expelled which fluoresce in their liquid state.

Problems posed by cleansers and detergents

Body fluids and cleaning fluids fluoresce when exposed to the same general wavelength range from the light source. When examining surfaces it is important to note that **many cleaning products are similar in chemical composition to body fluids**. Many of the cleaning products will fluoresce just like a body fluid and may be visually indistinguishable from them.

Related to this problem is clothes or materials that have been treated with, or washed with detergents containing optical brighteners. These brighteners are designed to fluoresce under UV-Violet (415nm) excitation. This may limit the use of UV or Black Lights as these devices cause the background to fluoresce as well. **To eliminate the fluorescence of the cleansers or detergents, use a Forensic Light Source tuned above 440nm**.

soap dispenser; CSS, No Filter

soap dispenser; CSS, Orange Filter

cabinet under sink; white light

cabinet under sink; CSS, Orange Filter

Detection vs. Identification

A forensic light source is ideal for detection. While the experienced user can make an educated guess as to what is being seen, the forensic light source can only allow the substances to be visualized. It is always required to collect and analyze the samples either presumptively or in a lab to determine identity and relevance.

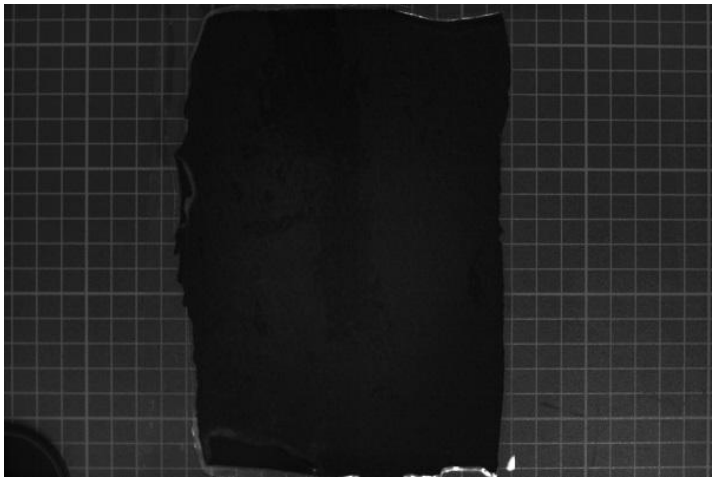
Many background surfaces glow under UV light and therefore a simple UV Black light will not yield the quality and the quantity of evidence that can be achieved with a tunable or multiple wavelength forensic light source.

Special Issues Related to Blood Detection

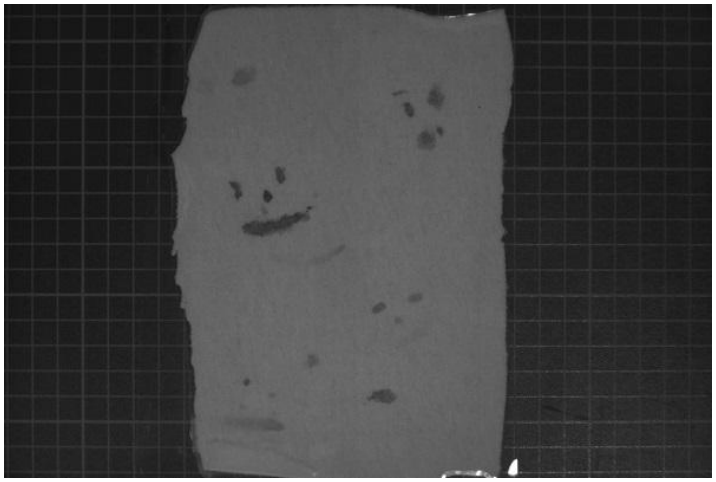
Blood is the only body fluid that does not fluoresce, at least not enough for the human eye to see. Although blood does not glow in the visible range, **it has a unique wavelength under which the blood stain will darken to enhance its contrast**. This is most effective in photographing bloody fingerprints because more of the detail of the fingerprint will be revealed by the enhanced contrast.

Blood absorption can also be detected in the Infrared, i.e., wavelengths above 700nm. With the advent of lower cost, easy to use Infrared sensitive cameras, like the Universal Imaging System, blood spatter and contamination can be detected and documented on many materials, including black materials due to the absorptive and reflective properties of materials.

In the examples below, both materials which are black in color to the naked eye, turn white in the Infrared. As the blood continues to absorb at the longer wavelengths, the Infrared allows the possibility of providing a contrast that is not visible to the naked eye.



Cloth stained with blood; room light with no camera filter.



Cloth stained with blood; room light with Longpass IR 715nm camera filter.

Black t-shirt stained with blood; left room light and no camera filter, right 415nm illumination and Longpass IR 715nm camera filter.

Challenges of using a forensic light source on Black Material

Detection on black material presents a special problem. The **black material absorbs all wavelengths of light** including the excitation (light from the light source) and the emission (fluorescence). This may cause stains to appear weaker or be overlooked completely. One possible solution in these instances is to use **white light** while varying the angle of illumination (oblique lighting). This allows for the detection of surface disruption due to residues from the fluids.

Related Products

CrimeScope CS-16-500W (https://spexforensics.com/products/item/crimescope-cs-16-500w)

HandScope Xenon (https://spexforensics.com/products/item/handscope-xenon)

Mini-CrimeScope Advance (https://spexforensics.com/products/item/mini-crimescope-advance)

New HandScope LED (https://spexforensics.com/products/item/handscope-

led-forensic-light-source)

Products

- Forensic Light Sources (https://spexforensics.com/products/forensic-light-sources)
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