

## ULTRAVIOLET LIGHT AND BLOODSTAIN ANALYSIS

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The use of ultraviolet light in the area of forensic science is well documented in the literature. The purpose of this article is to expand its use into the area of bloodstain pattern analysis. Small bloodstains are sometimes difficult to see, particularly on dark surfaces such as black or dark-colored shoes, clothing, furniture, etc. Common sense dictates that in order to accurately analyze the size and shape of a stain, we must first be able to see the edges of the stain. In these types of cases the ultraviolet light can be of great assistance. When ultraviolet light is directed at most dark surfaces which contain bloodstains, a contrast will be created by the combination of absorption and reflection of light by the surface and blood. This will enable the analyst to more clearly observe the stains and thus give a more accurate interpretation. The following equipment and technique has been proven to be effective; however, other types of cameras, lenses, and techniques may be just as profitable.

### **EQUIPMENT**

#### Camera/Lens

The authors use a 35mm Pentax K 1000 camera body with a Sigma Macro multi-coated lens. However, most any type of camera with a lens that will pass a sufficient amount of ultraviolet light should produce good results. In addition to the K 1000, we have been very successful using the Polaroid Spectra Camera and 1:1 copy stand for immediate results.

### Light Source

It is necessary to use a strong long wave ultraviolet light source capable of producing wavelengths in the area of 365 nanometers. A 100 watt Spectroline SB-100 ultraviolet light with a spot bulb is used to produce the required amount of light at the right wavelength. However, any ultraviolet light source meeting the above specifications should produce good results.

### Film

Even though black and white film will produce good results in some cases, color films have consistently produced excellent photographs and is more impressive when presented to a jury. Most color films will produce similar results; however, a minimum of 200 speed film is recommended because of shutter speed considerations. Figures 1 and 2 were exposed using Kodacolor 200. As mentioned earlier Polaroid has proven successful in some cases. Figures 3 and 4 were exposed using Polaroid 990 film.

### Copy Stand/Tripod

It is suggested that a copy stand or tripod be used to steady the camera. Some exposure times will be below the recommended shutter speed for hand holding the camera.

## **METHODOLOGY**

The suspect item should be examined in a darkened room with the ultraviolet light. Any possible bloodstains should be circled with a marker and labeled with a number, such as #1, #2, etc. A scale, preferably an ABFO2, should then be placed along side of, but not on top of, the stain. The scale should be placed at least one-half of an inch from the stain to allow the surface to create the necessary contrast.

While looking through the camera lens move the light source around the suspect stain until maximum contrast is achieved. If the light meter shows sufficient light, expose the film, bracketing one f/stop above and below the indicated setting. If the light meter shows insufficient light, adjust the f/stop or shutter speed until the light meter indicates enough light, then bracket one f/stop above and below the indicated setting. Because of the depth of field it is best to maintain an f/stop of 8 or higher. Once the suspected stain is photographed it is necessary to send either the item or a sample of the stain to the laboratory to determine first if it is, in fact, blood and second, the blood type. This should be completed and the results reported before any interpretation is attempted, as there are many substances which will react the same as blood when exposed to ultraviolet light.

**CONCLUSION**

This technique is just one of many available to the analyst and has proven very successful when encountering stains on dark surfaces. While most surfaces encountered were susceptible to this technique, others were not; therefore, the analyst should examine each surface carefully. This is a non-destructive technique of visualizing small stains for examination.



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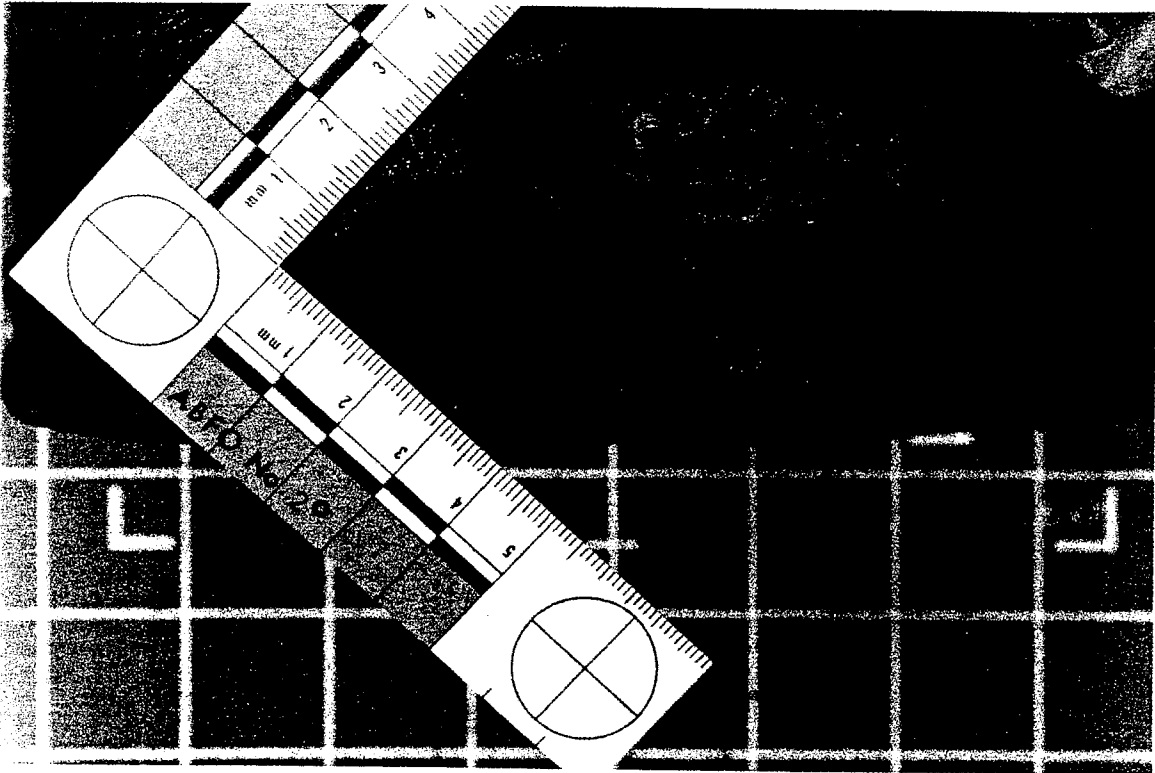
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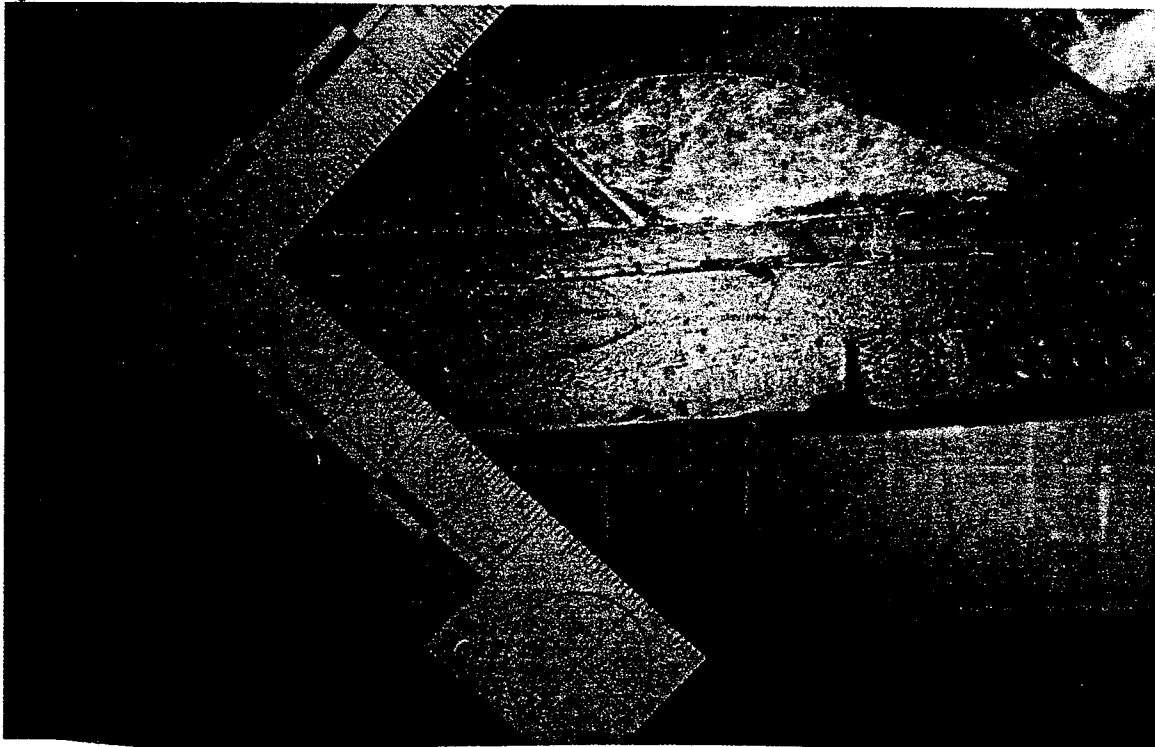
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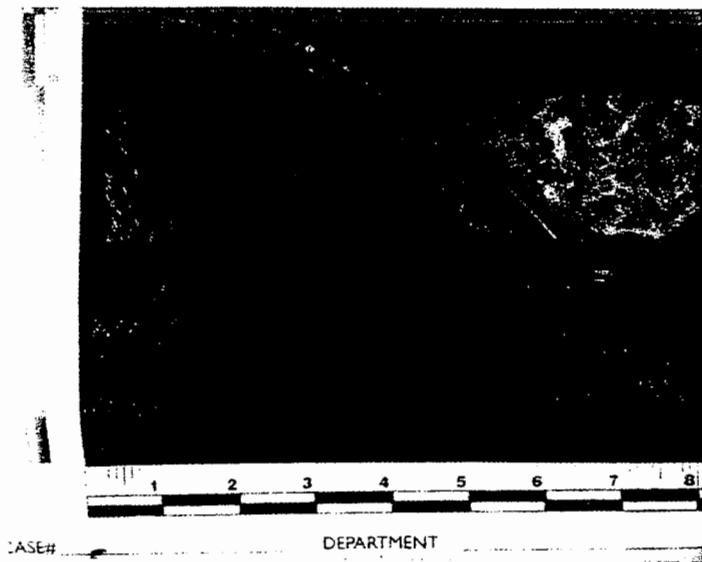
**Figure 1**

Normal exposure using a Pentax K-1000 available light and Kodacolor 200. Exposure setting  $f/8$  at  $1/15$  seconds.



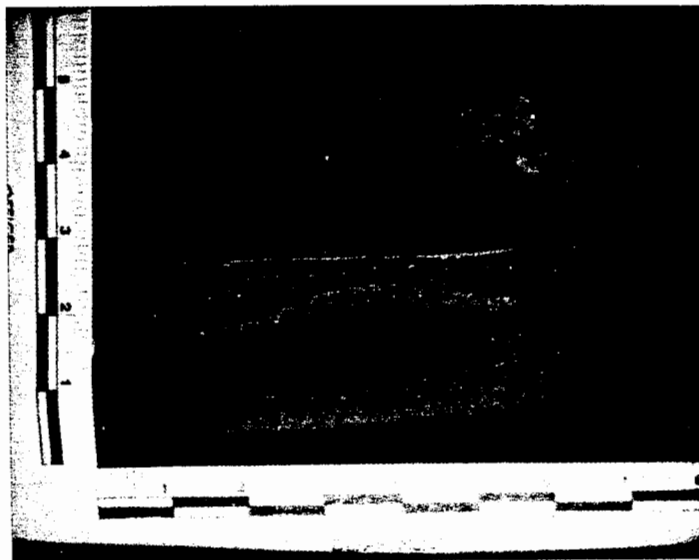
**Figure 2**

Exposure using a Pentax K-1000, Kodacolor 200 and a 100 watt ultraviolet light source. Exposure setting  $f/8$  at 1 second.



**Figure 3**

Normal exposure using a Spectra Polaroid camera with flash and 990 film.



**Figure 4**

Exposure using a Spectra Polaroid camera, without flash, 990 film and a 100 watt ultraviolet light source.