



A Versatile Tool Alternative Light Source (ALS) in Forensic Investigation

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Editorial

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Abstract

Forensic science is a very powerful investigative tool, irreplaceable in many instances for the elucidation of complex cases and for an objective understanding of the dynamics of criminal acts. Reliable and perfect finding of trace evidences at the crime scene is of utmost importance in Forensic or criminal investigation. Although some forensic investigators would occasionally use ultraviolet (UV Black Light) to examine for crime scene evidence, Many body fluids are fluorescent in their nature and can be discovered using light with different wave lengths suitable for each type of fluid which will reflect light to disclose its location. The intensity of light and degree of visibility of the fluid stain depend on different factors such as the type of the fluid and the nature of the surface on which it has been deposited.

Keywords: Alternative Light Source (ALS); Crime Scene Evidences; Forensic Investigation

Introduction

Forensic science is a very powerful investigative tool, irreplaceable in many instances for the elucidation of complex cases and for an objective understanding of the dynamics of criminal acts. Looking back at the history of forensic science, every time a new technique became available for acquiring data on the crime scene, a disruptive step forward was introduced in the ability of police forces to identify and prosecute criminals and eventually to fight crime. This was especially true at the end of the 19th century when the first studies on fingerprints as means for the identification of individuals were published by Faulds and Galton. [1,2] Just a few years had elapsed from these seminal works when, in Argentine in 1892, Juan Vucetich was the first to solve a criminal case using fingerprints for the identification of a felon. This started the era of modern forensic science. An equally revolutionary advancement came with the development of NA typing, in 1985 [3]. Since then, more and more sensitive techniques have been devised, decreasing the minimum sample size for obtaining a reliable

DNA profile. Less than 30 years later, it is almost impossible to imagine investigation without iDNA [4]. Traces can be defined as the remnants of an activity and forensic science endeavors to deduce from the traces left on the crime scene as much information as possible on the crime itself. I

This concept is very well synthesised by the well-known Locard's principle, which is often defined as every contact leaves a trace' even though Locard himself never formulated such an expression. Locard's words are very effective in stating this basic concept:

It is impossible for a criminal to act, and especially to act with the intensity that a crime requires, without leaving traces of his presence [5]. This was later elaborated introducing the notion that traces can be evidence left by the felon on the crime scene, but also, for a reverse action, they can be items collected from the crime scene and transferred to the felon [6].

Kirk very fittingly formulated the definition of traces as

mute witnesses:

Wherever he steps, whatever he touches, whatever he leaves, even unconsciously, will serve as a silent witness against him all of these and more bear mute witness against him. This is evidence that does not forget. It is not confused by the excitement of the moment. It is not absent because human witnesses are. It is factual evidence. Physical evidence cannot be wrong, it cannot perjure itself, it cannot be wholly absent. Only human failure to find it, study and understand it can diminish its value.

There are different types of light source that are used in crime scene investigation and the selection depends on the nature and state of the crime scene, the circumstances and the environmental condition at the time of evidence collection.

According to their wave lengths, these lights are classified into the following categories: Green, Blue, UV and White light.

They are used under the following circumstances:

Identification and visualizing biological stains using UV light: The advantages of using light include the following:

- Discovering blood stains on dark, red or violet color surfaces.
- Discover blood stains that are covered with paints. I

Identification and Visualizing other Body Fluid Stains

(such as semen, saliva, urine, vaginal fluid and sweat): These stains can be discovered using a UV Lamp which locates the site and place of the stain but without discrimination between different types of fluid which ultimately lead to the examiner or the forensic chemist to do further investigation to discover the type of fluid to which the stain belongs. This can be accomplished by using Alternative Light Source Kit (ALS Kit).

Visualizing Latent Fingerprints

Using fluorescent powder and spraying it on suspected locations, latent fingerprints will be seen after using UV light on smooth or rough surfaces. But they will be difficult to visualize when the surface is dark in color.

Identification of Fire or Burn Traces

Fire investigations are conducted to disclose the criminal setting of the fire or deliberate burning and in Arson investigation. This is a simple and economical method for

the detection of different ignitable liquids or fire accelerants. Using ALS may also lead to the location where the fire was started first. It will also reveal the pour pattern of the accelerant not only at the crime scene but also on the skin and clothes which will give fluorescence under UV light.

Discovering illegal dumping of hydrocarbon materials in soil or water using UV as a light source and different stains or radio fluorescent materials. Revealing invisible ink by using UV which will disclose various information such as names, phone numbers, location of stolen items, regardless of the nature of the surfaces they were written upon, e.g. glass, plastic, wood or paper surfaces or on clothes.

Identification of Narcotics Drugs & Psychotropic Substances

This can be done using UV to detect different narcotics and ecstasy drugs such as amphetamines and cocaine. All these drugs will fluoresce after application of UV light even if they were in small quantities.

Identification of Hair and Fibers

This can be accomplished by two different methods:

- Application of white or usual light to the surface in parallel or tilted direction.
- Application of UV or blue light.

Hair and fibers will fluoresce which will make them easy to locate and collect.

Visualizing bite marks, bruises, pattern wounds and shoe prints which all might not be seen in ordinary light. Alternative light sources help to visualize injuries and bruises which are not visible on the skin under the ordinary light sources.

Detecting gunshot residue (GSR) or explosive residue through detection of fire residue like tattoo, carbon or soot blackening on the victim's clothes. Consequently, the direction of the shot and the entrance wound will be known and discriminated from the exit wound. It will also help to identify the perpetrator through the detection of the same fire residue on his hand and clothing's.

Detecting skeletal remains and the age of old bones by examining the cross section of one of the long bones and observing the fluorescence which will start to decrease gradually in a circular manner starting from the outer circumference to disappear completely after about 100 to 150 years.

In short, "ALS is well-established in the field for

crime scene and sexual assault investigations, and other applications as well

Conclusion

Availability of high intensity incandescent lamps slowly revolutionized alternate light source analysis of physical evidence since these machines, many weighing less than 20 pounds, could provide an intense light beam that could be passed through various filters covering from visible blue, green, yellow and red light. Using these colors enhanced the ability to reveal an abundance of what would otherwise be invisible evidence. All of these factors combined to make the technology a candidate for one of the center's landscape reports, which more often focus on cutting-edge technology, but always seek to help law enforcement agencies and forensic laboratories select the device that works best to meet their needs. When it comes to ALS, those needs most commonly include crime scene investigation, forensic biology, latent prints, trace evidence, medico legal death investigation and forensic nursing, and the report provides illustrative scenarios for each type of used. Choices must be made on every crime scene, about which items should be collected and which traces should be considered useful. In the opinion of the authors, these are best left to an expert investigator,

rather than to an instrument. Competence, more than tools or technologies, is the most powerful weapon that can be used for solving crimes. ALS devices to detect a wide variety of evidence and it can save a lot of time at crime scenes, and as we all know, time is valuable.

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