

THE RED THREAD OF JUSTICE: BLOOD EVIDENCE IN CRIMINAL INVESTIGATIONS

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ABSTRACT

In order to solve the circumstances surrounding the crime, the victim's and the perpetrator's actions at the scene, their role in the crime, and their behavior after the crime was committed, it can be crucial to locate and accurately interpret blood traces. Unless the Blood traces, along with other material evidence at the scene, can be a crucial controlling factor in determining the credibility and veracity of the statements made by event participants when the culprit is unknown during the early phases of a criminal inquiry. There have been documented instances in criminal and judicial practice where a comprehensive qualitative and quantitative examination of blood traces was essential for identifying the participants and offenders as well as demonstrating their involvement in the crime's commission.

Keywords: DNA, Pattern, Blood, Evidence

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INTRODUCTION

The initial minutes spent examining a crime scene may be the most crucial parts of the entire investigation [1]. In no other time would the detectives have been on the scene of the crime?. Never before will the area be more pure or free from contaminants, according to investigators. Fingerprints, tire and shoe prints, trace evidence, and the victim's condition are all most informative during those first few minutes. However, there is no other period when errors that could compromise the effective prosecution of the criminal are more likely to occur. It is rare to come across a crime without a crime scene of some sort, hence processing crime scenes is an essential task and responsibility connected to the majority of criminal investigation [2]. The process of processing a crime scene involves analyzing and assessing the situation specifically for gathering tangible proof and recording the scene's state as it was discovered, or in situ. The crime scene technician uses six fundamental processes to do this: evaluating, observing, recording, looking, gathering, and analyzing. These actions, as well as the sequence in which they are completed, are not capricious. Without lowering

the value of either, each has a fundamental function in gathering scene background and recovering evidence. From any angle, this is a difficult undertaking because the scene and the evidence are disturbed just by processing the scene. But at the end of these efforts, the investigator will have a lot of concrete proof and documentation of the incident, including notes, reports, sketches, and photographs. By giving the investigating team objective data to test investigative theories, support or contradict testimonial evidence, and ultimately show the court the conditions and circumstances defined by the scene, all of this information is crucial to the resolution of crimes. Although this assignment is simple to say, it is more difficult to complete. Purposeless action is foolish and, in essence, a waste of time. This is true in all endeavors; thus, it is essential that the investigator comprehend his or her mission before beginning any actions at the crime scene. In every aspect, processing crime scenes is a duty. The technicians process crime scenes because it is their duty to do so, not because they were instructed to. Many of the techniques conducted at the scene may seem pointless and hence unneeded if the investigator is unaware of this obligation and its

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ultimate goal.

EVIDENCE/ PROOF

Anything that can be utilized to investigate the circumstances and pinpoint the perpetrators of a crime is considered evidence [1]. During an investigation, investigators collect both direct and circumstantial evidence. Information obtained from comments given by eyewitnesses, suspects, and surviving victims is referred to as direct evidence.

However, this kind of proof is infamously untrustworthy. There are several ways in which perceptions of an event might be filtered and corrupted as they go from the eyes to the brain to the voice chords. The veracity of a witness's story might be distorted as it is filtered by their own visual acuity and filtered through the potent lens of their bias, prejudice, and prior experiences. The ability—or lack thereof—of the witness to precisely recall details and the sequence in which the crime's actions transpired makes an eyewitness account susceptible to continuity errors.

Generally speaking, materials like blood, fingerprints, hair, fibers, and DNA are considered circumstantial evidence. Compared to direct evidence, this kind of evidence is easier for scientists to examine. Furthermore, circumstantial evidence is typically more trustworthy because it may be verified by a variety of controls using any kind of scientific test. Nevertheless, a judge must still decide if circumstantial evidence is relevant. For instance, a jury must consider the claims that a suspect must have been there at the scene of the crime at the time of the incident if DNA analysis reveals that the suspect's blood was discovered there. However, what kinds of evidence—and how much of each kind—should be gathered? Any evidence that could identify a suspect at the site of a murder, assault, or burglary should be gathered for the investigation. This should go without saying; fingerprints, a murder weapon, bloodstains, and shoe prints can all be important clues in a criminal investigation. However, things that are not immediately apparent, such dirt, pollen, hair, and fibers, may not be as evident. These pieces of trace evidence could demonstrate that the offender originated in a particular remote area with distinctive geology and vegetation. But gathering everything from a crime scene—from a couch to the dust—would be a headache for paperwork and storage, and it would even make it more difficult to prosecute the case quickly and successfully. When it comes to determining which elements are most pertinent to the investigation of each sort of crime, experience is the best instructor. The offender may leave either visible or undetectable traces at the crime scene [3]. It is important to take precautions when safeguarding the scene to avoid destroying, changing, or creating new tracks. Footprints, papillary prints, garment fiber traces, blood traces, and tooth traces, assuming the perpetrator ate food

at the scene, are examples of traces. Inspection of the area surrounding the scene is required during the examination because it is possible that the criminal concealed the stolen items or discarded used tools, or that he left traces that could be used to identify him or track his movements when he arrived at and left the crime scene following the break-in.

BLOOD

Flesh is ripped, skin is scraped off, hair is pulled from its roots, and saliva is sprayed [1]. Numerous kinds of biological elements are typically left behind as witnesses to violent crimes. Blood always reveals more about the victim, the attacker, and the assault's conditions than any other physiological fluid or tissue, perhaps with the exception of semen in cases of sexual assault. DNA found in blood may be used to identify the offenders. Splash patterns can be used to identify the attack's location and manner. Blood can easily reveal an assailant's shoeprints or fingerprints. Everybody knows what a bloodstain is. It is crimson if it is fresh. Bloodstains that are older have a reddish-brown color. A stain that appears to be blood is not always blood, though. Blood can appear in a variety of liquids, including paint, rusty water, food coloring, salsa, and catsup. When a forensic scientist discovers a stain at a crime scene that seems suspicious, they must determine whether or not it is blood. This is done by performing a presumptive test, so called because, in the event that the test is positive, the researcher can presume the stain is blood. When exposed to hemoglobin, the iron-containing protein in red blood cells that transports oxygen from the lungs to the rest of the body, the majority of presumed blood tests yield a positive response by changing color. Regrettably, several vegetables, like potatoes and horseradish, have enzymes that can also cause a color shift in a blood presumptive test. If they turn up at a crime scene, these could result in a false-positive test. These incidents are uncommon, though, and forensic scientists' presumptive tests are trustworthy enough to be useful. Nearly all of them depend on oxidation-reduction, a chemical process.

Blood types

Blood typing was the main technique for determining blood type in forensic investigations for many years before deoxyribonucleic acid (DNA) was introduced as a more conclusive form of evidence [4]. In addition to the four primary blood types used for identification, there are eight more specialized categories that are directly related to the antigen found in the blood. Additionally, the presence of a positive or negative Rh factor will be present in the basic A-antigen and B-antigen in a person's blood. The following are the four blood types: A, B, AB and O. The precise blood type can be ascertained once human blood is found at a crime scene. Although this isn't personalized for any one person, it does assist reduce the proportion of the population with that particular blood type. If blood

typing is the only method available in a case, the investigator could reduce the number of potential suspects by identifying the blood type that was discovered at the crime scene and comparing it to the blood types of each individual.

Blood Identification

Forensic blood testing is predicated on the identification of hemoglobin or its constituents since hemoglobin is the most distinctive characteristic of blood [5]. Hemoglobin, a protein, is responsible for carrying oxygen from the lungs to all of the body's tissues and cells. Heme, which is in charge of carrying oxygen, and "globin," the protein component, combine to form hemoglobin. In reality, the initial forensic blood identification tests are heme assays. They employ certain dyes that undergo a chemical process known as oxidation, which causes them to change color when combined with peroxide. This reaction can be accelerated by natural protein enzymes, although heme will also quicken the process. Remember, enzymes are catalysts, which means they speed up normally slow reactions. Heme is also serving as a catalyst in this. Forensic scientists refer to these tests as "catalytic" because of the reaction. They have been in use for more than a century. Many dyes are effective, and several of them are frequently utilized in orthotolidine labs for forensic science. Tetramethylbenzidine, leucomalachite green, and phenolphthalein are among them. In a positive test, these compounds, which are composed in the appropriate solutions, change color.

Bloodstain Patterns

One effective forensic technique utilized in crime scene investigations is bloodstain pattern analysis [6]. If the researcher is aware of the dynamics of a fight, how blood reacts when it comes into contact with a surface, and how it behaves when it leaves the body, then an effort can be made to ascertain whether a crime was committed. In order to ascertain what did or did not occur, the skilled forensic scientist examines the patterns left by bloodshed. Trigonometry, physical blood droplet measurement, pattern identification from known photos or tests, and an understanding of motion physics are all necessary for interpreting the bloodstain patterns. The forensic investigator reconstructs a logical sequence of events backed by crime scene evidence by combining it with various forms of evidence from the crime scene, including fingerprints, tool marks and footprint impressions, DNA evidence, and chemical analysis. Just as crucial as correctly evaluating the data is the ability to gather and record it. Because bloodstains can't always be transported back to the lab, it's crucial to capture the scene carefully. The puzzle can be put together with the use of photographs and meticulous, scaled sketches. Bleeding and the ensuing bloodstain patterns are commonly seen in crimes involving violent contact between people [7].

Crime-scene investigators now recognize that bloodstains left on mattresses, walls, ceilings, floors, and other pertinent items can offer important information on what transpired during the commission of a violent crime. The following details are likely to be revealed through the analysis of bloodstain patterns: 1. The angle at which a blood droplet hit a surface and the direction from which the blood came; 2. The victim's position or location at the scene of the crime when a bloody wound was administered; 3. The movement of a bleeding person; 4. The bare minimum of blows delivered to a person who was bleeding; 5. The precise position of a person who delivered strikes that resulted in a pattern of bloodstains.

Although it takes years of training and effort to become a qualified bloodstain pattern analyst, the CSI may learn to assess blood spatter at the crime scene and determine direction of travel, and an approximate position for the impact's area of origin [8]. This knowledge is critical because the analysis of blood spatter patterns and other evidence at crime scenes can provide crucial investigative details, including the locations of the victim, attacker, and objects; the kind of weapon used to produce the spatter; the quantity of blows, shots, stabs, and other incidents that took place; and the victim's and attacker's movements and direction following the start of the carnage. Furthermore, it could support or contradict statements made by victims, suspects, or witnesses. Most importantly, it may prevent the conviction of an innocent person. The force of gravity produces passive bloodstains, which can appear on a range of surfaces, including wallpaper, wood, tile, carpet, and clothing. The crime scene needs to be closely examined, and every stain needs to be noted. Bloodstain pattern analysis can help the investigator ascertain what happened, who was present or not, and whether the accused perpetrator's claim of self-defense was legitimate by using the laws of physics, mathematics, and trigonometry. There may be multiple locations at the crime scene where blood splatter is discovered. It's crucial to take into account every area for examination during the first tour. The reconstruction will enable the CSI to create a strategy for the collection of blood samples from the most reasonable locations following the documentation of the scene, in addition to potentially determining the direction and order of events. It is not necessary to sample each and every drop of blood. Accurate representative blood samples will be forwarded to the crime lab for analysis after a thorough examination of the site.

DNA

DNA, that exquisite spiral molecule that twists like a lighthouse's staircase, has all the information required to create a whole You [9, 10]. Your DNA and the information it contains are responsible for everything about you, including your gender, skin tone, eyes, hair color, and even your ability to curl

your tongue into a half pipe if you have it. DNA is left behind as a calling card to the perpetrators of nearly all violent crimes, including rape, murder, and assault. The hair that was torn out by an attacker has DNA. The rapist's saliva and semen contain it. It is in the flesh that was trapped beneath the victim's fingernails while she was attempting self-defense. It's in the blood droplets from a gang killing that are splattered on the sidewalk. It is a silent observer who waits in the bones of the abandoned and deceased. It must first be isolated in a pure form and its quantity established before that witness will reveal its secrets. In reality, DNA consists of two molecules. It is composed of two strands that are joined by weak chemical connections between complementary bases known as hydrogen bonds. A C (cytosine) on one strand always forms a bond with a G (guanine) on the other strand, and an A base (adenine) on one strand always forms a bond with its complimentary base T (thymine) on the other strand. Base pairings (bp) include an A with a T and a C with a G. When a base, like A, C, G, or T, is attached to a phosphate group—a phosphorous atom surrounded by four oxygen atoms—and a ribose sugar, a nucleotide is formed. Two strands of nucleotides make up DNA. Under the correct laboratory circumstances, heating or chemical treatment can readily break the weak hydrogen bonds that bind those two chains.

DOCUMENTATION

Criminalistics is a broad category that encompasses many of the tasks conducted in a public forensic science lab [11]. Evidence management is one of these. Any type of evidence can be handled and evaluated using a few general guidelines. These guidelines deal with safety concerns, recordkeeping, the chain of custody, packaging, preservation, and contamination avoidance. Good records of what an evidence piece is and its precise origin, along with adequate labeling to enable tracking from one location to another, are what constitute documentation. Items gathered at a crime scene could be kept in an evidence storage facility run by the police department before being taken out and brought to a lab. Except for when they are removed for analysis, the items are stored in secure facilities at the laboratory. They might be put back in the police evidence storage after analysis. If the case involving the objects goes to trial, the evidence is transferred from police evidence storage to court evidence storage. It might then be taken out and brought to the courthouse for the trial before being put back in storage. It is possible to follow the goods

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during these transfers thanks to documentation. To prove that an item brought into court as an exhibit is the same item that police collected at the crime scene or another original place, there must be enough documentation. The "chain of custody" is another term for this procedure of making sure it is the same object. It consists of records that indicate where the item was always there since it was first taken.

SEARCH

Check to see if the police are legally permitted to be there while investigating the crime scene [12]. In essence, a crime scene investigation consists of finding evidence and appropriately recording, gathering, and conserving it. Search is crucial; the CSI must guarantee the protection of an individual's Fourth Amendment rights against arbitrary search and seizure. It is the responsibility of the crime scene investigator to confirm that they are legally permitted to be present while carrying out the investigation. Who has a reasonable expectation of privacy in the area where the crime scene investigation is being done is the main legal premise to ascertain. This could not always be the owner of a piece of real estate. Property that is lawfully rented needs permission from the legitimate renter, not always the property owner. A roommate may consent to a search, but only in their own space and any common areas (such the living room and kitchen); they would not consent to a search in their bedroom. Either a judge with the proper authority may issue a search warrant, or the person who has a legitimate expectation of privacy in the area to be searched may grant approval.

CONCLUSION

Experts conducting laboratory analyses of traces and other materials taken from the scene, specialized teams involved in the investigation of the crime scene (criminal technicians, investigators, police, public prosecutor), and, of course, experts in the investigation of blood, sexual, or other offenses during whose perpetration appearing traces of blood are all necessary for the effective use of blood traces in criminal investigations. At least three organizational forms of competent state bodies should be relied upon for this purpose.

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