

PHYSICAL EVIDENCE— BLOODSTAINS

Blood found at the scene of a crime, on the suspect, the victim, or an instrument used in the crime, provides information that may be translated into meaningful significance. A blood sample obtained from the victim of a crime of violence and the suspect may provide the necessary link to secure the chain of evidence against the assailant. The analysis of blood taken from an apparent suicide victim or a traffic fatality can establish if the victim had consumed alcohol, drugs or both before the time of his death.

Blood and Bloodstains— Investigative Aids

Blood is one of the more common types of physical evidence that may be found at the scene of a crime of violence. Properly collected and analyzed, it provides investigative leads that may have an impact upon the conduct of a case. For instance,

laboratory analysis can classify a blood specimen into one of four major blood groups. Under certain conditions—*adequate quantity of blood, the freshness of the sample and the like*—the grouping may further be refined into one of its many subgroups. Blood then acquires importance, in that it may be analyzed as to composition and establish with some degree of accuracy the suspect's association with a crime—*But, it cannot provide direct identification, as blood grouping is not particular to one individual; many persons have similar blood groupings.* For example, if bloodstains found on a hammer in the possession of a murder suspect have a different blood group than his own but are similar to the victim's, the investigator can make a strong inference (*not a definite conclusion*) as to the source of the stains.

Blood Drops and Stains: Bloodstains found at the scene of a crime or on the clothing of the suspect may provide the alert investigator valuable information. *The number, the relative position and the shape of the stains may help the investigator estimate the position of the attacker, the manner in which the weapon was used and the exact location of the attack (See Figure 1).* While blood smeared articles, door knobs, furniture, etc., can help the investigator retrace the movements of the victim or the attacker and provide useful information to reconstruct the course of events.

FORM OF BLOODSTAINS		
GENERAL APPEARANCE	DIRECTION OF FALL	GENERAL VERBAL DESCRIPTION
	VERTICAL Up to 2 feet	Well-defined spots with rounded edges
	VERTICAL 2 to 4 feet	Prickly and jagged edges which become finer and closer together as height increases
	VERTICAL Over 4 feet	Edges splash out up to one foot from the center of the drop. Small beads can be thrown out (arrow)
	OBLIQUE Varies with the speed of fall	Drawn-out shape with elongated or dotted ends with point in the direction of fall (arrow)

Figure 1

Blood, Paint or Rust?

The criminal or traffic investigator must recognize that bloodstains may assume a variety of colors. The fact that suspected stains differ from what is normally accepted to be blood should not deter the collection efforts. It is true that relatively fresh bloodstains will have a reddish-brown coloring and somewhat of a lustre. However, there are specific conditions—*the material of the surface, the age of the blood, climatic conditions, attempts to wash away the stains, etc.*—that cause bloodstains to vary in coloring.

A very thin layer of blood may appear as greyish-green in appearance. Sunlight, heat, weather or attempts to wash away bloodstains will cause them to lose their lustre and appear grey in color. Bloodstains on wall paper often absorb the dye or paint and may appear as green, blue or greyish-white stains. Contamination often occurs which also affects the appearance. Tobacco, urine, feces, coffee, vomitus, etc., can discolor bloodstains and render them visually unidentifiable.

We then see that bloodstains may assume various



shadings not normally associated with this fluid. On the other hand, other types of stains may be easily mistaken for blood. Paint, lipstick, rust, etc., are common substances that are often erroneously collected as bloodstain evidence. Visual identification is not accurate enough, the investigator must rely upon a number of simple field tests to apply on suspected stains. However, these preliminary examinations will also react positively to other substances. Their importance rests in their ability to indicate that the substance tested *may be* blood and in cases of negative reactions, they confirm that the suspected stain is not blood. These field tests are extremely sensitive and do not require large amounts of blood.

The Field Tests

Benzidine Test: One benzidine tablet is dissolved in 20 to 25 milliliters of glacial acetic acid and distilled water. If the reagent is prepared from benzidine powder, several drops of hydrogen peroxide must be added to the solution before conducting the test. Upon contact with blood, the color of the solution changes to a blue-green color. However, this reaction also occurs with fresh fruit juices, urine and fresh milk.

Leuco-Malachite Test: The test solution is prepared by dissolving one gram of leuco-malachite green into 100 milliliters of acetic acid and 150 milliliters of distilled water. This reagent has a light green color and may be kept indefinitely if it is stored in a tightly sealed dark bottle. Prior to use, five or six drops of concentrated hydrogen peroxide are added to about 5 milliliters of the solution. Upon contact with blood, the color of the solution changes to a deep blue-green.

This test is considered to be reliable although a positive reaction can be obtained from substances rich in oxygen—*red lead, oxides and permanganates*. However, these substances will change the color of the solution without the addition of hydrogen peroxide, which is not the case with blood. A control test may then be made, first of all, without the addition of hydrogen peroxide.

Conducting the Benzidine or the Leuco-Malachite Tests: Part of the stain that is to be tested is scraped loose with a clean knife, scalpel or other sharp instrument onto a piece of filter paper or clean blotting paper. A few drops of the reagent solution are then placed over the scrapings. Another method is to dampen a piece of filter paper with saline solution or distilled water. The moistened paper is then pressed against the stain. A few drops of test reagent are then applied to the transferred stain. Some authorities recommend following this procedure for testing bloodstains appearing on the fenders, grill, bumper, etc., of a vehicle suspected to be involved in a hit-and-run accident involving personal injuries or a fatality.¹

An apparent bloodstain on cloth may be field tested, either by partially scraping off some of the stain or by removing a stained fiber. The thread is placed in saline solution in a partially filled test tube or a watch glass. Several drops of the reagent are then added to the solution after the stain has dissolved.

When these reagents are used care must be exer-

cised to prevent contaminating the bloodstain. Any contact between the solution and the bloodstain renders it useless for further analysis. These difficulties are avoided if the reagent saturated paper is not pressed against the surface being searched or the stain being tested.

The Luminol Test: This reagent causes the blood to luminesce. Its use is, therefore, restricted to those areas that can be darkened. As with other preliminary tests, this too, is not conclusive as it gives a positive reaction to copper and its alloys.

The reagent is prepared by mixing sodium perborate with a mixture of 3-aminophthalhydrazide and sodium carbonate in a ratio of 0.14:0.02:1. The dry ingredients are dissolved in water and the solution is then sprayed on a suspected stain with an atomizer. The whole stain may be used as this compound does not interfere with later laboratory examinations.²

The Search

The chameleon like characteristic of bloodstains requires the investigator to collect and test any suspicious stains that he finds at the scene of a crime, on the body, on the clothing of the victim or of the suspect. A flashlight, preferably with a red or green light, held as an angle to the surface being examined (oblique light) will prove to be a valuable aid in this search.³

The search for bloodstains or splashes should be extended to areas that are not in direct view, especially if it is apparent that the criminal attempted to conceal his crime by *rearranging furniture and bedding, scrubbing the walls or floor, concealing any damage, etc.* Splashes or a fine spray of blood are sometimes found at a distance from the point of assault. *Look under furniture or at the opposite side or the corners of the room.*

The criminal with blood still on his hands may have opened a drawer (*check the bottom*), fingered through papers, grasped a door knob, etc. *Carefully examine freshly scrubbed areas. Take scraping samples from floor or wall cracks and seams and conduct field tests.*

The laundry room, the kitchen or the bathroom afford the criminal the opportunity to wash away bloodstains or to dispose of bloody clothing. Traces of blood may be found in the sink, laundry tubs, bathtub, toilet, on the soap, soap dish or detergent container. The latter may also contain fingerprints. *Check the towels and the wash cloths. Look in the clothes hamper, waste baskets, garbage pail. Examine the clothes or rags hanging in the bathroom, on pipes or laying in a corner. Disconnect and drain the contents of the traps into a jar. Never flush or use the toilets, run water in the sink or the bathtub until the search is completed. Check all curtains, draperies, slip or toilet box covers, bedding and the like for blood smears or stains.* Sometimes the criminal will use these articles to wipe himself. *Collect the clothes the victim and the suspect were wearing at the time of the crime for closer examination. Examine the shoes. Undergarments are especially important sources of evidence in violent sex offenses.* The presence of blood may be discovered

¹ *TECHNIQUES OF CRIME SCENE INVESTIGATION*. 2nd edition, Arne Swenson, Otto Wendel, New York, 1965. p.124.

² *TECHNIQUES OF CRIME SCENE INVESTIGATION*. p.123.

³ *MODERN CRIMINAL INVESTIGATION*. 5th edition, Harry Söderman & John J. O'Connell, Funk & Wagnalls Co., New York, 1962. p. 239.

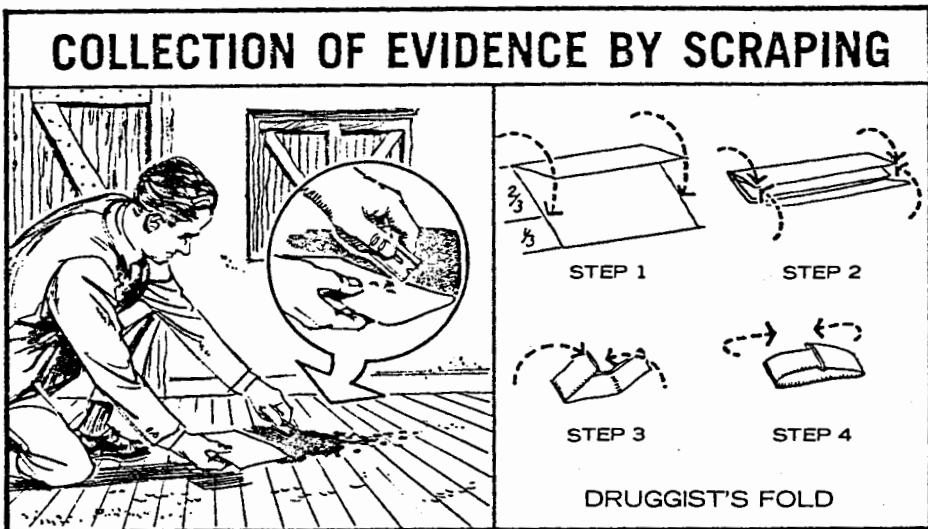
on the clothing if the criminal has washed off the more conspicuous stains. *Diluted stains may usually be found in the seams, trouser cuffs, the lining and pockets.*

Traces of blood may be found under the fingernails of the victim or suspect. The cuticles, the outer edges of the nails may also provide the needed evidence. Usually in homicide investigations, plastic bags are placed and secured over the victim's hands while the body is still at the crime scene to protect and preserve the evidence that may be located under the fingernails. The examination is then conducted at the morgue or hospital by evidence technicians or laboratory personnel.

Check the hair line and scalp, the edges of the beard or the mustache. In sex crimes, have medical personnel examine the genitals and pubic regions of both the victim and the suspect.

Closely examine the interior of a motor vehicle suspected of being used in the commission of a crime against the person. This is especially true when a rape or homicide occurred in the automobile. The finding of a body in the vehicle also calls for a close search for bloodstains. *Thoroughly check the front-end and under carriage* of an automobile suspected of being involved in a hit-and-run crime.

Closely examine the weapons suspected of being used in a crime in which the victim was physically beaten. However, it does not always follow that blood will be found on a knife or other sharp weapon used in a homicide or serious assault. The edges of the wound or the victim's clothing may have wiped the blood away as the blade was withdrawn.



Tufts of blood-stained grass are tied together and then cut with a sharp knife or scissors. The blood-stained grass is then placed in a jar. Shrubbery, leaves or other vegetation containing bloodstains are cut off and placed in a jar.

When the object on which the stain is located cannot be

recovered, the evidence may be collected in the following manner if the blood has not hardened:

oratory. Crime laboratories usually recommend that the minimum amount of whole blood be at least 10 cc's (about two teaspoon fulls) while as much dried blood as possible be provided. *A basic axiom to follow is to transmit as much of the evidence as is practical.*

Ideally, the best method of collecting bloodstains is to take possession of the object on which they are found—*clothing, upholstery, bedding, draperies, etc.* Certain investigations will require that some property be damaged in order that it may be removed with the bloodstain. In these instances, the gravity of the case must outweigh the damage that may result. The removal of tile, wall paper and linoleum, the dismantling or sawing off of a window frame, flooring or other structures require the officer to obtain permission of the owner or another responsible party before these items can be secured.

Bloodstains or soil are collected by removing the soil with a trowel or a knife to the depth of the blood saturation. Insects, worms and the like are removed before the specimen is placed in a jar and sealed. Control samples of the soil from the adjacent area is also collected and handled in the same manner as the evidence.

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Recording the Information

Whenever bloodstains are located and identified, it becomes necessary to record this information in the notebook and to sketch the scene before the evidence is removed. Some of the notes that are recorded at this time generally include the following:

1. The shape, the size and the color of the stain
2. The direction of the splashes and the estimated height of the fall
3. Whether the drops are moist, dry along the edges or completely dry. (*The notes and subsequent reports should refer to this evidence as stains, or appeared to be blood—not as a definite statement that it is blood.*)
4. The crime scene sketch and the measurements and the position of the bloodstains.

Photographs are also taken showing (1) bloodstains and the general area, and (2) close-ups of the stains.

Collecting the Evidence

Adequate samplings of blood or dried bloodstains must be collected for transmittal to the crime lab-

- 1) Soak a piece of sterile filter paper or a clean blotter in the blood. After the paper absorbs the blood, allow it to dry before placing it in a jar or test tube, or
- 2) Use an eye-dropper or a pipette to pick up and transfer the blood in a test tube containing a saline solution (2 teaspoons of salt to 1 quart of water). The saline solution prevents the blood from putrefying at room temperature and will not affect the outcome of future analysis. Dried bloodstains may be scraped off if the object cannot be moved. Use a clean, sharp knife, a scalpel or other sharp instrument to scrape off the bloodstain onto a piece of white paper which is then folded in a druggist fold which is then sealed with an adhesive tape. The paper is then placed in a clean glass container and sealed.

Bloodstains found on hard non-porous surfaces may be collected by dissolving them in saline solution or distilled water. Add the solution to the dried bloodstain and allow it to stand for a while. Then stir the mixture with a glass, plastic or small wood rod until the dried blood has completely dissolved. The reconstituted blood is then collected either by using an eye-dropper, or a pipette and transferred to a test tube, or it may be absorbed with a blotter or filter paper.