

## IDENTIFICATION OF PHYSICAL EVIDENCE

### AT THE CRIME SCENE & IN THE LABORATORY

By Deanna Teminsky,  
Altamonte Springs Police Department

Today, more than ever before, physical evidence plays a major role in the criminal investigation process. Significant advances in forensic science have greatly increased the use of physical evidence as an investigator's tool. But before any item can be useful as evidence, it must first be recognized as such. An investigator's ability to recognize, collect, and use evidence determines his/her success in solving a case. Physical evidence may be something as small as a single strand of hair or as large as an office building. It can be in the form of a gas, solid, or liquid. Generally, physical evidence at the crime scene may be found in one of four forms: transient, pattern, conditional, and transfer.

#### 1. *Transient Evidence*

This is temporary in nature and can be easily changed and/or lost. Most common types are odor, temperature, imprints and indentations, and markings. These are usually detected by the first officer on the scene and should be documented as soon as possible, whether by photographs, notes, or immediate collection.

#### 2. *Pattern Evidence*

This is generally produced by forcible, direct contact between persons and objects or one object with another object. Most are in the form of imprints, indentations, striations, markings, fractures or depositions. Pattern evidence is extremely valuable in the reconstruction of events. It can be used to verify or refute an individual's statement, eliminate certain factors, or provide an investigator with new leads. Most common types are blood spatter, glass fracture, fire burn, furniture position, projectile trajectory, track/trail, tire or skid mark, clothing or article, modus operandi, powder residue, material damage, and body position.

#### 3. *Conditional Evidence*

This is produced by a certain event or action. If not noted and documented carefully, it may be changed or lost. Examples are if lights are on or off, the color of smoke at a fire, the color of a fire's flames, location of items at a scene, whether a vehicle's door are locked or not, windows open or closed, radio on or off, odometer reading, position of the body, degree of rigor mortis, presence of lividity, types of wounds.

#### 4. *Transfer Evidence*

This is the classical type of physical evidence. It is produced by physical contact between persons or objects, or between persons and objects. This includes body fluids, latent fingerprints, hairs, fibers, glass, soil, drugs, chemicals, foot/tire impressions, tool marks, etc.

Evidence items may be analyzed and compared to known samples to determine if they possess the same *class* characteristics (i.e., same size shoes) or *individual* characteristics (i.e., wear pattern on shoe sole). There is no one set of procedures for evidence collection that is fitting for every case. There are some general guidelines that can be followed and will be addressed here. Depending on the circumstances of the case, special considerations may be employed. Common types of evidence discovered at a crime scene, their significance, and conventional collection methods are as follows:

**ARSON**

Accelerants are the primary evidence collected at an arson scene. Because they evaporate quickly, they must be collected as soon as possible and placed in an airtight, preferably metal, container.

**BODY  
FLUIDS**

Usually associated with crimes of violence, *blood* can provide an invaluable link between a victim, a suspect, and the scene itself. It can be determined if blood is human or animal, the ABO blood type, and a DNA profile can be provided. Blood stain patterns can be used for crime scene reconstruction (position of persons involved, direction of travel, etc.).

One of the most frequent examinations requested is the identification of *semen* in connection with sexual assault cases. Serological examination may determine the presence or absence of acid phosphatase, the presence or absence of spermatozoa, ABO group factors, and possibly a DNA profile.

If liquid body fluid is present at the scene, it should be swabbed onto a clean, white cotton gauze, dried at room temperature, and packaged in a paper bag.

Dried stains on a smooth surface may be scraped into a piece of paper and folded. On porous items, such as wood, cut out the portion containing the stain. If possible, the entire object should be collected and submitted.

Any garments suspected of containing body fluid stains should be air dried at room temperature prior to packaging. They should be packaged in separate paper bags being careful not to smudge the pattern or lose any possible trace evidence.

All packaging containing body fluids should be marked with a bio-hazard warning symbol and label.

**BUILDING  
MATERIALS**

Usually associated with burglaries, debris from *glass, paint, wood, plaster, metal, brick, concrete, tar, ceiling insulation or tool fragments* may be transferred to the perpetrator during the commission of the crime. All clothing items from the suspect should be collected and packaged separately. Also, known samples from the damaged areas of the building, as well as samples from the intact areas, need to be collected for comparison purposes to determine if there is a common origin.

**FIBERS,  
FABRICS**

Cross transfer of fibers occurs during contact between people and/or objects. Analysis and comparison of these fibers can show association between individuals, objects, and crime scenes.

All appropriate clothing should be collected for known standards and placed in separate paper bags. Do not allow items from the suspect and victim to touch each other or lay unpackaged on the same table; cross contamination will occur and render the comparison useless. Fibers may be collected with tweezers and sealed in a manila envelope. If fabric marks are present (such as on a vehicle involved in a hit and run), they should first be photographed, with and without scale, dusted and lifted with latent fingerprint tape. Paint samples should also be collected from near the mark.

**FIREARMS**

Comparison of fired bullets, cartridge cases, and shotshells can determine if they were fired in a suspect weapon. Examination of powder residues can aid in the determination of firing distance. Comparison of suspect weapon to open cases to ascertain if it has been used in other offenses.

*Weapons* should only be handled by surfaces that would not normally yield fingerprints, i.e., checkered grips or edges of the trigger guard. Weapons should not be cleaned, dry fired, or taken apart. NO objects should ever be placed in the barrel. All weapons should be unloaded and position of the rounds documented prior to being submitted to the laboratory. Weapons should be placed in a sturdy box and secured to prevent shifting.

*Cartridge cases, bullets, and live rounds* should NOT be marked in order to avoid damaging individual characteristics. Bullets should be wrapped in gauze and placed in separate, sturdy containers to prevent rattling around. Cartridge cases should be placed in separate, sturdy containers.

*Gunshot residue* may assist with identifying a shooter or reconstruction of the scene. A suspect's hands can be patted with an adhesive disc to obtain gunshot residue particles for analysis. This should be done before the suspect has washed or otherwise cleansed his/her hands. Any item with suspected residue should be packaged in order to limit any movement and to avoid direct contact with the surface of the packaging itself. GSR pattern analysis is valuable in distance estimation.

#### **HAIR**

Hair is commonly found in cases involving personal contact, i.e., homicide, sexual assault, and vehicle accidents involving pedestrians. Analysis can determine if the hair is of human or animal origin. If human, it is possible to determine the area of origin on the body, the race of the individual, whether the hair was crushed, burned, fell out naturally, or was forcibly removed and whether the hair came from a particular source. Microscopical examination of hairs does not provide a positive means of individualization, but can provide exclusionary value.

Hairs at the scene may be picked up with fingers or tweezers or may be vacuumed. They should be placed in a paper which is secured by a druggist fold, and then placed in a secondary container and properly labeled and sealed. Hairs collected from separate areas should be placed in separate containers to avoid cross contamination.

#### **LATENT PRINTS**

Fingerprints are one of the most valuable types of evidence recovered from crime scenes. Depending on the environmental conditions, the size and surface of the items, they may be processed on the scene or packaged and submitted to a laboratory for processing.

All objects at a scene should be treated as possible sources of fingerprints. When collecting items, cotton gloves should be worn to avoid wiping away latent prints from the surface. Items should be secured to prevent shifting in the package. Complete and legible inked prints of all the ridges on the fingers and palms should be taken from all subjects.

Hard, smooth, non-porous surfaces (i.e., glass, metal, plastics) may be dusted with contrasting powder, or fumed with super glue and then dusted. Prints should be photographed prior to being lifted with tape and placed on a latent lift card. Some prints can be lifted more than once to enhance their quality. Be sure to label each lift in the sequence.

Porous surfaces (i.e., paper or cardboard) can be processed with chemicals such as iodine, ninhydrin, silver nitrate, or physical developer to make the prints visible. Once developed, all prints should be photographed to preserve them.

Alternate light sources utilize various wavelengths and intensities of filtered light to illuminate prints on surfaces. This is a non-destructive method which can help locate prints that would not otherwise be developed. Again, all prints made visible should be photographed for preservation.

#### **SHOE/ TIRE IMPRINTS**

*Imprints* are two-dimensional reproductions of a finger, foot, shoe, or tire usually left on a hard, smooth surface in dust, blood, or grease. *Impressions* are three-dimensional indentations produced when an object (i.e., shoe or tire) has passed through a soft medium such as mud, wet sand, or snow.

Analysis can determine if the pattern compares with that of a mate, if the pattern was made by a particular mate, and, if individual characteristics are present if the object did or did not make the pattern.

All imprints and impressions should first be photographed with and without a ruler, making sure the camera's film plane is parallel to the plane of the surface with the imprint. If the print is in dust, it may be possible to capture it by using an electrostatic dust print lifter. Other imprints may be captured by utilizing latent fingerprint techniques (i.e., dust and lift with tape, or chemical enhancement). Impressions should be recovered by making a cast utilizing dental stone or silicone casting material.

**TOOL  
MARKS**

A tool mark is any impression, cut, gouge, scratch, indentation or other marking left in an object by another object or instrument. Examples are a screwdriver used to pry open a cash box or a pry bar used to force open a door. The working edges of the tool leave individual characteristics upon the attacked surface.

Laboratory examination may determine: (1) if a suspect tool did, could have, or did not make the questioned marks, (2) which type of tool may have made the mark, (3) comparison of tool marks from different scenes to determine if the same tool was used, and (4) if two objects were at one time joined as one.

All tool marks should be photographed with and without scale. If possible, submit the item containing the tool marks. Otherwise, a "cast" may be made using a product like "Mikrosil" casting putty.

Never attempt to fit a suspect tool into the questioned tool mark. Do not clean the suspect tool. Place any identifying marks away from the acting edges of the tool and package all tools to prevent losing any trace evidence and protect the edges from damage. Package each tool separately.

The recognition, collection, and preservation of evidence does not rest on the shoulders of the crime scene technician; it is the responsibility of everyone involved with the case - from the first responding officer to the prosecuting attorney. Evidence cannot be manufactured or created; it is either present or not. Evidence collection is based on non-biased, methodical, and logical principles. Adhering to these principles greatly enhances the likelihood of successfully prosecuting a case.

**REFERENCES:**

1. Lee, Henry, C., Dr., Editor, , Physical Evidence , Magnani & McCormick, Inc., Color Lithographers, Enfield, CT, 1995
2. Moore, James, T., Commissioner, FDLE Crime Laboratory Evidence Submission Manual, 1993