There are many different types of evidence found at a crime scene. Any of these could be a significant piece in solving the crime. The significance of each piece of evidence is often unknown until after the evidence has been bagged, labeled, and sent to the lab. For these reasons, forensic scientists treat each and every piece of evidence as if it is vital. Every object at a crime scene is considered to be significant until toughly examined. More often than not, the forensic scientists only obtain usable evidence from a small percentage of the objects collected at a crime scene. It may seem that much examination of evidence is fruitless, but the discovery of unexpected evidence such as a fingerprint or hair, can break and investigation wide open.

There are several different kinds of analysis which can be performed on each type of physical evidence. Almost all evidence requires one or more types of analysis to yield the most complete information. Most analysis fits into one of the following categories:

**Types of Analysis**

*Comparison* Most types of evidence require a control with which to be compared (example: fingerprints, hairs)

*Visual* If evidence can be utilized or compared through unaided observation, then that analysis is called visual (example: fingerprints, tool marks)

*Microscopic* A microscopic analysis indicates that evidence must be observed with the use of some type of microscope (example: hairs, fibers)

*Chemical* If an article of evidence must be subjected to any type of chemical procedure to be best utilized, that article requires chemical analysis (example: DNA typing, drug screening)

**Common Types of Physical Evidence**

*Documents.* Any document, hand- or typewritten, will be submitted so that authenticity and source can be determined. These types of analysis are utilized mainly with ransom notes, suicide notes, death threats, and forgeries. When typewriters were used, it was quite simple to match a machine to its productions. With the development of inkjets and laser printers, matching printed documents have become nearly impossible. The exception would be if a document were to be printed with an uncommon font or with a rare ink.

Since the diminished use of typewriters, document analysis is now primarily concentrated on handwritten documents. Although each person’s handwriting is original, no one reproduces writings in the same way twice. Forgers are resourceful and inventive during their attempts to reproduce signatures. For these reasons, handwriting analyses rarely provide a 100% match.
Glass. Glass panes, particles, or fragments that are found or transferred to a person or object involved in a crime may be substantial evidence. Such evidence, whether broken by a bullet or other means, may link a suspect or piece of evidence to a crime scene, and be used to deduce cause of breakage or direction of penetration. Additionally, it is common for fingerprints and/or blood to be present on broken glass.

Soils, Minerals, Wood, and Other Vegetative Matter. Any items containing soil, minerals, wood, or other vegetative matter could link a person or object to a particular location (for example, soil imbedded in shoes and vault insulation found on garments). Most samples of such are unable to prove make match, but may with the presence of a rare material. Often such types of evidence are considered circumstantial, but are useful in supporting other evidence in a case.

Fingerprints have long been a mainstay in criminal investigating. It is widely known that when a person touches an article with their bare hands that a print is left behind. Such prints are called latent prints. The challenge for the forensic chemist is to develop, or make visible, these latent prints so as to discover their owners. In the past matching these prints required a narrowed field of suspects, but with the utilization of computers and large databases, identifying a suspect’s prints have become routine.

Hair. Hairs are often found at a crime scene and are fairly easy to compare and identify with the use of a microscope. Any animal or human hair present at the scene could link a person or animal with a crime. With a number of samples to compare, hairs from a crime scene may be matched to a suspect with a high degree of certainty. Upon the discovery of a root or follicle tissue, DNA analysis can provide an exact match.

Fibers are any natural or synthetic fiber transferred which may be useful in establishing a relationship between objects and/or persons. With the exception of DNA analysis, fibers are examined and examined in approximately in the same manner as hairs. When control fibers are available for comparison, a match is often made with a high degree of certainty. In the absence of control fibers an experienced observer can provide valuable insight on the origin of a fiber. They may be able to predict if such a fiber originated from clothes, towels, carpet, or other sources.
**Firearms and Ammunition.** Firearms, as well as discharged and intact ammunition, are often important evidence in an investigation. In fact, it is often impossible to get a conviction in shooting cases without the discovery of such evidence. Weapons seem to be everywhere. Young children have access to them, gang members can buy them on the street, and many ordinary citizens carry them or have them in their homes for protection. Adding to this confusion is the large variance in firearm laws from state to state, and in some instances from city to city. When accompanied by a suspected weapon, a fired bullet or spent cartridge may be matched to a weapon as well as a fingerprint is matched to a finger.

**Powder Residue.** A person or item may be suspected of containing firearm discharge residue. The presence and disbursement of powder residue is used to discern if, when, and where a firearm may have been fired. It is nearly impossible to fire a weapon and avoid depositing such evidence on your person or surroundings. These substances are fairly easy to detect and quite difficult to remove from skin, clothing, and inanimate objects.

**Explosives and petroleum products.** These products are devices containing an explosive charge, as well as all objects removed from the scene of an explosion or fire that are suspected to contain the residues of an explosive material. The placement and appearance of these items is significant in determining where a fire or explosion originated and advanced. After collection and analysis, the chemical composition of such may be helpful identifying the origin and users of the substances.

Evidence is not always as it seems. Below left, a lipstick holder and ink pen are more than they appear to be, as revealed at right.
Impressions and Tool Marks. Impressions include tire markings, shoe prints, depressions in soft soils, and all other forms of tracks, glove and fabric impressions, and bite marks in skin or foodstuffs. Similarly, tool marks are any objects suspected of containing an impression of another object that served as a tool in a crime. With examination of the suspect tool, matches may be made to near certainty. This type of evidence is approached similarly as is bullet analysis. Although not limited to the previously mentioned categories, there is a continuing effort to compile large databases of different types of impressions. In such cases, evidence may provide important information to investigators, even in the absence of a control.

Top left: the underside of the boot which made the imprint at bottom left. As you can see, it is an easy match.

Top: tire tracks can indicate a type of vehicle. Bottom right: shoe prints can often identify the type of shoe and shoe size. Large databases of shoe treads are available to the authorities for such inquiries. This can imply sex and approximate height; occasionally such a print can even be individualized.

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Drugs. Any substance in violation of laws regulating the sale, manufacture, distribution, and use of drugs or chemicals will be seized. In addition to the large number of illegal drugs which are manufactured, sold, and used, a large number of perpetrators committing other crimes are involved with drugs in some fashion. The production of drugs is a big business. With increasing advancements in technology and availability of chemicals, it has become much easier to manufacture illicit drugs and more difficult to apprehend suspects.

Upon discovery of suspected drugs at a scene or on a body, samples are packaged and sent to the lab for analysis. Initial tests are to discover the identity of a drug. Further tests will identify the strength of the drug and its components. The identification of drugs has been perfected by the application of technology and physical science. Although such equipment is expensive and requires constant maintenance, the results from such tests are indispensable.

Paint. Any paint, wet or dry, may be transferred from the surface of one object to another during the perpetration of a crime. Most paint evidence originates from crimes involving hit-and-runs. With a control sample to compare a suspected sample, paint can be matched to a vehicle with near 100% certainty. However, in many hit-and-run cases, locating a suspect is difficult if not impossible. With the development of large databases containing detailed information about the composition of paints, the forensic chemist can often make specific predictions about the origin of paint samples. Of course, automobiles can be sanded and/or painted. Such changes prevent a chemist from linking a paint sample to a specific car, but instead investigators may then direct their search for a vehicle which does not have an original paint job.

Blood, Semen, Saliva, Organs, and other Physiological Fluids. All body fluids, animal or human, will be subjected to biochemical analysis for determination of identity and origin. By examining the amount, color, and distribution of such fluids, an investigator may able to make several predictions about what took place at a scene. A smear may indicate an attempted clean up or dragging of a body. At left, each blood spatter is characteristic of different circumstances:
1\textsuperscript{st}: one-foot vertical drop
2\textsuperscript{nd}: three foot vertical drop
3\textsuperscript{rd}: six foot vertical drop
4\textsuperscript{th} & 5\textsuperscript{th}：“splashers” occur when blood flies through the air at an angle and hits on object. The characteristic “exclamation mark” shape points in the direction of movement.

After careful collection, nearly every type of organ or organic fluid will be subjected to blood typing and DNA analysis. Toxicology tests may also detect the possible existence of drugs, alcohol, or poison. Blood typing, used for many years to narrow possible suspects or victims, is still a useful tool. However, recent advancements in technique, equipment, and collection, have elevated DNA testing to the most common analysis of body fluids.

At right, bones are found on the side of the road. Are they animal or human?

A micrograph will show distinctive forms of diatoms. When a drowning person swallows water, diatoms often enter the bloodstream. This is potentially the most reliable means of determining whether the person was alive on entering the water. Moreover, different types of diatoms form in different water environments. For example, the diatoms found in salt water are different from those present in fresh water.