

# PHYSICAL EVIDENCE

## EVERY CONTACT LEAVES A TRACE



The value of trace (or contact) forensic evidence was first recognized by **Edmund Locard** in 1910. He was the director of the very first crime laboratory in existence, located in Lyon, France. The **Locard's Exchange Principle** states that "with contact between two items, there will be an exchange."

## EXAMPLES OF PHYSICAL EVIDENCE



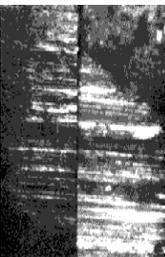
**PAINT** - Physical and chemical analysis of paint can indicate its class or what type of paint it is (auto, house, nail polish, etc.) Individual characteristics, such as the color, number of layers, chemical composition, or features of paint chips, can be analyzed and used for matching evidence to a suspect.



**GLASS** - Particles found at various crime scenes (breaking and entering, hit and run, vandalism, or murder) will be analyzed to determine its properties, such as color, tint, thickness, density, chemical composition, and refractive index (RI).



**EXPLOSIVES** - Chemical analysis can determine the type of explosive used in a device. Traces of explosives found on a suspect or materials from a suspect's home, work, or car can be analyzed to establish a connection to explosives from a crime scene.



**BALLISTICS** - Characteristics of ammunition, firearms, and gunshot residue (GSR) are examined to find matches between suspects and evidence found at a crime scene. Rifling in a gun barrel causes distinctive marks on fired bullets. The Integrated Ballistics Identification System (IBIS) is a database used for this type of evidence.



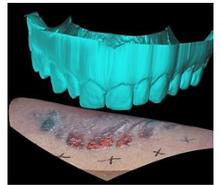
**DUST & DIRT** - This type of evidence can reveal where a person has traveled as it may be picked up at a crime scene or left behind. Investigators examine samples for chemical composition, pollen, plants, and other organic matter to find links to a specific crime scene.

## IMPRESSION EVIDENCE

**Shoepprints & Tire Tracks:** Impression evidence can be photographed, lifted with tape, or cast with plaster. Investigators will examine the evidence to identify the brand of shoe or tire based on the tread pattern and other physical features. Shoes and tires will also show wear patterns after being used for a period of time as well as other features (scratches, nicks, and cuts) that can be used to match evidence to specific items.



**Bite Marks:** Each of the 32 teeth in humans is unique due to age and wear. Impressions and photographs of bite marks left on a victim, suspect, or other object at a crime scene can be matched to dental records for the identification of a victim or suspect.

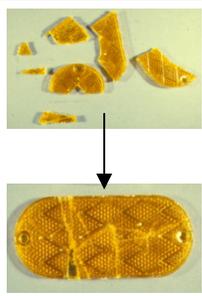


**Tool Marks:** Tiny nicks and chips form on the edges of a tool as it is used, which can be used to identify matches between evidence and suspects. Tools may also pick up traces of blood or other substances that can be tested or have fingerprints that can be lifted.



**FINGERPRINTS** - There are 3 types of patterns: arches, loops, and whorls. Unique ridge characteristics (minutiae) are also used for identification. AFIS stands for the Automated Fingerprint Identification System and is a database used by investigators to find matches to latent fingerprints found at a crime scene.





**FRACTURE MATCHES** - When an object is broken, torn, or cut, two unique edges (**fracture lines**) are formed. These can be compared to see if they fit together to show that they may have been part of the same object at one time. Investigators compare the pieces of tape, glass fragments, paint chips, pieces from a car, etc. to find possible matches.



**WOUNDS** - Wounds can often be matched to weapons or tool marks on the weapon. The weapon's size, shape, and length may also be determined. Wound analysis provides clues about a victim's injuries, the suspect (left-handed, right-handed, height, etc.), and the positions of the victim and suspect.

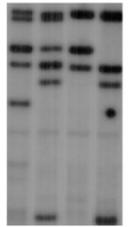


**QUESTIONED DOCUMENTS** - Examiners analyze a ransom note or other document to find clues to link it to a crime scene or a suspect. The type of paper used, printing method or handwriting style, or type of ink will be analyzed. Unique features, such as watermarks or indentations on a paper, may provide useful clues.



**INSECTS** - Flies, beetles, and other insects can provide useful clues about a corpse. Forensic entomologists use factors such as weather conditions, the location and condition of the body, and their knowledge of the life cycles of insects to help them estimate the postmortem interval or PMI (the time between death and the discovery of the body).

**DNA** can be extracted from almost any tissue (hair, fingernails, bones, teeth, & body fluids) and used to create DNA profile to identify a suspects or victim. **CODIS** (Combined DNA Index System) is database that is used to find matches to unknown DNA samples from a crime scene.



**SKELETAL REMAINS** - These can be analyzed by forensic anthropologists to identify remains or determine the cause of death or life history. Sex can be determined by examining the pelvis, humerus, and femur. Age and stature (height/build) can be determined by analyzing the teeth, bone growth, and the length of specific bones. Race can be determined by analyzing the skull for specific characteristics.



**BODY FLUIDS** - Blood, semen, saliva, sweat, and urine can be analyzed to provide information about the crime as well as its victim or the suspect. Chemicals and UV light can be used at a crime scene to find areas with body fluids, which are swabbed, bagged and collected in vials.



**HAIRS & FIBERS** - These may be transferred from a suspect to a victim and vice versa. Hairs can be examined to identify their origin, such as human or animal. Hairs with roots intact can be tested for DNA. Fibers are used to make clothing, carpeting, and furniture. They may be natural fibers (plants or animals) or synthetic (man-made).



**EVIDENCE CHALLENGE:** Search this card to find the answers to each of these questions. **Underline the answers as you find them and label each one with the question number.**

1. What is the difference between class and individual characteristics?
2. What is a fracture line? Give an example of a material that could be identified using fracture matches.
3. What are three examples of impression evidence?
4. What type of light is used to find body fluids at a crime scene?
5. What must be present in a hair sample in order to test for DNA?
6. What could a scientist learn from a wound?
7. What four things can a scientist learn about a victim from studying skeletal remains?
8. What could a scientist learn from a sample of dirt from a suspect's car?
9. Besides handwriting, what else could an investigator use to match a ransom note to a suspect?
10. What does a forensic entomologist study?
11. What are the three main types of fingerprints?
12. What does each of these acronyms represent? AFIS CODIS IBIS GSR RI PMI

