

# Further Reading - Forensic Science Evidence

## FORENSIC SCIENCE



Forensic Science is the use of scientific methods to study crime evidence that will then be used as testimony in a court of law.

This field is becoming more critical in police investigations.

Forensic scientists are required to make increasingly precise determinations with evidence in order for the evidence to be admissible in a court of law. Forensic scientists draw from a host of routine scientific activities from thorough fingerprint analysis to comparing bodily fluids found at crimes scenes with that collected from suspects. While much of the analysis stage of investigation is now automated and computerized, the basic skills of close observation, comparison and deduction are necessary to becoming a good forensic scientist.

The accuracy of any work by a forensic scientist begins with the effective gathering of evidence by the investigating officers.

Officers are specifically trained in the required techniques.

## EVIDENCE GATHERING

There are three stages in an investigation. First, detectives must determine that a crime has actually been committed. A broken window may mean that someone has tried to enter a house illegally, or it could have been caused accidentally. Next, detectives try to determine who committed the crime. In the initial stages of an investigation there may be many suspects. Finally, detectives try to gather enough evidence to prove, in a court of law, who was actually responsible for the crime. Identification officers help detectives gather the physical evidence necessary to prove 'who-done-it'. Detectives collect as much evidence as they can, even though much of it may not be allowed in a court of law. The first principle of forensic science is: "The criminal always takes something to the crime scene and always leaves something there."

Detectives use the scientific method to investigate a crime scene:

- 1 Gather evidence;
- 2 Test evidence;
- 3 Look for inconsistencies/errors;
- 4 Form a hypothesis or possible explanation;
- 5 Test the hypothesis.

## STANDARD PROCEDURES

When police officers in Calgary respond to a call and discover a suspicious death, they follow a standard set of procedures. The Staff Sergeant of the Homicide Unit is notified immediately. They, in turn, notify the following:

- 1 the detectives in his unit who are going to investigate the case;
- 2 the Medical Examiner (unless already notified by the dispatcher); and
- 3 the Crime Scenes Unit (officers trained to gather evidence at the crime scene).

Eventually, the Staff Sergeant may arrange to have their detectives or uniformed officers canvass the neighbourhood for witnesses and for information from homes and businesses in the vicinity.

The Staff Sergeant usually attends the crime scene with the detectives assigned to the case. By the time they arrive, the scene will already have been contained by the officers who first responded to the call and any other back-up units (other police officers on duty in the area) called in to assist.

‘Containing the scene’ means the officers do not let anyone except those people authorized to be there into the area around the victim. This is extremely important, as someone not taking the proper measures can inadvertently destroy valuable evidence (for example, walking over footprints left by the culprit(s), contaminating blood evidence, touching objects that may have fingerprints on them, or even moving furniture whose original order may have some bearing on how the incident transpired). Even police officers authorized to be at a scene must be extremely careful not to disturb the physical evidence.

Upon arriving at a crime scene, the first thing homicide detectives do is look it over in its entirety and help direct the Crime Scenes officers in collecting evidence and taking photographs. Videotaping the scene is now routine as well. They also endeavour to learn the identity of the deceased person. Transient physical evidence (evidence that can be readily lost, such as blood, fingerprints and tire treads) is collected first.

Next, detectives question anyone at the scene who has any potential connection to what happened.

Soon after everything has been looked after at the crime scene, the homicide’s primary investigators fill out an Occurrence Report. As the investigation progresses, any new information is added to the report.

Based on what they find at the crime scene, detectives form initial theories about what happened. They then discuss how they are going to proceed. What they find at the crime scene dictates what avenues they will pursue. For example, did the culprit leave anything at the crime scene that could eventually reveal his or her identity (such as an article that can be traced back to the store from which it was purchased)?

In most cases, detectives identify people they need to interview (usually immediate family, close relatives and friends), and these interviews often lead them to other people they must contact. During this process, they will likely discover who had a motive, the means and an opportunity to murder the victim. As well, they will probably identify witnesses who can be called to testify if a suspect is charged and goes to trial.

After they conduct interviews, detectives must verify the information they've collected. During their follow up, they may need to re-interview suspects and possibly obtain search warrants to collect potential evidence such as clothing, weapons, computers or other items that may be pertinent to the case. Once the physical evidence has been analyzed, they weigh all of the information they've collected against it. They seek, for example, to determine if any of the forensic evidence places their suspect(s) at the crime scene.

## **WORKING WITH EVIDENCE**

The entire crime scene is photographed before evidence is collected, paying special attention to areas where evidence will be gathered and to objects that will be moved to the lab for further examination. Detectives must search slowly and painstakingly so as not to accidentally destroy any evidence while they are searching.

Detectives look for things that are unusual or that seem out of place. For example, a button on the floor of an otherwise spotless room, a cigar butt in the kitchen sink or sand in the trunk of a car. Detectives also look for common things that gain significance by being present at the crime scene, such as fingerprints and clothing fibres. Fingerprints are still the most sought-after evidence today.

A large amount of the evidence gathered will be sent to a lab for analysis. A detective must be aware of the possible techniques available for analyzing evidence so that the correct gathering, packaging and shipping procedures are followed.

## **EVIDENCE AND INFERENCE**

Evidence constitutes concrete, indisputable facts and data based on observation —things experienced directly and therefore known for certain. Inference involves extracting theories, conclusions, guesses and hunches from the evidence using logical, deductive thinking.

Detectives are trained to avoid jumping to conclusions as they work through the maze of clues. They learn how to evaluate pieces of evidence and, through continued testing, become aware of how initial, possibly hasty conclusions have to be refined in the light of new findings.

In fact, these are the skills required of all scientists: the need for careful, thorough experimentation and the ability to continually ask questions until the answers make sense. Science, after all, is all about being curious, asking questions, and having fun while working to solve each new investigative challenge.

## **TYPES OF EVIDENCE**

There are three main types of evidence:

### **1. Physical (Forensic) Evidence**

This includes evidence gathered at a crime scene that directly links a suspect to the crime. Examples include fingerprints, footprints, blood (DNA), hair, fibres, and so on.

DNA analysis has become widely accepted as a tool of forensic science. In Calgary, the use of DNA evidence dates back to 1989, when prosecutors used DNA evidence to convict a man who murdered a prostitute.

'Transient physical evidence' is evidence that can be tainted or disappear if it is not collected immediately (for example, fingerprints and blood).

If it is properly collected, examined and presented, physical evidence is usually irrefutable in court.

### **2. Circumstantial Evidence**

Although circumstantial evidence does not allow detectives to say with certainty who committed a crime, it leads them to further investigate certain suspects. For example, if a witness places a suspect a few blocks from the crime scene, one can only conclude with certainty that the suspect was in the area; it does not establish the suspect's guilt. Another example is when a suspect's clothing matches that described by an eyewitness.

As the body of circumstantial evidence grows, it becomes more important and incriminating.

### **3. Factual or 'Hard' Evidence**

Similar to physical evidence, factual evidence includes such things as documentary evidence. It might be a letter that implicates a suspect or, in a fraud case, an altered business document. In the new era of electronic communications, email messages and computer files comprise factual evidence (even if they've been deleted and exist only as fragments on a computer's hard drive). Security camera footage and cell-phone data would also be considered factual evidence.