**Role & Function of Forensic Science in Crime/Criminal Detection**

**Introduction**

In the words of Professor Frank Tannenbaum, crime is eternal—as eternal as society. It means that as long as there is a society, crime will exist. It can never be abolished. In his view, a crime-free society is a “non-existent utopia”. As society progresses, so does crime. And with developments in science and technology, crime and criminal detection methods have also progressed.

The advent of forensic science and its various branches has completely transformed the methods of investigations. Forensic science has become an integral part of our justice system. Its role in crime detection has been popularized by famous TV shows such as CSI: Crime Scene Investigation, NCIS, and Law and Order. Many crime-based TV shows in India, especially CID, have also mimicked the concept of solving crimes with forensic science.

But how exactly is it defined? What role does forensic science play in crime/criminal detection? Where does it stand from a legal point of view? Let’s find out.

**What is Forensic Science?**

The word forensic is derived from the Latin word “forensics,” which means before the forum. In a modern context, it refers to something related to law or courts. Forensic science, thus, refers to the application of scientific methods and processes to law. It describes the science of associating people, places, and things involved in criminal activities. It is essentially used to detect crimes, solve them, and establish the alleged criminal's guilt or innocence.

In other words, forensic science can be defined as the application of the knowledge and methodology of various branches of science, such as physics, biology, chemistry, pharmacy, anthropology, archaeology, and psychology, among others, to legal proceedings.

The law and science are strange bedfellows. But they have come together to ensure that justice is served. Forensic science assists in investigating and adjudicating criminal and civil cases. The evidence found at the crime scene or otherwise is brought into laboratories, where it is analysed using different technologies and methods. Forensic science and its multiple branches make this evidence analysis possible.

**Branches of Forensic Science**

Following is some of the significant branches/areas of forensic science:

1. **Forensic Pathology**

Dead bodies yield many clues. Forensic pathology's central function is to determine the cause of death by analysing the body and involves autopsy or post-mortem. It makes known the time of death and can also indicate whether the death was natural, accidental, or a consequence of a criminal act.

1. **Forensic Anthropology**

This branch of forensic science deals with identifying people who can no longer be identified by the usual methods. It involves the analysis of skeletal remains to ascertain the age, height, sex, and other characteristics to establish an identity of the deceased. It is done mainly in events of mass casualties such as bombings, train and airplane crashes, road accidents, etc.

1. **Forensic Odontology**

The hardest material produced by our body is enamel and that is why remains are often found with intact teeth. When it is impossible to identify such remains by any other method, their teeth are analyzed to establish identity. This helps in the identification of bodies in times of mass disasters. It also involves the analysis of bite marks.

1. **Forensic Biology**

As the name suggests, this branch of forensic science deals with the analysis of biological evidence such as blood, semen, saliva, skin, hair, etc. it is then used to establish a connection between the victim and the perpetrator.

1. **Forensic Entomology**

Insects are often found to inhabit a corpse, especially the ones found outside. Forensic Entomology involves the analysis of the various insect inhabitations to determine the time of death. Factors such as temperature, humidity, moisture, and type of clothing, among others are of influence and thus this branch requires a good amount of training to be able to determine an accurate time of death.

1. **Forensics Engineering**

This involves examining certain materials, products, and structures to identify the cause of their failure. This failure can cause damage to property, personal injury or even death. This branch of forensic science is used in civil and criminal cases.

1. **Toxicology**

It involves the analysis of a body, dead or living, to check for the presence of any drug, alcohol, or poison. It is often used in drunken-driving cases. It also helps identify if the cause of death was poison or any such toxin.

1. **Criminalistics**

It is that branch of forensic science that involves analysing evidence brought into existence by criminal activity. Such evidence might include drugs, weapons, fingerprints, blood, and trace evidence.

1. **Digital Forensics**

This branch of forensics deals with the analysis of digital evidence, which can be found on computers, laptops, mobile phones, networks, clouds, hard drives, or servers. It also includes collecting information through SMS, email, images and deleted files.

1. **Behavioural Sciences**

It involves the study of the behavior of criminals. A psychological profile is created which gives a glimpse of the criminal’s personality and thus aids the investigating authorities to narrow down their search to a particular set of people.

1. **Ballistics**

The study of ballistics is used to determine what kind of firearm was used to commit the crime.

**Legal Provisions Supporting the use of Forensic Science**

The Code of Criminal Procedure, 1973 and the Indian Evidence Act, 1872 lay down the provisions regarding the procedure to be followed in criminal cases. Both of these statutes recognize the role played by forensic science in crime/criminal detection and give it legal validity.

Forensic reports and opinions of forensic experts are admissible in a court of law as evidence under section 45 of the Indian Evidence Act. This section states that when the Court has to form an opinion upon a point of foreign law, science, or art, or to identify handwriting or finger impressions, the opinions of persons who are especially skilled in these fields are to be considered as relevant facts. Such a person is called an expert witness. An expert of the relevant branch of forensic science can be called upon to give evidence under this section. Further, it is sections 45 to 51 which talk of the relevancy of opinions of experts.

In *Malay Kumar Ganguly* v *Sukumar Mukherjee*[vi], the Hon’ble Supreme Court held:

“expert opinion can be admitted or denied. Whether such evidence could be admitted or how much weight should be given thereto, lies within the domain of the court. The evidence of an expert should be interpreted like any other evidence.”

In *State of Maharashtra* v. *Damu Gopinath Shind*e[vii], the apex court held:

“without the examination of the expert as a witness, reliance cannot be placed on the expert evidence.”

In *Vijay* v *State*[viii], the Delhi High Court held:

**“**FSL report is only a corroborative piece of evidence and merely because it does not corroborate the testimony of the victim would not, in any manner, render the testimony of the witness, which is otherwise reliable, as unreliable or liable to be discarded. The Draft National Policy on Criminal Justice has proposed an amendment to the Evidence Act to make scientific evidence admissible as substantive evidence.”

Section 73 of this Act gives Courts the power to compare signatures, writing, or seal or fingerprints.

Section 53 of CrPC provides that an accused may be examined upon arrest if there are reasonable grounds for believing that such examination will afford evidence as to the commission of an offence. Section 53A of CrPC was inserted by the 2005 Amendment Act. It expanded the scope of examination of an arrested person. It provides for the examination of an accused upon arrest if he is arrested for committing an offence of rape or an attempt to commit rape and there are reasonable grounds that such an examination will afford evidence as to the commission of such crime.

Similarly, section 164A of CrPC provides for the medical examination of the victim of rape within 24 hours of receiving the information as to the commission of such an offence.

**Role of Forensic Science in Crime Detection**

Forensic Science has become an essential part of the judicial system. It has a highly critical but often underrated role.

From fingerprints and blood splatter to DNA samples and injuries along with so much more that is found at a crime scene—everything tells a story and it is forensic science that enables this story to be heard. Without forensic science, it would become extremely difficult to convict criminals and they would roam around scot-free.

Forensic Science may prove the existence of a crime, the perpetrator of a crime, or a connection to the crime through the examination of physical evidence, administration of tests, interpretation of data, clear and concise reporting, and truthful testimony of a forensic scientist. It answers the “who, what, when, where, and how” questions about the crime that was committed. It can be used by the prosecution to prove the guilt of the accused beyond a reasonable doubt on one hand and can also be relied upon by the defense to prove innocence on the other.

In 1892, Francisca Roja of Argentina became the first criminal in the world to be found guilty based on fingerprints. Outside Argentina, the first use of fingerprints in a murder case was in Bengal, India, in May 1898 when a thief called Kangali Charan was charged with murdering his former employee. In 1910, Thomas Jennings became the first American convicted of murder based primarily on fingerprint evidence. The first UK arrest following a DNA match came in 1995.

The notorious serial killer Ted Bundy was brought to justice in part on evidence of bite marks[xvi]. In 1987, after a serial rapist terrorized 23 women in Orlando, Tommie Lee Andrews was caught by two fingerprints left on a victim’s window, identification by a victim in a lineup, and with the same blood type left at each scene. Illinois Governor George Ryan applied DNA testing to death row inmates in 1998 and found 13 of the 25 could be exonerated by the results.

In 2010, Matt Baker, a Baptist preacher, was convicted of the murder of his wife[xix]. Initially ruled as a suicide, the real crime came to light after the analysis of Baker’s search history. He had searched for “overdosing on sleeping pills” and had also visited several pharmaceutical websites prior to the wife’s death.

The suicide bomber responsible for the assassination of former Prime Minister Rajiv Gandhi was identified through DNA analysis of the skull and charred muscle found at the scene. In the Nithari case, hundreds of bones and skeletal remains were examined, followed by the psycho-analysis tests of the accused to establish a detailed picture of the gory crime. In the absence of eyewitnesses, forensic evidence helped crack the sensational Neeraj Grover murder case. The half-burnt and decomposed skeletal remains found in a forest near the Raigad district were identified to be of Sheena Bora through DNA analysis. Forensic science played a vital role in solving the Kotkhai gang rape and murder case that shook India in 2017.

**Judicial Decisions in India**

In *Neelam* v *State of Haryana*, the petitioner was aggrieved due to an improper investigation and had thus filed this petition under section 482 of CrPC. The Punjab & Haryana High Court observed that the investigation was completed, alleged allegations were not proved and hence, a cancellation report was also filed. The Court also observed that the FIR was registered under section 306 of IPC without considering the report of Forensic Science Laboratory. The Court held that such an investigation cannot be called fair and thereby transferred the case to SIT in the interest of justice.

In Parvesh v State, two of the accused-appellants were arrested on the basis of witness statements while the third surrendered violently. It was him who directed the police towards the murder weapon. The Delhi High Court relied upon the FSL report which confirmed that the blood found on the murder weapon as well as the clothes of the accused was human blood with the same blood group as that of the deceased, and thus, dismissed the appeals filed by the accused.

In *State (NCT of Delhi)* v *Manish*[xxvii], the State had filed an appeal against the acquittal of accused by the trial court. In this case, the Delhi High Court found the testimony of the Prosecutrix to be inconsistent, exaggerated and full of improvements and concealments. The Court further found that her testimony was also not supported by any medical evidence or FSL report. The Court, therefore, dismissed the appeal.

**Conclusion**

There is no doubt in stating the fact that the advent of forensic science has revolutionized the manner of detecting crime. Investigative procedures have seen a change over the course of the past two decades due to the constantly developing technologies used as a part of forensic science. It plays a major role in the justice system as it is majorly due to forensic science that crimes and criminals are identified. Since, it is a developing study and requires a lot of education, skills as well as experience, the Courts have often viewed forensic science as not being enough or completely reliable. Nevertheless, its role in getting convictions cannot be denied.