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FORENSIC SCIENCE IN THE ADMINISTRATION OF CRIMINAL JUSTICE

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ABSTRACT

Forensic science plays a crucial role in the administration of criminal justice by providing scientific methods and techniques to investigate crimes, analyze evidence, and aid in the resolution of criminal cases. This research paper explores the multifaceted aspects of forensic science in the context of the administration of criminal justice. It examines the historical evolution, current practices, and emerging trends in the field of forensic science, with a focus on its application in criminal investigation, evidence analysis, and courtroom proceedings. The paper highlights the importance of forensic science in the investigation process, including the collection, preservation, and analysis of physical evidence from crime scenes. It discusses various forensic disciplines, such as DNA analysis, fingerprint analysis, their contributions to criminal investigations. Overall, this research paper provides an overview of the critical role of forensic science in the administration of criminal justice, its challenges and limitations, and future trends. It emphasizes the need for continued research, standardization, and interdisciplinary collaboration to enhance the effectiveness and reliability of forensic science in the criminal justice system.

Keywords: Evidence, criminal trial, Standard protocol, judges, consent

I. INTRODUCTION

A crucial component of the criminal justice system is forensic science. Its primary focus is on the examination of physical and scientific hints found at crime scenes. The distinctiveness

of the crime's perpetrator is discussed in forensic science. The nature (what) of the offense is unambiguously defined by the evidence. The hour of the incident is also discussed in the circumstantial evidence. The forensic evidence identifies the crime scene and the location of the crime. A government agency like the police, CID, CBI, etc. that enforces civil and criminal laws uses forensic science to do so. within the framework of a system of criminal justice. Applying scientific methodology and knowledge to legal challenges is the focus of forensic science." Forensics" is a term derived from the Latin word "forenses," which means "forum."

The preservation, collection, and analysis of evidence that can be used to prosecute an offender in a criminal court are all topics covered by forensic science. The use of forensic science in the criminal justice system in India thus paints a clear picture. In the legal and justice systems, forensic science plays a significant role.

For evidence in criminal prosecutions. This is because there is less space for injustice and bias when scientific procedures and methodologies are used. It requires the use of several academic fields, including chemistry, physics, computer science, biology, and engineering, for the examination of the evidence. For instance, physics is utilized to interpret the pattern of a blood splatter, chemistry is used to interpret the chemical makeup of narcotics, and biology is used to ascertain the origin of an unidentified suspect. In a trial or investigation of a case, forensic science is a branch of law that assists in



analyzing various features such as DNA, fingerprints, blood samples, chemical and toxin tests, and so forth.

Additionally, forensic evidence is used to link crimes that are thought to be connected. For instance, DNA evidence might clear the guilty or link a culprit to a number of crimes or crime locations. Additionally, forensic evidence helps to link incidents, supports law enforcement personnel in reducing the number of potential suspects, and establishes crime patterns that can be used to track down and convict offenders.

The civil and criminal judicial systems benefit from computer forensics' assistance in assuring the reliability of digital evidence presented in court cases. Digital evidence, along with the forensic technique used to collect, store, and analyze it, has become more crucial in resolving crimes and other legal issues as computers and other data-collection tools become more prevalent in all spheres of life. Most of the data that current devices gather is never visible to the average individual. For instance, computers in cars continuously record information about whether a driver brakes, shifts, or alters their speed without realizing it. Computer forensics is routinely used to locate and preserve this information since it can be essential in concluding a legal case or solving a crime. With the aid of physical evidence analysis and the identification of offenders using personal clues like fingerprints, footprints, blood or hair evidence, cell phones or other technology, vehicles, and weapons, forensic science plays a significant role in the criminal justice system.

II. TYPES OF FORENSIC SCIENCE IN PRACTICE

The criminal court system in India uses a variety of forensic methods, including DNA analysis, NARCO, and brain mapping. DNA testing has been applied in situations where the issue of succession in property problems arises.

NARCO-ANALYSIS TEST-An unconscious state brought on by drugs is called narcosis. A

technique called narco-analysis involves injecting a patient with drugs to make them sleepy or sleepy-headed, and then questioning them while they are unconscious. A witness' memory has been improved using this technique.

FINGERPRINTING-Criminal investigators have employed fingerprints as one of the most important pieces of evidence. On their fingertips, humans are born with a distinctive pattern of ridges. The ridges provide a well-established pattern for life because they are packed tightly with sweat pores.

DNA PROFILING-One of the most reliable methods of forensic scientific investigation is DNA profiling. DNA stands for "Deoxyribose Nucleic Acid," an organic molecule that is present in every living cell and is responsible for carrying out an individual's genetic code. DNA can be extracted from many different materials, such as blood, sperm, bone, saliva, and more. DNA was initially discovered by Fredrick Micscher in 1869.

POLYGRAPH TEST- The word "Polygraph" relates to a method of documenting psychological processes and meaning "many writings." The essential premise is that when someone lies, he becomes nervous, which causes excitation in the mind. Adrenalin, which controls blood pressure, heart rate, and breathing after it enters the bloodstream, is secreted by the adrenal glands in an effort to disguise the excitement. A polygram is a document that documents psychological developments. To ascertain whether the suspect experienced emotional stress as a result of the questions asked during the lie detection exam, they are analyzed.

III. LEGITIMACY OF FORENSIC SCIENCE

Article 20(3) of the Indian Constitution¹ states that "No person accused of any offence shall be compelled to be a witness against himself." This provision, commonly known as the right against

¹ The Constitution of India, art. 20 cl. 3



self-incrimination, protects individuals from being compelled to provide evidence that may incriminate themselves. In light of this constitutional provision, the legitimacy of forensic science in criminal courts in India can be examined from the perspective of how it relates to the right against self-incrimination.

Forensic science, as a scientific discipline, involves the analysis of physical evidence collected from crime scenes or individuals, and its findings are often used as evidence in court to establish facts related to a crime. The use of forensic evidence in court proceedings, including DNA analysis, fingerprint analysis, ballistics, and other types of forensic analysis, can raise questions regarding the admissibility and legitimacy of such evidence in light of Article 20(3).

In general, forensic evidence is considered legitimate in criminal courts in India, as it is based on scientific principles and subject to rigorous testing and verification. However, there are certain considerations related to Article 20(3) that need to be taken into account:

Compelled Evidence: Forensic evidence that is obtained from an accused person through compulsion, such as coerced confessions or involuntary extraction of bodily samples, would be in violation of Article 20(3) and would not be considered legitimate in court.

Voluntary Consent: If an accused person voluntarily provides forensic evidence, such as providing a blood sample or fingerprints, without any compulsion, then such evidence is generally considered legitimate and admissible in court.

Right to Silence: The right against self-incrimination also includes the right to remain silent and not provide evidence that may incriminate oneself. Therefore, an accused person cannot be compelled to provide forensic evidence if it would go against their right to remain silent.

Safeguards and Due Process: It is important to ensure that forensic evidence is obtained, preserved, analyzed, and presented in court in accordance with established legal procedures and due process, protecting the rights of the accused and ensuring fairness in the criminal justice system.

Expert Testimony: The testimony of forensic experts in court is subject to cross-examination and scrutiny, and the reliability and credibility of forensic evidence can be challenged by the defense, as part of the adversarial legal process.

Interpretation of Evidence: The interpretation of forensic evidence is a complex process, and different experts may arrive at different conclusions. It is important for courts to carefully consider the probative value and limitations of forensic evidence, and not solely rely on it without considering other corroborating evidence.

In summary, forensic science is generally considered legitimate in criminal courts in India, but it must be obtained and used in accordance with the principles of fairness, due process, and protection of the accused's rights, including the right against self-incrimination as enshrined in Article 20(3) of the Indian Constitution. It is important for courts to exercise caution and critically evaluate the admissibility and reliability of forensic evidence, considering the specific circumstances of each case and upholding the constitutional rights of the accused.

The Aarushi Talwar case, also known as the Noida double murder case, was a high-profile murder case in India that involved the murder of a 14-year-old girl, Aarushi Talwar, and her family's domestic help, Hemraj, in 2008. The case garnered widespread attention and highlighted various issues related to forensic science and the right against self-incrimination as enshrined in Article 20(3) of the Indian Constitution.



One of the key aspects of the Aarushi Talwar case² was the reliance on forensic evidence, particularly DNA analysis, in establishing the guilt or innocence of the accused. The prosecution had presented forensic evidence, including DNA samples collected from the crime scene, to link the accused, Aarushi's parents, to the murder. However, the defense had contested the admissibility and reliability of the forensic evidence, raising concerns about the methodology, preservation, and interpretation of the evidence. The case raised questions about the legitimacy of forensic science in the Indian criminal justice system, and its compatibility with the right against self-incrimination. The accused, Aarushi's parents, argued that they were being compelled to provide self-incriminating evidence through DNA samples, which was in violation of their right against self-incrimination as guaranteed by Article 20(3) of the Indian Constitution. The defense contended that the DNA samples were obtained from the accused under compulsion, without their voluntary consent, and thus should not be considered legitimate evidence.

The Aarushi Talwar case brought to the fore the need for stringent safeguards and due process in the collection, preservation, and analysis of forensic evidence. The court had to carefully consider the admissibility and reliability of the forensic evidence in light of the accused's right against self-incrimination. The defense's arguments regarding compulsion and violation of the right against self-incrimination were taken into consideration, and the court had to assess the credibility and probative value of the forensic evidence in light of these concerns.

Ultimately, in 2017, the accused were acquitted by the High Court, citing that the prosecution had failed to prove their guilt beyond reasonable doubt, and highlighting the limitations and inconsistencies in the forensic evidence presented.

The Aarushi Talwar case underscores the importance of upholding the legitimacy of forensic science in criminal courts in India while also safeguarding the constitutional rights of the accused, including the right against self-incrimination. It highlights the need for adherence to established legal procedures, due process, and scientific rigor in the collection, preservation, analysis, and interpretation of forensic evidence. It also underscores the importance of expert testimony, cross-examination, and critical evaluation of forensic evidence in court, to ensure fairness and justice in criminal proceedings. The case serves as a reminder of the complexities and challenges involved in the interplay between forensic science and constitutional rights in the Indian criminal justice system.

IV. EVIDENTIARY VALUE OF FORENSIC SCIENCE IN INDIAN COURT

The evidentiary value of forensic science in criminal courts in India can be significant, as forensic evidence can serve as crucial and compelling evidence in criminal cases. Forensic evidence can provide objective and scientific support to establish facts, reconstruct events, identify perpetrators, link suspects to crime scenes, and corroborate or refute witness testimony. The evidentiary value of forensic science in criminal courts in India can be summarized as follows:

Establishing Facts: Forensic evidence, such as fingerprints, DNA, ballistics, and trace evidence, can help establish facts in criminal cases. For example, fingerprints recovered from a crime scene or a weapon can be matched to fingerprints of suspects, establishing their presence at the crime scene or their connection to the weapon. DNA analysis can establish the identity of a suspect or victim, link them to a crime scene or a weapon, and provide information about relationships or physical characteristics. Ballistics analysis can link bullets or cartridge cases to a specific firearm, which can be used to establish the weapon used in a crime.

² Dr. (Smt.) Nupur Talwar vs State Of U.P. , CRIMINAL APPEAL No. - 293 of 2014



Reconstructing Events: Forensic evidence can be used to reconstruct events related to a crime. For example, bloodstain pattern analysis can help determine the origin, direction, and nature of bloodstains, which can be used to reconstruct the sequence of events at a crime scene. Forensic experts can analyze vehicle damage, tire marks, and road debris to reconstruct accidents or hit-and-run cases. Digital forensics can recover and analyze electronic evidence from devices such as computers and smartphones, which can help reconstruct digital activities related to a crime.

Identifying Perpetrators: Forensic evidence can be used to identify perpetrators of a crime. For example, fingerprint or DNA evidence found at a crime scene can be compared to known samples of suspects to establish their involvement. Tool marks, shoe prints, or tire tracks recovered from a crime scene can be compared to tools or footwear of suspects to establish a match. Facial recognition and other biometric technologies can be used to identify suspects from surveillance footage or other images.

Corroborating or Refuting Witness Testimony: Forensic evidence can corroborate or refute witness testimony in criminal cases. For example, a forensic expert can provide scientific analysis of physical evidence that supports or contradicts the testimony of witnesses. Forensic evidence can provide objective and scientific support to establish the credibility and reliability of witnesses, or identify inconsistencies or contradictions in their testimony.

Linking Suspects to Crime Scenes or Victims: Forensic evidence can link suspects to crime scenes or victims, providing important circumstantial evidence in criminal cases. For example, DNA or fingerprint evidence recovered from a crime scene can be linked to a suspect, establishing their presence at the scene. Forensic evidence can also be used to link suspects to victims, such as DNA evidence recovered from a victim's body or belongings.

It's important to note that the evidentiary value of forensic science in criminal courts in India depends on the accuracy, reliability, and admissibility of the forensic evidence, as well as the proper handling, preservation, analysis, and interpretation of such evidence in accordance with scientific principles, standardized protocols, and legal requirements. When presented and evaluated appropriately, forensic evidence can be a powerful tool in establishing guilt or innocence in criminal cases in India.

V. LIMITATIONS TO FORENSIC SCIENCE IN INDIA

Forensic science plays a crucial role in criminal investigations and court proceedings in India. However, there are several limitations to the application of forensic science in criminal courts in India, which include:

Lack of Standardization: One of the major limitations of forensic science in India is the lack of standardization in forensic procedures, protocols, and practices. There is a lack of standardized guidelines and protocols for forensic investigations, leading to inconsistency and variability in forensic evidence collection, preservation, analysis, and interpretation. This can result in unreliable and inconsistent forensic findings, which can impact the integrity of forensic evidence presented in court.

Limited Resources and Infrastructure: Forensic laboratories in India often face challenges in terms of limited resources and infrastructure. Many forensic laboratories lack modern equipment, technology, and trained personnel, which can hinder the accurate analysis and interpretation of forensic evidence. The backlog of cases in forensic laboratories is also a common issue, leading to delays in forensic reports and court proceedings.

Quality Control and Accreditation: Accreditation and quality control of forensic laboratories are essential for ensuring the reliability and accuracy of forensic evidence. However, not all forensic laboratories in India are accredited, and there is a lack of stringent quality control



measures. This can result in errors, contamination, and tampering of forensic evidence, which can impact its admissibility and reliability in court.

Lack of Specialization: Forensic science covers various disciplines such as DNA analysis, fingerprint examination, ballistics, toxicology, etc. However, there is a lack of specialization in many forensic laboratories in India. Some laboratories may not have the necessary expertise or specialization in certain forensic disciplines, leading to subpar analysis and interpretation of evidence.

Admissibility Challenges: Forensic evidence in India is subject to the Indian Evidence Act, which has strict admissibility requirements. The courts may have challenges in understanding the scientific complexities of forensic evidence and may question its reliability, leading to challenges in the admissibility of forensic evidence in court.

Human Error and Bias: Like any scientific process, forensic analysis is not immune to human error and bias. Forensic experts may make mistakes during evidence collection, analysis, and interpretation, leading to inaccurate results. Additionally, human bias can impact the objectivity and impartiality of forensic analysis, leading to potential miscarriage of justice.

Lack of Continuing Education and Training: Continuous education and training are essential for forensic experts to keep up with the latest advancements in forensic science. However, there is a lack of regular and standardized continuing education and training programs for forensic experts in India, which can impact the quality and reliability of forensic evidence presented in court.

Legal and Ethical Challenges: Forensic science in India also faces legal and ethical challenges, such as the admissibility of new and emerging forensic technologies, privacy concerns in DNA profiling, ethical issues in the use of forensic evidence, and challenges in dealing with

juveniles and vulnerable populations in forensic investigations.

In conclusion, while forensic science plays a crucial role in criminal courts in India, there are several limitations that need to be addressed to ensure the accurate and reliable application of forensic evidence in court proceedings. Standardization, resource allocation, accreditation, specialization, admissibility, human error and bias, continuing education, and legal and ethical challenges are some of the key areas that require attention for improving the application of forensic science in criminal courts in India.

VI. SUGGESTIONS AND REFORMS-

Forensic science plays a crucial role in criminal courts in India, providing scientific analysis and evidence that can aid in solving crimes and delivering justice. However, there are several areas where improvements can be made to enhance the effectiveness and reliability of forensic science in criminal courts in India. Here are some suggestions:

Standardization and Accreditation: Establishing standardized protocols and procedures for forensic analysis across all forensic laboratories in India, along with accreditation processes to ensure their compliance, can help improve the consistency and reliability of forensic evidence presented in court.

Quality Assurance: Implementing robust quality assurance programs in forensic laboratories, including proficiency testing, inter-laboratory comparisons, and regular audits, can ensure that the results of forensic analyses are accurate and reliable.

Training and Education: Enhancing the training and education of forensic scientists, investigators, and legal professionals involved in the criminal justice system can improve their understanding of forensic evidence, its limitations, and its interpretation, leading to better utilization of forensic science in court proceedings. **Research and Development:**



Encouraging research and development in forensic science, including new technologies and techniques, can help advance the field and enhance the capabilities of forensic laboratories in India.

Admissibility and Interpretation: Developing clear guidelines for the admissibility and interpretation of forensic evidence in court, including expert testimony, can prevent misinterpretation or misuse of forensic science in legal proceedings. **Preservation and Collection of Evidence:** Ensuring proper preservation and collection of forensic evidence at crime scenes, including proper chain of custody procedures, can prevent contamination or tampering of evidence, leading to more reliable results in court.

Collaboration and Interdisciplinary Approach: Promoting collaboration and an interdisciplinary approach among forensic scientists, investigators, and legal professionals can lead to a more comprehensive and holistic use of forensic science in criminal court proceedings, considering the multiple facets of forensic evidence. **Capacity Building:** Investing in infrastructure, technology, and resources to build the capacity of forensic laboratories in India, including adequate staffing, equipment, and facilities, can enhance their efficiency and effectiveness in providing timely and accurate forensic analysis.

Ethical Considerations: Ensuring that forensic scientists adhere to strict ethical standards, including impartiality, objectivity, and integrity, can maintain the credibility and reliability of forensic evidence presented in court. **Continued Professional Development:** Encouraging continued professional development of forensic scientists through ongoing training, workshops, and certifications can ensure that they stay updated with the latest advancements in forensic science and apply best practices in their work. Implementing these suggestions can contribute to the improvement of the scenario of forensic science in criminal courts in India,

leading to more reliable and scientifically sound outcomes in criminal cases.

VII. CONCLUSION

Criminal investigations and trials in India have relied heavily on technology. The Committees on Criminal Justice Reform have emphasized how crime detection technologies may make the system function more effectively. Regular changes to the relevant laws have made it possible to apply forensic technologies in crime investigation and prosecution. One could counter that there are flaws in the laws that need to be fixed. The development of technology has given criminal investigations around the world access to a useful and precise tool. Currently, forensic science is essential to both the detection and prevention of crime. Fair justice is the fundamental concept of the criminal justice system. Clearly, forensic evidence is more reliable than eyewitness testimony. Forensic science, as a form of scientific evidence, is advantageous to the criminal justice system

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