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Applicability of Forensic Science in Criminal Justice System in India With Special Emphasis on Crime Scene Investigation

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ABSTRACT

Presently, the rapid pace of scientific advancement includes forensic science, which utilizes scientific methods to provide impartial, corroborating evidence. Consequently, an increasing amount of complex research data is emerging, often becoming unintelligible to non-scientists. Forensic science, an overarching term, encompasses various scientific fields and addresses numerous healthcare issues. It amalgamates common sense, practical application, and insights from medical, obstetric, and operational domains. Notably, the past 25 years have witnessed significant progress in forensic science, exemplified by developments such as DNA typing, physical evidence databases, and related scientific instruments. Despite these advancements, many police investigations forego forensic procedures due to insufficient funding.

A few more comprehensive studies into DNA testing, its expenses, and its impact on the resolution of unsolved crimes and small-time theft have been conducted, but none that look at the entire range of physical evidence and the criminal justice system. The detective may be able to ascertain how a law was broken with the aid of the evidence analysis. This research aims to explore how criminology is applied in criminal investigations and how important it is to upholding law and order in a community.

Moreover, researchers have also discussed certain methodologies that are devised within a framework that facilitates a comprehensive understanding of how a particular type of evidence can significantly contribute to various aspects of a case. Instead of limiting it to a narrow, reactive process, this approach aims to provide a contextualized and evaluative report of forensic science data relevant to the case. It enables the consideration and proper evaluation of alternative scenarios, thereby enhancing problem-solving capabilities. The role that digital forensics plays as a bridge between medico-legal researchers is also covered in this study.

KEYWORDS: - Justice, medical jurisprudence, forensic science, and criminal investigation.

INTRODUCTION

Sometimes it is referred to as scientific, judicial, or state philosophy, or medical jurisprudence. Healthcare may be defined as the field that teaches how every context of healthcare science can be used to the goal of law; as such, its boundaries are the requirements of the law on the one hand and the entirety of health on the other. Disciplines include anatomy, physiology, medicine, surgery, and chemistry. In certain cases, all of these academic disciplines are required to enable a court of law to render an accurate decision on a disputed issue impacting persons or property, with the assistance of chemistry and botany.[1]

While terms like medical philosophy, forensic pharmacy, and legal medicines are commonly used to describe the field of medicine that applies medical expertise and concepts to legal matters, they carry multiple interpretations. Medical jurisprudence encompasses various aspects concerning individuals' civil or social rights, including instances of bodily harm, thereby intertwining healthcare professionals with legal frameworks. Forensic technology primarily concerns the utilization of scientific knowledge in legal contexts, whereas scientific adjudication deals with the legal aspects of healthcare. In essence, forensic science is a broad term encompassing the application of technology to legal regulations governing crime, overseen by authorities and prosecutors.

The term "state medicine," coined in 1949 by Dr. Stanford Emersion Chaille, is widely denounced worldwide. In the USA and Europe, the term "legal medication" is frequently used. Nonetheless, the term "forensic medicine" is widely used in many nations across the world.[2] Many people in the UK believe that Andrew Duncan (1744–1828), a scholar of the Academy of Sciences at the University of Edinburgh, is the originator of forensic prescription medicine. He succeeded in convincing the authorities to establish a regis chair in medical jurisprudence and healthcare officers in 1806. Duncan discussed how forensic sciences are used widely in society:

"….to deal with the distribution of economic justice when a person's reputation, wealth, or life are at stake; to shield the tarnished integrity from the fire of false allegations or malicious defamation".[3]

[1] The first paragraph of Alfred Swayne Taylor's Principles and Practice of Medical Jurisprudence, first published in 1865. (Medical jurisprudence was term favoured over forensic Medicine in 19th century. The former term reflecting more accurately the subjects perceived subservience to the needs of the law)
[2] HWV Cox, Medical Jurisprudence, seventh edn, 2002, p 3
[3] Duncan A, Heads of Lectures on Medical Jurisprudence and Forensic Medicine, 1801, p 177.

Duncan discussed the primary uses of forensic science. Among the illicit uses were rape, abortion, stillbirth, and murder. The following are the other two sections:

1. Mental state: depression idiotism, insanity
2. Pregnancy: disguised, fictitious
3. Removal: hidden, faked, delayed, preterm
4. The eldest child of twins
5. Disorders that are disguised, feigned, or assumed
6. Maturity level and anticipated lifespan

UNDERSTANDING THE DEFINITION

Forensic science, commonly referred to as forensics, is the integration of multiple disciplines to tackle legal challenges, whether in criminal or civil contexts. Beyond its legal significance, forensics encompasses established academic and investigative techniques used to ascertain the truth of incidents, objects, or bodies. This notion aligns with validation principles, extending beyond legal frameworks to confirm authenticity or accuracy. The term "forensic" originates from the Latin word "forensis," meaning "of or among the court." Bridging law and medicine, forensic science addresses issues that serve as a nexus for scholars and legal practitioners alike.[4] Peter White has provided two definitions of the term "forensic science," one more restrictive than the other. Court proceedings in the widest sense, social and environmental protections, physical condition and safety at work, and legal claims like negligence and breach of contract are all included in this broad term. Conversely, the term is commonly used to describe how law enforcement authorities used science to investigate a case and gather evidence to settle it in a subsequent trial.[5]

According to the U.S. Department of Energy's Midwest Forensics Resource Center, forensic science is "scientific study which is the use of inherent sciences to the methods of regulation." Practically speaking, the principles and methodologies of the study of legal science are derived from those of physical science, science, and other scientific fields. "

According to the California Criminalistics Institute, forensic science is:[6]

[4] Deepak Ratan & Mohd.H. Zaidi, Applications of Forensic Science in India And World (Alia Law Agency, Allahabad, edn. 2008), page 28
[5] Peter White (ed.), Crime Scene to Court the Essential of Forensic Science (RSC Publication, Cambridge), 1998
[6] Nayan Joshi, Medical Jurisprudence and Toxicology (Kamal Publishers, New Delhi, 2008), P.23

"The application of basic science methods and techniques to valid problems is known as forensic science. Scientific Science is a very broad branch of research. It includes Crime Laboratory Scientists, also referred to as Forensic Scientists or, more accurately, Criminalists, who work with real evidence acquired at crime scenes."

The application of natural sciences to legal matters is referred to as forensic science. Forensic science involves several technical techniques and processes from fields like as chemistry, biology, physics, and others. Physical evidence must be found, identified, evaluated, and personally expressed in order to support criminal justice administration. It is one of the most dynamic, expressive, cutting-edge, and fascinating fields of study used to identify crimes and occurrences.

NATURE OF FORENSIC SCIENCE

Not the academic fields per such, but practically every scientific field is touched by forensic medicine and used for legal purposes. At first, all of the methods were taken from other scientific fields, but forensic medicine is currently changing and becoming its own field. Additionally, it has grown into a number of sectors that are essentially in the forensic industry. Forensic medicine is primarily the exclusive domain for the study of fingerprints, anthropometry, traces, documents (particularly handwritten exams), and forensic ballistics. Research on digital photography, voice analysis, olfactory analysis and pattern recognition, serology, and olfactory analysis has made forensic medicine a more popular field. The DNA profile is the most significant invention of the 20th century for identifying individuals. Thanks to developments in this field, plants and animals are now also using this technology. Multidisciplinary and multiprofessional medicine are the two primary pillars of forensic medicine.

For the appropriate distribution of law through the use of forensic science, the forensic experts must rely on the national bureau of investigation on one side and the representing counsel and the court on the other. The investigation team must be an expert in the area of gathering evidence. To link the experimental conclusions with the entirety of the data, the court and attorneys must also have a solid comprehension of the science. The technology is comprehensive, which is the second distinctive quality, necessitating the establishment of complete Forensic Science Laboratories with specialists in all disciplines, technology for all disciplines, extensive databases, and other necessary amenities.

UNDERSTANDING FORENSIC SCIENCE

Because forensic science is such a vast and advanced area, it is now an effective workhorse in the court system. The current state of criminal arrest and trial procedures in India is appalling. In India, the overwhelming amount of trials end in mistrials. Formal and informal statistics are available. Theoretically, it's about 90%, but the informal figure is far greater. In India, crime investigation and trial are insufficient. Even in the most horrific crimes, a substantial fraction of criminals goes unpunished, and only a tiny majority of individuals result in acquittal, leading in a growth in the number of criminals and crimes. These frequent exonerations are mostly the consequence of outmoded investigating procedures that disclose several doubts. Thus, professional academic procedures are essential for meaningful enquiry.[7]

The aforementioned causes have contributed to the necessity for the power of scientific in the propagation of criminal justice:

1. **Societal Vagaries-** The times are rapidly and drastically changing. India has witnessed a significant metamorphosis, evolving from an imperialist empire to a contemporary democracy. Better transportation is only one of the many facets of society that have been impacted by technology. Still, this invention has impacted terrible people as much as it has inspired good ones. Communications networks, which on the one hand help the intelligence community, have also benefited dishonest minds. It would be easy for a terrorist group with US headquarters to mentor members or students in India.
2. **Obscurity -** The shift in accessibility strategies and the sociological milieu from a village to an urban setting let the offender flee from impending capture (and punishment) after the crime. Utilizing improved capacities, the criminal may conceal oneself in any part of the city or fold away huge distances away from the location where the crime was done in a brief span of time.

   Today's culture is unconcerned with the truth of what is going on in his neighbourhood. Aristotle thought man to be a sociable animal, but he has become a self-centred individual. He doesn't even recognize his next-door neighbour, which is common in areas. Thus, if a neighbour is murdered, the killers brought to fruition only after the remains rot and generate a terrible odour.

[7] Satyendra. K.Kaul and M.H.Zaidi, Narco Analysis, Lie Detector, Narco Analysis, Brain Mapping, Hypnosis Tests In Interrogation Of suspects,(Alia Law Agency, Allahabad, 2008), pg 1.

3. **Technical Knowledge-** As a customary man's expert mastery has improved, so have the method for carrying out wrongdoing, and to fight these refined procedures of perpetrating wrongdoing, the strategies and philosophy of combatting a similar wrongdoing must likewise be cleaned and refreshed.
4. **Broad Scope-** The sphere of activity of criminal law is rapidly expanding. Traditionally, the offense and offender were local, and he typically utilized age-old techniques to perpetrate the crime, but today national and worldwide criminals are frequent. Drug trafficking, financial fraud, and counterfeiting offer a varied and constantly growing industry.
5. **Improved Evidence -** Physical evidence that is accepted by authorities is typically very measurable; for instance, if a fingerprint is found at the scene of a crime, it is assumed to belong to a single person. Assuming that individual is the blamed, he should make sense of his support at the occasion. Similarly, in the event that a gunfire is recovered from a dead individual, it must be followed back to one weapon. Assuming this weapon comes to pass to be the charged, he ought to be expected to take responsibility for its part in the homicide. Such proof is generally provable.

ROLE OF FORENSIC SCIENCE IN CRIME INVESTIGATION

Forensic science plays a vital role within the criminal justice system by analyzing scientific and physical evidence gathered from crime scenes. It aids in identifying the perpetrator of the crime, revealing the nature of the offense, and shedding light on the timing of the incident through circumstantial evidence. Additionally, forensic evidence helps establish the location of the offense and examines the method used by the offender. Ultimately, forensic investigation aims to understand the motive behind the crime, reconstructing both the characteristics of the criminal and the victim[8].

In criminal investigations, evidence is gathered from crime scenes or eyewitnesses, analyzed in laboratories, and presented in court. Every crime scene presents its own set of challenges. Forensic science plays a vital role in the criminal justice system by providing scientifically valid information through the analysis of physical evidence. This evidence assists in identifying perpetrators through personal markers like fingerprints, footprints, bloodstains, and hair, as

[8] N. B. Narejo, M. A. Avais, *Examining the Role of Forensic Science for the Investigative Solution of Crimes*, 252 SURJ (SCIENCE SERIES) Vol. 44(2) 2012.

well as objects such as mobile phones, gadgets, vehicles, and weapons. It establishes connections between criminals and objects found at or taken from the scene, linking them to the victim. Conversely, if the collected evidence fails to link the accused to the victim or the scene, it can demonstrate the accused's innocence. Forensic science also clears innocent individuals. With DNA technology, a modern forensic method, investigating officers gain significant information, enabling them to identify criminals based solely on scientific evidence found at the crime scene.[9]

VARIOUS FIELDS OF FORENSIC SCIENCE

Police prosecutions are supported by various forensic science disciplines. These methods encompass DNA profiling, biometrics, forensic physics, forensic psychiatry, forensic entomology, forensic toxicology, armor, forensic biochemistry, forensic odontology, forensic anthropology, and file analysis.

1. **Forensic Entomology-** The scientific study of insects and other arachnids is known as forensic entomology. In relation to the global climate, it addresses biology, location, changes, and their management. Utilizing data from agricultural and environmental events, it is a broad area with a global network of scholars, researchers, and business people. Generally speaking, forensics is linked to death investigations; nevertheless, it can also be utilized to distinguish and contrast various drug kinds and toxins, explain the circumstances, determine how long a senior or child was irresponsible, and record the frequency and timing of the harm's infliction.

2. **Forensic Toxicology-** The science of toxins, or poisoning, is the study of neurotoxins. Walls categorises toxicity into the following categories:
    1. Clinical Toxicology: Recognizing overdose indications and implementing appropriate treatment procedures.
    2. Chemical Toxicology: detecting toxicity in gastrointestinal samples were washed, blood tests, and so on or in post-mortem materials (if the individual or victim becomes well) (if he dies).

    Toxicology is the study of substances' ability to impede living organisms. A broad spectrum of specializations, including medicolegal death exams that integrate technical technology

[9] Jyotirmoy Adhikary, DNA Technology in Administration of Justice, (LexisNexis, Butterworths, 2007)

with legal context and other competency challenges, are included in the field of forensic toxicity, which helps with the identification and analysis of various drug compounds. The main objectives of these studies are threefold:

a) To ascertain whether the toxicants in question have the potential to cause death.
b) To establish whether the harmful by-products being investigated in toxicology could lead to changes in lifestyle patterns.

3. **Forensic Psychiatry-** Psychiatry is the investigation of mental disease, with direct reference to the cure of psychological illnesses, and Forensic Psychiatry is the use of Psychiatry in the judicial process.[10]

   The phrase "forensic psychology" spread faster in the next several decades than it did prior to the 1980s. In legal circumstances, or other relevant legal surroundings, forensic psychotherapy is best described as the study of individual behavior.[11]

   Forensic pathologists and psychiatrists have taught on a wide range of legal topics, as they handle both criminal and civil concerns. Among other things, the assessment of mental health and the question of ability are the two primary focuses of criminal law. Examine the various ways of thought that led to the ultimate result.[12]

4. **Forensic ballistics** is a branch of forensic science that focuses on the examination of firearm use in criminal activities. Ballistics itself is a field of mechanics concerned with studying the movement, characteristics, and effects of projectiles such as missiles, gunshots, and gravity grenades. It also encompasses the science and art of designing and deploying weapons to achieve specific outcomes.

5. **Documentary Analysis -** The criminological science record division handles a wide range of issues related to middle class violations, such as the analysis of writing style and signs, the identification of counterfeit works, the recognition and visual representation of erased or obliterated works, the interpretation of postal deferment seals, elastic seals, etc.

[10] V.V. Pillay, Textbook of Forensic Medicine & Toxicology (Paras Medical Publisher, 17 edn., 2016), pg100
[11] M. Fanetti, W.O. Donohue, et al, Forensic Child Psychology; Working in Courts And Clinic (John wiley and Sons publications, 2015), page no.3
[12] Psychiatry behaviour in forensic science, available at: www.forensicsciencesociety.org.uk/ (visited on date 29- 11-2015).

Analysing printing, typescripts, fading ink illustrations, examining burnt documents, and determining the relative age and chronology of two converging pen dyes.

6. **Forensic Anthropology-** Anthropology is the study of human beings and human behavior. The study of ethnology is quite vast, with several subfields within it and not just one. This broad field of study has three primary sections.
    1. Osteology for Justice
    2. Forensic Taphonomy
    3. Forensic Archeology

    Osteology is the study of the skeletal system including the whole bone. Archaeology is the meticulous gathering and removal of human remains and other material from crime scenes. Examining anomalies in biological systems both before and after death, including injuries, cell division, and environmental influences, is known as taphonomy.[13]

    Cultural anthropologist is the adaptation of psychology, including all of its subfields, to a legal situation. Forensic anthropologists aids in the authentication of dead persons whose mortal remnants have been decayed, charred, mangled, or otherwise rendered unrecognizable, as in aircraft disasters. Forensic anthropologists are also useful in investigating and documenting mass burials and mass killings.

7. **Forensic Odontology-** The branch of digital forensics known as "forensic orthodontia" uses dental expertise to legal systems. There are times when forensic clinical medicine and judicial dentistry are utilized interchangeably. The field of forensic research involves the examination, assessment, and proper handling of evidence presented in a court of law to serve the interest of justice. An odontologist, also known as a forensic dentist, examines teeth and dental prostheses to determine causation. This type of analysis is commonly applied in cases involving murder victims and disaster scenarios. The expertise from crime scene investigations becomes valuable in situations such as major disasters or when estimations are needed for factors like tooth marks or age.

[13] Stephen P. Nawrochi, An outline of Forensic Science *available at*: archlab.uindy.edu (visited on May 5th, 2024).

8. **Forensic Chemistry-** In most forensic laboratories, the chemistry unit is the main standalone unit (followed by the biologist). Paints and debris are often scooped up as a consequence of automobile wrecks or hit-and-run events. The pharmacist also has the power to examine and compare images, such as tyre and shoe prints, as well as trace evidence, left at the site of the incident, most commonly during the act of unauthorized entrance.[14]

9. **DNA Analysis-** DNA Analysis is one of the greatest important developments in data investigations in recent years. It was originally known as "DNA analysis" or "Geneting Identification." DNA verification has gained widespread acceptance in criminal and legal proceedings due to significant attention generated by high-profile cases, TV crime programs, and movies. The following tasks are associated with DNA analysis:
    - Establishing a biological tie for official reasons, organ transfer, and other purposes
    - Establishing parentage and maternity.
    - Investigation of child exchange instances
    - Rapist recognition in rape cases, especially gang rape situations
    - defined on the basis of disfigured corpses, as in bombings, murders, and major calamities.
    - defined on the basis of wild animals
    - The screening of different microorganisms that might contaminate food, soil, water, or the air.
    - Verification of the product, like wine.

10. **Dactylography or biometric identification:** Galton developed a classification system for biometrics, building on assertions by Henry Faulds and Sir William Hershel in a 1880 publication in Nature. They argued that the method was consistent and unchanging over time. Galton's system categorized biometrics into three main groups: arcs, circles, and fractal patterns.

But he couldn't divide them apart, which was important when dealing with 2500 people. Since 1900, an effective and aesthetically attractive basic categorization system has been in use, and it is ascribed to Edward Henry.

[14] Brian Lane, the Encyclopedia of Forensic Science 5 (BCA Publication, London)

The examination of epidermal grooves and features in the palms and soles is known as the fingerprint method. The soles of the feet can also be treated with this method. Fingerprints recovered from a crime scene or found on items at the scene of a murder can serve to identify the individuals involved, including the perpetrators, victims, and anyone else who had contact with the object.

FORENSIC SCIENCE'S IMPORTANCE IN CONTINUING CASE INVESTIGATION

When it comes to the extent of investigation, especially considering the seriousness of the incident, few resources are more beneficial to criminal prosecutors than the utilization of forensic scientific principles.

In a criminal court, the outcomes of such forensic analysis might be the distinction between innocence and guilt. Forensic science has made significant contributions to criminal probe. It is advantageous to address suspects, casualties, and observers to get the truth. Entrancing, mental recognizable proof of untruthfulness (Lie identification), Narco-investigation, and Brain imaging are instances of neuroscience testing that have changed criminal indictments, saving time, cost, and exertion while creating significantly better discoveries. By making cross examinations more empathetic and acceptable through these logical ways, prestigious third degree processes of addressing—which sometimes turn horrifying—have been eliminated.

The science of criminal examination is a workable field that involves reality evaluation in order to identify, describe, and prove the guilt of an accused criminal. Inquiry, conversations, cross-examinations, document collection, preservation, and many investigative techniques may all be part of a comprehensive criminal investigation.[15]

The ancient science of criminal investigation, dating back to the Code of Hammurabi around 1700 BC, may be considered as the earliest form of such practice. According to this law, both the accuser and the accused were entitled to present their collected evidence. Today, criminal investigations are predominantly conducted by government law enforcement agencies. However, private experts are often hired to aid or conduct investigations in secret. Essentially, criminal investigation is a crucial aspect of law enforcement.

The highly interconnected and organized global society has developed systems to deal with criminals, prevent regulatory violations, and minimize harm to ensure the smooth functioning

[15] Charles E. O'Hara and Gregory L. O'Hara, *Fundamentals of Criminal Investigation* (Sixth Edition, 1994), page 132.

of countries and the well-being of their citizens. The ultimate aim of an effective law enforcement framework is to uphold rules that directly contribute to public safety, enabling people to live and work in a secure and pleasant environment.

Quantifiable science works with criminal assessment in completely various ways and assumes a significant part in maintaining law and order in the overall population. It has turned into a critical piece of criminal examinations and two won't ever be unique.

Evil is essentially as ancient as the person. The term "anomaly," which means "abnormality," has been in human society since Adam's expulsion. The Bible and the Koran provide proof that Adam's offspring committed the primary sins on Earth. As a result, it is possible to argue that sins have been committed in some capacity since prehistoric times and that solutions to these crimes have always existed. All facets of human existence have altered as a result of science and growth, and given the court's and its legal executive's regular operating procedures, this is not an exceptional instance.

Various countries have taken a more permissive approach on research methodology. The fact that no more reason is necessary indicates that these processes can be applied to illegitimate investigations. This scientific study helps to demonstrate a relationship between historical and modern crime, often known as Corpus Delecti, or the body of the offence. Linda Mann, then 15, was assaulted and murdered in the neighbourhood of Ender in 1983. The issue is still pending. Three years later, Don Ashworth, at fifteen, took part in an identical matters. Using DNA "fingerprints" from semen collected from the two victims' collections, police found that the two women were assaulted and killed by the same person. When the older man, then 17 years old, was originally apprehended, a DNA test was performed on his blood. Nevertheless, the lack of a DNA match amply demonstrated the man's innocence and proved it. Subsequently, police asked all ender men between the ages of 13 and 30 for voluntary blood samples for DNA testing.

Orlando, Florida, had a string of rapes and assaults in 1986, marking the first instance of DNA testing being utilized in a national criminal investigation. Crime followed a broad trend. The attacker used a knife to attack the victim's house after midnight. In order to prevent anybody from providing more information about the attacker, the attacker swiftly covered the victim's eyes with a sheet or blanket. Investigators witnessed a blue 1979 Ford going out of the location where they thought a rapist had attacked people in early 1987. After a few distance, the vehicle came into contact with a power tower on a bend.

In the case of Bazari Hajam v. King Emperor, the question arose regarding the reliability of relying solely on flimsy fingerprint evidence to determine the guilt of the accused. Justice Bucknill expressed reservations on this matter, stating: "While I am inclined to feel uneasy about convicting an individual of a serious crime based solely on the comparison of thumbprints or fingerprints, the very act of obtaining a thumb impression from a defendant for the purpose of potentially producing incriminating evidence is sufficient reason to hesitate before convicting, assuming that such proceedings did not constitute a fair trial."[16]

In Public Prosecutor v. Kandasami Thevan, Schwabe, C. J. rejected this viewpoint, but the case took some time to come to light because the allegedly fake documentation included the detainee's thumb impressions in the record in addition to those the justice had obtained in court to verify by touch.[17]

In the case of Pritam Singh v. State of Punjab, it is established that the study of impression recognition is a fundamental science and cannot overly depend on the implications of identification.[18]

The age of the young woman was the real issue in Harpal Singh v. State of H.P.; this age was determined using logical strategies. A similar result from the clinical trials was then supported by school records, which were confirmed by the head administrator, and furthermore by a passage in the birth register.[19]

The case that brought DNA analysis to prominence in the Indian Legal System was the assault and murder of Priyadarshani Matoo. During the trial, crucial evidence relied on DNA analysis of vaginal swabs from the victim, which ultimately yielded positive results, ensuring justice was served. Similarly, DNA testing technology played a vital role in proving that former minister Rajendra Mushahary, associated with the Asom Gana Parishad, had assaulted a woman on two occasions, resulting in her pregnancy, thereby establishing him as the father of the child. This DNA testing also proved crucial in identifying the perpetrator of Rajiv Gandhi's assassination, Dhannu, by examining her remains. Just as after the 9/11 attacks on the World Trade Center in New York, where scientific DNA testing was used to identify the victims' remains, DNA technology continues to play a significant role in various legal proceedings.

[16] AIR 1922 Pat.73:23 Cr. L.J 638.
[17] AIR 1927 Mad. 696: 27 Cr. L. J 1251.
[18] AIR 1956 S.C. 415.
[19] (1999) 8, SLC 679.

Aarushi Talwar murder case (2013) Noida

Aarushi Talwar, aged 14, was found decapitated in her parents' affluent home in Jalwayu Vihar, a prosperous suburb of Noida. The girl's parents were both dentists. Suspicion immediately fell upon Yam Prasad Banjade, a 45-year-old Nepali national who worked as a servant for the family under the name Hemraj. But when it was discovered that her own parents had carried out the murder after her inquiry was completed, it was deemed an honorary murder for her.

HELD BY THE COURT

The comprehensive analysis presented underscores the invaluable role of forensic science in expediting the delivery of justice. Forensic science, a multidisciplinary scientific approach, leverages state-of-the-art medical technologies to address various facets of investigation. It requires skilled professionals adept at collecting blood samples with utmost precision and adhering to meticulous protocols for handling and preserving biomaterials like blood, sperm, saliva, and hair. When executed meticulously, forensic science can significantly contribute to the swift administration of justice in contemporary society. Expert reports from forensic scientists serve to meet society's demand for forensic expertise, especially as criminals employ sophisticated tactics to evade detection. In today's evolving landscape, the relevance of forensic science is ever-growing, with digital forensics playing a pivotal role in resolving intricate criminal cases, including mysterious murders. As forensic science continues to evolve, various fields within digital forensics prove instrumental in detecting, solving, and apprehending criminals. However, the advancement of digital forensics relies on continuous scientific innovation and the expertise of professionals skilled in securely gathering evidence. While DNA analysis is widely utilized in legal proceedings in countries like the United States and Britain, its application in India's legal framework remains limited. The admissibility of DNA testing in court hinges on the meticulous collection, maintenance, and documentation of evidence, ensuring its integrity and continuity from acquisition to verification, a standard upheld to satisfy the court and ensure the reliability of the evidence presented.[20]

[20] Thesis by Sandhya Verma, Emerging Trends in Criminal Investigation and use of Scientific Technologies, thesis, law dept." Aligarh Muslim University, Aligarh, Ph.D, 2015, pg 52

CHALLENGES ENCOUNTERED BY ALLIED SUBSIDIARIES

Law enforcement often faces challenges in modern criminal investigations, largely due to a lack of training in advanced techniques among officers. There's a widely held belief that police rely too heavily on traditional methods, resulting in criticisms of outdated practices. Insufficient scientific knowledge among investigators can lead to mishandling of crime scenes, potentially contaminating vital evidence. Properly collecting, sealing, and forwarding samples to laboratories for examination is crucial for preserving evidentiary value. Thus, the involvement of forensic experts alongside police from the outset of an investigation, along with effective coordination with medical experts, can significantly assist in solving crimes[21].

In India, a major concern revolves around the autonomy and self-governance of forensic laboratories. Both state and central forensic science labs operate under the direct administrative authority of law enforcement bodies. State and Union Territory Forensic Science Laboratories are either directly managed by the respective Home Department or through police establishments. Due to being integrated into the police framework, forensic science institutions lack full independence across all levels. Forensic labs face shortages in manpower and infrastructure. They are often understaffed and lack proper equipment and infrastructure. Additionally, they encounter funding challenges. Furthermore, there is a noticeable lack of coordination between forensic experts and the police force.

The report from the Committee on Draft National Policy on Criminal Justice emphasizes the need to focus on guidance, accreditation, standardization, professionalism, and research and development in forensic science within the policy framework[22].

The Malimath Committee put forth a suggestion to set up more advanced laboratories capable of handling DNA samples and evidence effectively. Furthermore, it suggested the introduction of particular regulations to aid law enforcement in accessing genetic information, emphasizing the importance of maintaining uniform standards and implementing sufficient safeguards to prevent abuse. More recently, the Justice Verma Committee emphasized the importance of properly storing and preserving DNA samples, particularly in cases of sexual assault.[23]

[21] The forensic use of bio-information: ethical issues, Nuffield Council on Bioethics, *available at:* http://nuffieldbioethics.org/wp- content/uploads/The-forensic-use-of-bioinformation-ethicalissues.pdf (last visited on May 4, 2024)
[22] Report of the Committee on Draft National Policy on Criminal Justice, Ministry of Home Affairs, Government of India, July, 2007.
[23] Report of the Committee on Amendments to Criminal Law, 23rd January, 2013.

CONCLUSION

In India, there is an increasing emphasis on integrating technology into criminal investigations and trials. Commissions tasked with reforming criminal justice have emphasized that utilizing technology can improve the efficiency of the system. Laws have been regularly amended to facilitate the use of forensic technologies in investigations and trials. However, it's evident that these laws have flaws that need addressing.

Courts often approach scientific evidence cautiously or hesitate to fully rely on it due to either their cautious nature or the inherent limitations in the evidence presented, which can deter complete trust. The primary objective of the criminal justice system is to ensure fairness in dispensing justice. Undoubtedly, forensic evidence carries more credibility than eyewitness testimony. As a form of scientific evidence, forensic science is a valuable asset to the criminal justice system. However, it's imperative to address the existing shortcomings to advance in this area.

We must learn from past experiences, challenge conventional thinking, bolster our communities, and adapt our culture. This entails collaborative efforts to rectify the scientific deficiencies in current forensic evidence while laying a robust foundation for integrating new innovative technologies into the field of forensic science. Concurrently, it's essential to ensure that law enforcement and investigative agencies fully appreciate and utilize forensic science as an effective problem-solving tool. This may entail employing methodologies such as case assessment and interpretation.

These methodologies are devised within a framework that facilitates a comprehensive understanding of how a particular type of evidence can significantly contribute to various aspects of a case. Instead of limiting it to a narrow, reactive process, this approach aims to provide a contextualized and evaluative report of forensic science data relevant to the case. It enables the consideration and proper evaluation of alternative scenarios, thereby enhancing problem-solving capabilities. This approach, supported by organizations like the Association of Forensic Science Providers, stresses the importance of integrating forensic data into the unique context of each case.