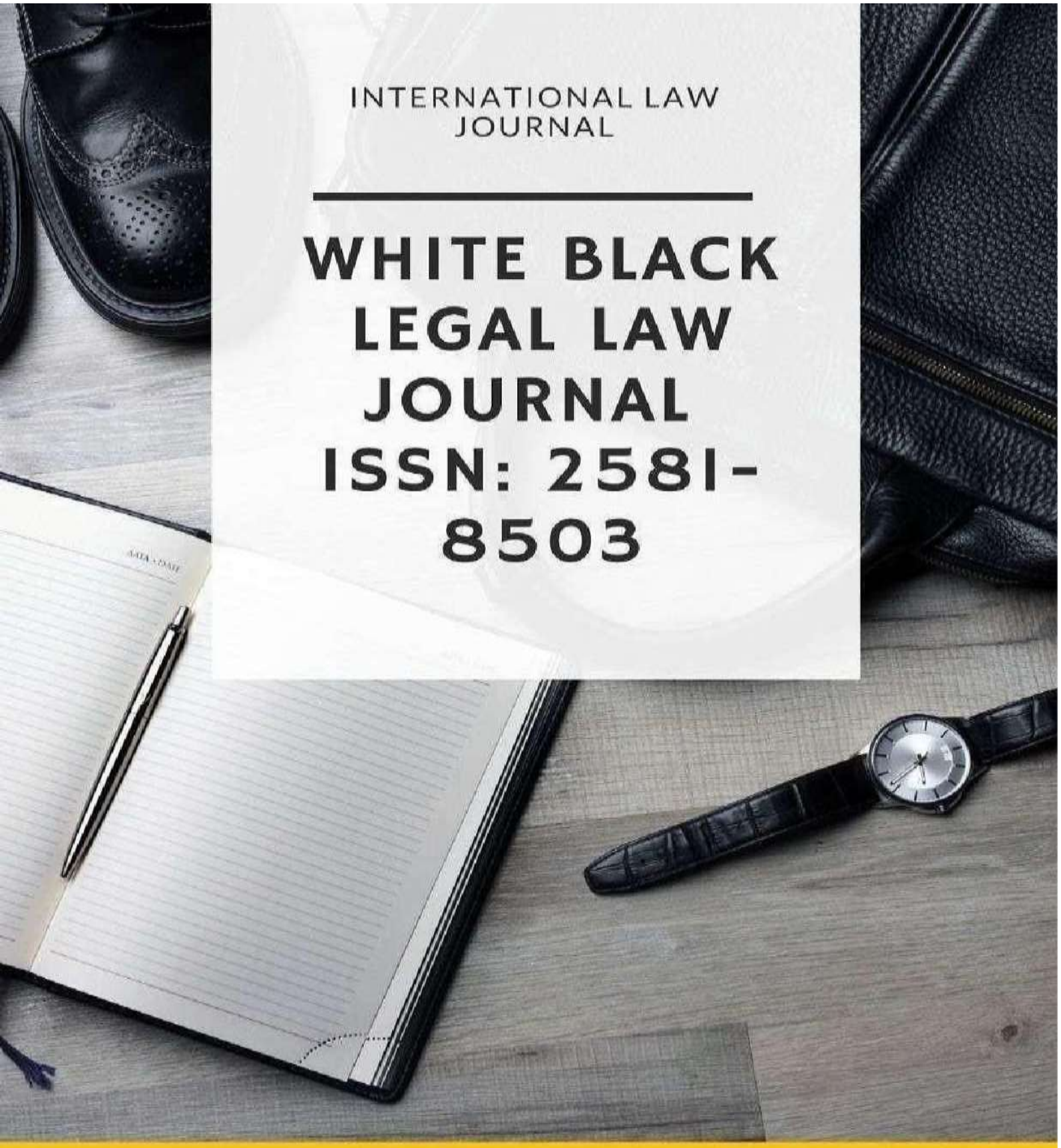

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Subhrajit did his LL.M. in Sports Law, from Nottingham Trent University of United Kingdoms, with international scholarship provided by university; he has also completed another LL.M. in Energy Law from University of Petroleum and Energy Studies, India. He did his B.B.A.LL.B. (Hons.) focussing on International Trade Law.

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ROLE OF DNA EVIDENCE IN CRIMINAL CASES

AUTHORED BY - TOOBA NAWAZ NAQVI

ABSTRACT

The implementation of forensic science tools has resulted in substantial scientific progress in the adjudication of criminal cases. Nevertheless, additional research was required to evaluate the precise influence of forensic evidence on conviction and acquittal rates. Research regarding the influence of forensic evidence, including DNA, ballistics, fingerprints, and toxicology, on criminal decision-making has substantiated the assertion that forensic science provides superior probative value compared to direct evidence in case resolution. In the majority of instances where forensic evidence was utilized, it aided in securing a conviction.

A comparative review of forensic evidence legislation across several nations underscores disparities in the significance and admissibility of such evidence. In the United States, judges are required to assess the relevance, reliability, utility, and appropriateness of expert evidence for the case. The United Kingdom necessitates expert testimony to fulfill the standards of help, pertinent competence, neutrality, and evidential credibility. Germany emphasizes the appropriateness of experts for the pertinent domain, whereas in India, evidence is permissible if it pertains to relevant facts or the facts at issue.

Analyses of criminal case statistics provide valuable insights into the influence of forensic evidence on conviction or acquittal outcomes. DNA evidence is deemed substantive in circumstances like rape or identification from remains, although just corroborative in other criminal categories. It serves a comparable function in paternity and maternity situations. DNA evidence possesses twin attributes: substantive and corroborative. DNA evidence resulted in convictions in 88.16% of criminal cases. In paternity and maternity situations, petitions were granted in 7o.83% of the instances examined.

Conversely, ballistic evidence is predominantly corroborative. In incidents involving firearms or firearm-related injuries, the insights of ballistic experts are essential, especially when both the weapon and the crime cartridge are retrieved. Ballistic evidence contributed to securing convictions in 82% of criminal cases.

Fingerprint evidence, although significant, is typically corroborative and must be acquired in accordance with the Identification of Prisoners Act of 192o. In instances when fingerprint evidence was utilized, convictions were attained in 71% of the cases.

Toxicological evidence also functions as corroborative support. Possession of specific substances constitutes an offense under the Narcotic Drugs and Psychotropic Substances Act of 1985. Nonetheless, if drugs samples are not managed according to established protocols, the evidence loses its significance. Toxicological evidence resulted in convictions in 79% of cases.

The aggregate conviction percentage for the four categories of forensic evidence—DNA, ballistics, fingerprints, and toxicology—was 8o. o4%, thereby corroborating the initial theory.

KEYWORDS

DNA, India, Ballistics, Fingerprints, Toxicology, Evidence, Forensic Science, Forensic Evidence, Witness, Short Tandem Repeats (STR), IPC, Indian Evidence Act, DNA Profiling, CRPC, Constitution of India

INTRODUCTION

His presence, actions, and remnants—regardless of intent—constitute unspoken testimony against him. In addition to his fingerprints and footprints, his hair, garment fibers, shattered glass, tool marks, scratched paint, and whatever blood or semen he may leave or gather—all of these elements serve as silent evidence against him. This evidence is not forgettable. It is not perplexed by the particulars of the case. Physical evidence is infallible, devoid of errors, and cannot be absent. only our understanding may be erroneous. only human error in its discovery, analysis, or comprehension can undermine its worth. — Paul L. Kirk, Doctor of Philosophy Paul L. Kirk's comment succinctly encapsulates the essential tenet of forensic science: the notion that evidence, be it physical or biological, conveys its own narrative. In contrast to human testimony, which may be swayed by prejudices, erroneous recollections, or deliberate falsehoods, physical evidence is objective and immutable.[1] It remains constant, unaffected by events, and does not vanish unless it is obliterated or misplaced. Forensic evidence serves as an unbiased witness, providing critical insights into criminal proceedings. Nonetheless, its genuine potential can only be actualized when accurately detected, evaluated, and comprehended by specialists.

This paper examines the revolutionary impact of forensic science on criminal justice. In recent decades, breakthroughs in forensic technologies have radically transformed the criminal justice system, providing novel instruments for the detection, investigation, and conviction of crime. Technologies such as DNA analysis, ballistic identification, fingerprint matching, and toxicology have created new opportunities for law enforcement and the judiciary, rendering previously unsolvable cases solvable. These advancements have transformed the adjudication of criminal cases, facilitating a more precise and impartial methodology for the investigation and prosecution of crime.

Nonetheless, although these improvements have significantly impacted the field, they have also underscored the necessity for additional research to comprehensively comprehend the specific effects of forensic evidence on conviction and acquittal rates. Demonstrating that forensic science enhances investigative outcomes is one matter; analyzing its specific influence on a suspect's conviction or acquittal is another. Research was essential to investigate the efficacy of various sorts of forensic evidence across different categories of criminal cases. DNA evidence may be essential in cases of sexual assault or homicide, however its applicability in instances of theft or fraud may be less certain.[2] Ballistic evidence is crucial in shooting incidents, although fingerprints may hold diminished relevance in cases of intricate fraud or white-collar crime.

Furthermore, this research necessitated an examination of the treatment and application of forensic evidence by various legal systems globally. Every nation possesses a distinct framework regulating the admissibility of forensic evidence in judicial proceedings. In the United States, courts must ascertain whether expert evidence is both pertinent and credible in a certain case. The emphasis is on guaranteeing that the scientific methodologies employed for evidence collection and analysis are robust. In the United Kingdom, the grounds for admittance are rather broader, requiring experts to exhibit impartiality and pertinent competence. Germany prioritizes the appropriateness of specialists to provide testimony on a particular field of evidence, but in India, evidence is allowed solely if it is considered pertinent to the circumstances at hand.

The primary problem with conventional investigative techniques is their excessive dependence on human testimony, which is often laden with mistakes. Eyewitnesses may misremember events owing to confusion, stress, or a deliberate effort to deceive. Moreover, witnesses may

not attend court for several reasons—fear of retaliation, unwillingness to participate, or even forgetting the trial date. Witnesses, while present, may provide unreliable testimony due to influences from defence or prosecution counsel, as well as their capacity to accurately recall and articulate every detail.[3] Consequently, criminal prosecutions reliant exclusively on witness testimony may be susceptible to inaccuracies, resulting in false convictions or, alternatively, the exoneration of culpable individuals due to insufficient tangible evidence.

In certain extreme instances, no witnesses are present, especially in scenarios where crimes occur under circumstances that preclude observation. Crimes perpetrated in remote locations, during nocturnal hours, or if the offender deliberately seeks to obliterate evidence or obstruct witnesses, provide investigators with no human testimonies to depend upon. In such instances, forensic evidence serves as the sole dependable method for case resolution.

The transition to forensic evidence in criminal cases emphasizes the deficiencies of the conventional eyewitness-based justice system and illustrates the increasing necessity for a more scientifically-oriented approach to investigations. As criminal activities evolve in complexity, the investigative instruments employed must likewise advance. Contemporary criminals frequently employ technology to perpetrate offenses, encompassing cybercrimes like hacking, identity theft, and online fraud, as well as conventional crimes that now utilize technological instruments, such as computer-assisted theft or financial fraud. Contemporary criminal activities cannot be sufficiently examined by conventional approaches. Investigating a cybercrime necessitates the application of cyber forensics to track digital footprints, identify offenders, and retrieve evidence from devices such as computers, phones, or servers.

With technological advancements, criminals are progressively using it to perpetrate offenses in manners before deemed inconceivable. This include the utilization of encryption to obscure unlawful communications, the alteration of data to conceal fraudulent operations, and the application of sophisticated methods to eliminate digital traces. This emerging trend in criminal activity necessitates a correspondingly advanced investigative methodology. Law enforcement organizations and investigators can no longer depend on antiquated methods such as interrogations, monitoring, or informants to resolve these sophisticated crimes. They must rely on forensic science, particularly cyber forensics, to find evidence and identify perpetrators.

The criminal justice system cannot operate effectively in this shifting terrain without the support of forensic science. The advancement of forensic technologies has provided law enforcement and the judiciary with a formidable array of instruments to address even the most intricate crimes. Forensic science enhances investigations by providing more precision, efficiency, and confidence, enabling law enforcement to collect incontrovertible evidence to substantiate criminal accusations. The emergence of forensic science has initiated a fundamental transformation in criminal investigations. The method is no longer exclusively dependent on witness testimony, which may be subjective and fallible. Forensic science allows investigators to depend on tangible, objective evidence that is both reliable and exceptionally precise.

Forensic science has proven essential to successful criminal investigations worldwide. Forensic science has empowered law enforcement to resolve instances that would otherwise stay unsolved, including DNA testing to conclusively associate a suspect with a crime scene and ballistic analysis to identify the type of weapon employed in a shooting. As criminal behavior evolves, forensic science will remain an essential instrument in combating crime. Absent this, the criminal justice system would have constrained resources, endeavoring to contend with the advanced techniques utilized by contemporary offenders. Forensic science facilitates the administration of justice with enhanced accuracy, guaranteeing the conviction of the guilty and the safeguarding of the innocent.

PRINCIPLES OF ADMITTING SCIENTIFIC EVIDENCE BY INDIAN COURTS

Deoxyribonucleic Acid (DNA) is an essential element of all living beings, harboring genetic information that is distinctive to each individual, with the exception of identical twins. The distinctiveness of DNA has rendered it an indispensable instrument for personal identification, especially within the realm of criminal investigations. DNA contains areas termed Short Tandem Repeats (STRs), which are sequences of base pairs that are repeated and exhibit variability in length among individuals.[4] The variation in the quantity and length of these STRs among individuals (except identical twins) provides a unique genetic fingerprint, enabling precise identification.

A DNA profile is generated by examining particular STR sections within an individual's DNA. The profile is fundamentally a comparison of the distinct patterns of these repetitive sequences

at certain loci on the DNA strands.[5] DNA profiling has transformed criminal investigations, providing law enforcement with a potent means to associate suspects with crime sites or to exonerate innocent individuals.

A prevalent application of DNA evidence in criminal justice is the comparison of DNA profiles from a crime scene specimen with those from a suspect or a DNA database. The matching procedure has emerged as a prevalent and dependable method in criminal investigations, especially in instances where alternative forms of evidence, such as eyewitness testimony, are absent or inaccurate.

The Procedure of DNA Profiling

Generating a DNA profile is a difficult endeavor, requiring a sequence of intricate methods to extract, analyze, and compare genetic material. Here is a comprehensive analysis of the procedure:

Extraction and Purification of DNA: The initial phase involves extracting DNA from the biological sample obtained at the crime scene, which may include blood, hair, skin cells, or other fluids. The DNA is further processed to isolate it from other impurities and materials that may be present in the sample.

Fragmentation using Restriction Enzymes: Following purification, the DNA is cleaved into smaller fragments with restriction enzymes. These enzymes function as molecular scissors, cleaving DNA at designated regions referred to as restriction sites. The DNA of each individual is fragmented into varying lengths, contingent upon their distinct genetic composition. This procedure is an essential phase for subsequent analysis.

Separation of DNA Fragments by Size (Gel Electrophoresis): Following fragmentation, the DNA fragments are segregated by size via agarose gel electrophoresis. This method operates by subjecting a gel containing DNA fragments to an electric field. Smaller fragments traverse the gel more rapidly, but larger fragments progress more slowly. This separation method yields a pattern that enables differentiation among various DNA samples.

Transfer of DNA Fragments to a Nylon Membrane (Southern Blotting): After the DNA fragments are resolved in the gel, they are transferred to a nylon membrane by a technique known

as Southern blotting. This procedure enables the fragmented DNA to be affixed to the membrane for subsequent analysis.[6]

Hybridization with a Radioactively Labelled Probe: The subsequent step entails subjecting the transferred DNA to a radioactive-labeled probe. This probe is a brief, single-stranded DNA sequence that is complementary to a particular area of the target DNA. The probe's binding to its complementary DNA sequence facilitates the identification of the specific STR markers under investigation.

Visualization of DNA Bands (Autoradiography): The bound pieces are ultimately identified using autoradiography. This entails subjecting the membrane to X-ray film, which records the radioactive signals released by the probe. The outcome is a sequence of bands on the X-ray film that resemble a barcode. These bands signify the DNA fragments and are examined to construct the DNA profile.

The resultant profile has a sequence of bands that correspond to the varying lengths of the STRs in the DNA. When comparing DNA from various persons, the bands will correspond to an individual's profile but will vary among different individuals. This variation in patterns serves as the foundation for identifying or excluding individuals in criminal proceedings.

The Polymerase Chain Reaction (PCR) and DNA Profiling Alongside conventional DNA profiling methods, Polymerase Chain Reaction (PCR) has emerged as a crucial instrument in forensic research. PCR is a technique employed to amplify specific DNA regions, even from little or degraded samples.[7]

PCR entails successive cycles of thermal denaturation and annealing to facilitate DNA replication. It employs primers, which are brief nucleotide sequences that commence the replication process. PCR is especially advantageous when DNA material from a crime scene sample is inadequate or when the sample is compromised, complicating analysis by conventional techniques.

By amplifying specific polymorphic DNA regions, which exhibit variation among individuals, PCR generates sufficient copies of a single DNA segment for comprehensive examination. This technique enables the utilization of DNA samples that would otherwise be unviable, hence

considerably broadening the range of cases in which DNA evidence can be employed.[8]

DNA Analysis in Forensic Science: A Revolutionary Advancement

The significance of DNA profiling in the realm of criminal justice is paramount. This has revolutionized criminal investigations by providing a robust, scientifically validated means of associating a suspect with a crime scene or exonerating them from suspicion. DNA analysis is generally regarded as the gold standard in forensic science due to its renowned precision and reliability.

In February 2009, the National Academy of Sciences (NAS), a distinguished institution in the United States, published a report on forensic sciences which determined that, "with the exception of DNA analysis, no forensic method has been rigorously demonstrated to possess the ability to consistently and with a high degree of certainty establish a link between evidence and a specific individual or source."[9] This comment underscores the unmatched reliability of DNA evidence in contrast to other forensic techniques, some of which have faced criticism for their susceptibility to errors.

Although forensic science may be susceptible to errors—occasionally leading to false convictions—DNA profiling has consistently demonstrated reliability. over the last 1o years, numerous individuals convicted of major offenses, including death sentences, have been exonerated via DNA analysis. This has not only averted miscarriages of justice but has also furnished vital evidence in resolving cold cases, resulting in convictions for crimes previously deemed unsolvable.

LEGAL PROVISIONS UNDER WHICH DNA EVIDENCE WAS USED/REFERRED

Various statutes, notably sections of the Code of Criminal Procedure (CrPC)[10], 1973, and the Constitution of India, precisely establish the legal framework governing the gathering and use of DNA evidence in India. These legislative rules control the circumstances under which DNA testing may be conducted, the acceptability of DNA evidence in court, and the safeguards provided to people in respect of their basic rights.

Legal Structure for DNA Gathering

The Code of Criminal Procedure links closely the acceptability of DNA evidence to its acknowledgment as a valid medical examination. Specifically, the Explanation to Section 53[11] of the CrPC was changed to clearly classify DNA profiling as a medical technique. This change makes it clear that, like other medical tests, DNA profiling is a legitimate method of examination in criminal investigations when done by a certified medical professional and does not infringe the rights of the accused.

The court has also looked at DNA profiling's constitutional aspects. It decided that conducting DNA tests does not breach Article 20(3)[12] of the Constitution of India, which safeguards people from being forced to testify against themselves. The DNA evidence is not considered testimonial in nature, therefore the technique of acquiring DNA samples—including by buccal swabs or blood samples—does not violate the individual's right to stay silent or self-incrimination. Moreover, it complies with Section 161(2)[13] of the CrPC, which permits the police to gather physical evidence from a suspect without forceful testimony.

The court also detailed situations when DNA testing could be very essential. DNA testing, for instance, might offer the final way of identifying a dead person in situations requiring identification of that person. A DNA test might not be required, though, in certain situations—such as the one cited—if other types of identification are accessible or adequate.

Indian Law on DNA Evidence

Particularly in terms of crime resolution and criminal identification, certain laws in India are quite important for the use of DNA evidence. Some of the main statutes and clauses concerning DNA evidence are below:

The Indian Penal Code (IPC), 186o: This is the foundation of criminal law in India, covering a broad spectrum of offenses including murder, rape, kidnapping, abduction, and dacoity. In cases of sexual offenses and violent crimes, where biological evidence can be the deciding element in identifying the offender, DNA evidence is very important.

The 1959 Arms Act: This Act deals with certain crimes connected to the unlawful use and possession of guns. For example, Section 25[14] addresses penalties for offenses connected to the possession of weapons; Section 27[15] addresses sanctions for crimes involving the use of

firearms. When found on weapons or crime sites, DNA evidence might connect a suspect to a gun-related crime.

The Narcotic substances and Psychotropic Substances Act, 1985: It governs the manufacture, use, and possession of illicit substances. DNA can be quite important in connecting people to drugs found in their presence or at the site of a drug-related crime; Section 5o[16] outlines the processes for the search of people engaged in drug offenses.

The Scheduled Castes and Scheduled Tribes (Prevention of Atrocities) Act, 1989: Aims to stop and punish crimes against marginalized communities. Particular atrocities against these communities are defined in Section 3[17]. Especially in cases when eyewitness testimony is lacking, DNA evidence might be essential in identifying victims and offenders in such crimes.

The Medical Termination of Pregnancy Act, 1971: This Act allows for the legal termination of pregnancies under specific circumstances, and DNA testing may be used in cases where the identity of the foetus needs to be confirmed, such as in cases of suspected infanticide.

The Code of Criminal Procedure (CrPC), 1973: This procedure code specifies the rules for criminal investigations and trials. Important parts on DNA gathering are:
Section 53[18]: Requires the medical examination of a suspect, which can involve DNA collecting.
Section 53A[19]: often including DNA testing to verify the existence of biological evidence, certified practitioner examines those accused of rape as specified in Section 53A.
Section 54[20]: Calls for a medical officer to investigate those under arrest; this may involve collecting DNA samples as required for the case.
Section 125[21]: This section covers the maintenance of spouses, children, and parents, which could be significant in paternity conflicts or other situations involving DNA testing. **Section 482[22]:** Guarantees the High Court's natural power to intervene in legal cases including DNA testing and other evidentiary concerns.
The Indian Evidence Act, 1872: The Evidence Act controls the kinds of evidence allowed in court. Particular clauses on DNA evidence are:
Section 112[23]: States that if a child is born during the marriage, it is definitive proof of legitimacy that can be supported by DNA evidence in paternity disputes.
Section 114[24]: Lets the court infer the existence of particular facts, including the identify of a deceased individual, which can depend on DNA evidence.

The Indian Constitution: Several basic rights granted in the Constitution are absolutely vital in deciding the legitimacy of DNA collection:

Article 20(3)[25]: Protects people against self-incrimination by guaranteeing no one can be compelled to testify against themselves, especially in the case of DNA collection.

Article 21[26]: Guarantees the right to life and personal liberty, which could be involved if the DNA collection is illegal.

Article 32[27]: Lets people pursue recourse for the enforcement of fundamental rights, which might be called upon if DNA evidence is illegally utilized or gathered.

Article 226[28]: Gives High Courts the power to write for the enforcement of rights, which might cover concerns about DNA evidence misuse.

Article 227[29]: Empowers the High Court to oversee lower courts and guarantee appropriate legal procedures are followed in the gathering and use of DNA evidence.

CRIMINAL CASES IN WHICH DNA EVIDENCE WAS USED FOR RECORDING CONVICTION OR ACQUITTAL

1. Swami Premananda v. Inspector of Police (29.09.1995 MADHC) MANU/TN/1057/1995

Petitioner and seven others were charge sheeted for crimes punishable under sections 12o(B), 3o2 read with 34, 376, 376(2)(c) read with 1o9, 2o1, 2o2 read with 114 and 5o6(ii) of IPC. This is why a bail application was submitted. Held, all details needed under section 173(2) of CrPC, viz. statement of witnesses interrogated during course of investigation were produced except further statement of victim girl, DNA report and abortion certificate into court. But when the petitioner went to the Magistrate for copies of the charge sheet and papers, the Magistrate refused to issue copies and ruled that scientific reports were pending following receipt of which only charge-sheet to be created and given to petitioner. Prosecution has looked at 1o9 witnesses and there were section 164 of CrPC recorded statements. medical evidence and DNA certificate. Release of petitioner on bond would have an effect in tampering with material gathered by investigating agency considering position of petitioner, status of victim, and kind of evidence thus gathered. Releasing petitioner thus was not helpful for fair trial. The petition was therefore rejected.

2. State v. Nalini (1999) 5 SCC 253

A human bomb killed Rajiv Gandhi, former Prime Minister of India, during the night of 21.

05.1991. Along with him, 15 people including 9 police officers perished; 43 others experienced serious or minor injuries. Also perished in the explosion was assassin Dhanu, an LTTE (Liberation Tigers of Tamil Eelam) activist who set off the belt bomb hidden under her waist and Haribabu, a photographer and conspirator, set to capture images of the terrible scene. A plot caused the event. Under sections 3o2 read with section 12o B of IPC, seven living accused persons including a lady who participated in the plot were found guilty. Four of the seven convicted defendants (including the woman) were given death sentences. The sentences of the other three offenders changed to life in prison. DNA profiling not only helped to identify the victims but also confirmed the identities of the offenders mostly by the belt being found from the site of crime which was carrying little body flesh tissue.

3. Chandradevi v. Sate of Tamil Nadu by Inspector of Police, C.B., C.I.D. (12.12.2002-MADHC) MANU/TN/2335/2002

Under sections 376 and 3o2 and 12oB IPC, the accused were found guilty. There was a grave allegation of rape involving thirteen females. A-1's strength was evaluated; he was discovered to be normal and able to have sexual intercourse. The D.N.A. Test showed he had fathered the dead foetus of P.W.14. Additional accusations were that A-1 and A-2 violently murdered the deceased since he objected to this A-1 action. Prosecution proved that A-1 and A-2 with stick on left upper limb and lower limb inflicted physical injuries on deceased. When the deceased fell down after being untied, both A-1 and A-2 kicked him on his back and chest. on A-1 and A-2's orders, Deceased was locked in kudil without access to food or water. The deceased perished from starvation. Conduct of A-1 and A-2 prior and after as well as case circumstances including purpose and their intention to kill was set up. The appeal was rejected and A-1 and A-2's convictions were confirmed.

CONCLUSION AND RECCOMENDATIONS

A thorough examination of the several forensic evidence sources showed that, when appropriately applied, it is a vital instrument in the decision-making process for criminal cases. The study has also highlighted the system's shortcomings regarding inquiry and prosecution. The study also clarified the court's mindset regarding forensic evidence acceptance and rejection during decision-making. In this area, still some work and changes are needed to make it far more reliable and credible. Some suggestions given herewith help to raise the quality of forensic science outcomes as A. More Money B. Strengthening Forensic Education to Promote

a research Culture C. Strengthening the Culture of Forensic Science Journals D. Guiding Casework by Scientific Standard E. Increasing the "Science in the Scientific Working Groups (SWGs)" F. Data Access G. Balancing the Conflict Between a Research Culture and an Adversarial Society. one of the main challenges, especially in poor nations, is the lack of particular financing to assist study.

Sometimes the National Science Foundation funds forensic science research initiatives in United States. Some of the required study in these areas could significantly contribute methodologically and theoretically to more general domains such probability theory, statistics, decision research, and cognitive psychology113. The National Institute of Justice (NIJ) has also lately funded pattern identification sciences. Such funding is intended to encourage basic research to enhance knowledge of the accuracy, dependability, and measurement validity of forensic science disciplines. Future legion of people with abilities and background should join the field to work in the academic research community and also as practitioners, which will greatly help forensic science. Should some of these individuals maintain a strong grip on both research and practice, they would be very helpful for both the sectors as they could be valuable translators, mediators and educators in both fields and also communicate to fellow practitioners the need for a research based approach and help to guarantee that research emphasizes areas of genuine and important relevance to practitioners. The Government should offer large competitive grants for highly competent practitioners to pursue advanced graduate studies in relevant fields or research- oriented forensic science program. These funds might potentially cover half of an analyst's pay for a few years, giving them time and money to pursue a PH.D. A few highly endowed, fiercely competitive grants of this sort would greatly enhance the research culture of forensic science. Currently, in the U.S. in the "pattern identification"114 area, the number of practicing analysts with a PH.D. is somewhat low in comparison to the forensic areas, including DNA analysis and toxicology, in which a considerable proportion of analysts possess PHD. Some modifications to the present strategy on journals and publishing are absolutely required if forensic science is to have a better research culture. First, all forensic science publications should demand a complete dedication to research standards. Publication in any journal not indexed by at least some of the main indexing services should not be counted as publication. Individuals well qualified to evaluate the scientific qualities of any particular article should conduct serious, blind peer review. Although non-research oriented professionals can contribute significantly to peer review, judgments by those with the required credentials to evaluate the merits and execution of any particular study should prevail in the acceptance

criteria. Forwarding the peer review procedure for acceptance of forensic evidence, the Frye v. United States115 and Daubert v. Merell Dow Pharmaceuticals, Inc116, already covered in the second chapter, guides it. Access to data and test subjects is yet another required aspect for a strong research culture. Participation in the research industry has to obviously be balanced against a laboratory's other requirements; a laboratory might not be able to engage in every research project requested of it. Practitioners at a given laboratory should not be the only ones with access to data exemplars and databases. Forensic laboratories, as well as organizations like the FBI and state and federal criminal justice agencies, should provide data to qualified researchers to the greatest extent feasible given suitable confidentiality protection measures and the required involvement of Institutional Review Boards. Many critics have pointed out the institutional ties among the crime labs, the prosecutors, and the police. It follows that crime labs must be free from these other fields.

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[12] Constitution of India, A.20(3).
[13] Code of of Criminal Procedure, 1973, S.161(2).
[14] Arms Act, 1959, S.25.
[15] Arms Act, 1959, S.27.
[16] Narcotic Drugs And Psychotropic Substances Act, 1985, S.50.
[17] Scheduled Castes and Scheduled Tribes (Prevention of Atrocities) Act, 1989, S.3.
[18] *Ibid* N.11.
[19] Code of Criminal Procedure, 1973, S.53A.
[20] Code of Criminal Procedure, 1973, S.54.
[21] Code of Criminal Procedure, 1973, S.125.
[22] Code of Criminal Procedure, 1973, S.482.
[23] The Indian Evidence Act, 1872, S.112.
[24] The Indian Evidence Act, 1872, S.114.
[25] *Ibid* N.12.
[26] Constitution of India, A.21.
[27] Constitution of India, A.32.
[28] Constitution of India, A.226.
[29] Constitution of India, A.227.