



EVIDENTIARY VALUE OF DNA PROFILING TECHNOLOGY IN CRIMINAL TRIALS - AN INQUIRY INTO ITS RELEVANCY AND ADMISSIBILITY IN INDIA

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ABSTRACT

DNA profiling technology has become an established feature of the criminal justice system, and the results of DNA tests are generally admissible in trial proceedings. The Courts in India have come to recognize DNA evidence as both “relevant fact” and “conclusive proof,” despite their initial reliance on expert testimony based on DNA evidence. There is, however, on-going discussion on the extent to which guilt can be inferred in the event an apparent match of samples takes place. Generally, it will only be able to pinpoint a suspect’s location relative to the crime scene. The risk of scientific appropriation of the Criminal Justice system is increased by the blind acceptance of “this forensic evidence” as the objective solution to the problem of identifying a criminal, as in the majority of contentious criminal cases, the key question is not identity but rather intent or mens-rea, for which DNA evidence is of no relevance.

The aim of this research work is to describe the development and application of DNA profiling in India, with a focus on the unique challenges that the Indian

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Judicial system has encountered as a result of incorporating this cutting-edge forensic tool into Criminal proceedings. It also explores how the technology-based evidence is valued differently in the legal systems of England and United States of America, the stages of DNA Profiling - based evidence acceptance in India, and the impact of judgments rendered by the Apex Court, on the evidentiary value of DNA Profiling technology in Criminal Trials.

Key Words: Forensic Sciences, DNA Profiling, Liberty, Constitution, Criminal Trials.

INTRODUCTION

Many significant technological breakthroughs and advancements have occurred in the twenty-first century. Modern technology has spread its tentacles to include the study of life sciences, such as the analysis of human Deoxyribonucleic Acid (DNA). There have been significant social benefits from its numerous economic, medicinal, and administrative applications. The administration of justice has benefited much from this technology, making it a notable use.

DNA evidence has been used to either convict offenders or rule them out as suspects, and this has been the most significant advancement in the field of criminal investigation since fingerprinting was first introduced¹. Crimes can be linked to perpetrators by DNA analysis of bodily fluids, hair, skin, blood, and sperm. DNA technology has gained widespread acceptance over the past twenty years and is currently employed by law enforcement agencies, prosecutors' offices, defence attorneys, and courts around the globe. In cases where the two samples are a perfect match, DNA testing can provide an almost certain identification. These DNA profiles have revolutionised criminal investigations by enabling the identification of individuals in criminal and paternity cases. The genetic information included in a person's DNA is unique to that person. Several characteristics of people are influenced by it, which is hereditary.

As every living cell (aside from red blood cells) contains DNA, it is possible to identify who was there by comparing the DNA profiles of

¹ Claude Roux et al., *DNA Profiling and Criminal Justice: A Contribution to a Changing Debate*, 36 ALB. L.J. SCI. & TECH. 34-43 (2004)

any traces of blood (white blood cells include DNA), semen, or hair roots (but not hair or nails) found at the site of the crime. Nonetheless, there are good reasons to proceed with caution despite these advantages. Evidence based on a DNA profile is not the same as a physical items found at the crime scene. Concerns about the accuracy of the tests, the appropriateness of the results, and the potential impact on civil liberties all arise when employing DNA profiles². People often incorrectly compare DNA to fingerprints, yet the two are very different. Fingerprints are only an imprint of a finger as compared to DNA, which contains information that raises much more privacy and other civil liberties problems.

While DNA profiling is used in a way that is similar to how blood grouping is traditionally used in that it can exclude or link suspects to a crime, the potential tremendous increase in discrimination power allows for much more conclusive assertions than were previously possible. The possibility of a false positive result is likewise quite unlikely. Due to the greater discriminatory power, screening a broad population can be used as an alternative to conducting traditional criminal investigations³. When investigating a case involving commission of rape, DNA profiling is a great supplement to standard blood grouping since it can be performed on separated and frozen sperm, whereas blood group chemicals are only detected in the seminal fluids⁴.

Since DNA technology has grown increasingly popular in the forensic and biological sciences, courts in the United States, Europe, and Asia have employed it in both civil and criminal cases. The relentless progress of technology does make one question how things like DNA profiling may affect people's right to privacy. Although if these developments have a wide range of advantages for the administration of criminal justice, they can also open up new opportunities for dual-use for criminal activities. The DNA of an individual, which contains his complete

² V.K. Kashyap et al., *DNA Profiling Technologies in Forensic Analysis*, 4 AM. CRIM. L. REV 11–30 (2004)

³ J. Ritchie, *Probabilistic DNA evidence: The laypersons interpretation*, 47 BERKELEY J. CRIM. L. 440–449 (2015)

⁴ Carolyn Hoyle, *Forensic Science and Expert Testimony in Wrongful Convictions: A Study of Decision-Making at the Criminal Cases Review Commission*, 59 BUFF. CRIM. L. REV 919–937 (2019)

genetic blueprint and sensitive information, might be harmful to humanity if used improperly. If DNA is stolen, this sensitive genetic information of the person may be disclosed, potentially leading to misuse of his critical information as well as a violation of his right to privacy and personal liberty⁵.

EVOLUTION OF DNA PROFILING TECHNIQUE AS EVIDENCE – FROM LAB TO COURTROOM

The genetic blueprint of every living thing is written in DNA. It is commonly believed that DNA is the most fundamental building component of a living thing because of its hereditary nature and the role it plays in determining an individual's genetic make-up, which in turn is responsible for the physical and other features that are uniquely theirs. The fact that, with the exception of identical twins, everyone's DNA is completely unique stands out as the most remarkable thing about it. Microsatellites are little sections of DNA that vary from person to person and allow researchers to tell them apart, despite the fact that nearly everyone's DNA is identical (99.7% of it is)⁶. The discrete pieces of the DNA sequence that code for proteins or certain enzymes are known as genes, and they are found inside DNA.

In life forms, genes serve as the essential building block for the inheritance of genetic features; they are responsible for a person's unique traits. There are around 22,000 genes packed into 23 pairs of chromosomes that make up the human genome, which are the genetic coding portions of the DNA. 23 pairs of chromosomes are housed in the nucleus of every human cell. During conception, each parent contributes one half of each pair of chromosomes⁷. Forensic science relies on DNA profiles, which are numerical representations of an individual's unique DNA makeup. There are many ways in which forensic science has benefited from DNA analysis. In genes referred to as polymorphic genes, which are located at polymorphic sites or loci on a DNA molecule, the

⁵ Dormaan Dalal, *DNA Evidence, Its Admissibility, and Its Impact on Criminal Trials: A Comparative Study*, 4 *FORDHAM L. REV.* 11–15 (2013)

⁶ L. A. Foreman et al., *Interpreting DNA Evidence: A Review*, 71 *CAL. L. REV.* 473–495 (2003)

⁷ Bennett Margann, *Admissibility Issues of Forensic DNA Evidence*, 44 *COLUM. J.L. & SOC. PROBS.* 13–21 (1995)

Genetic information specific to an individual is kept. Human tissue samples, such as blood, skin, hair follicles, or semen stains, include fragments of the DNA molecule that can be isolated and identified to help pinpoint the identity of the person from whom the DNA originated.

Blood, sperm, skin cells, tissue, organs, muscle, brain cells, bone, teeth, hair, saliva, mucus, perspiration, fingernails, urine, faeces, and so on all contain DNA and can be found at a crime scene. The likelihood of discovering the criminal's DNA at a crime scene is extremely high given the volume of available data. Every form of physiological fluid or tissue that may be tested for DNA today can be done so using contemporary methods. That indicates many perpetrators left enough evidence to trace them to the crime scene, which is good. Every person who examines a crime scene runs the risk of leaving traces of their own DNA behind⁸.

The process of extracting and identifying portions of the DNA molecule is known as DNA identification analysis. This methodology was developed by scientists investigating human genetics. Scientists learn from their studies that different people's versions of the same DNA segment have varied lengths, and that these discrepancies will necessitate the employment of multiple analysis methods for comparing and matching human DNA samples.

Forensic DNA testing typically employs two main types of analysis methods. Restriction Fragment Length Polymorphisms (RFLP) and Polymerase Chain Reaction (PCR), are two names for these. Although DNA testing procedures vary depending on the sort of analysis being performed, there are a few standard processes that always take place.⁹

EVIDENTIARY VALUE OF DNA TECHNOLOGY – RELIABILITY V. PROBABILITY

Given the wide range of variations in DNA sequence that exist between individuals, there is no scientific debate that the tools available

⁸ Subhash Chandra Singh, *DNA Profiling and the Forensic use of DNA Evidence in Criminal Proceedings*, 53 J. CRIM. L. & CRIMINOLOGY 195–226 (2011)

⁹ Dan L. Burk, *DNA Fingerprinting: Possibilities and Pitfalls of a New Technique*, 28 J FORENSIC SCI & CRIMINAL INVES (1987)

today can accurately detect genetic variances. Two DNA samples can be thoroughly analysed to see if their DNA patterns match. If they do, it can be determined how likely it is that a single source is the cause of both samples if the analysis is done correctly and evaluated (except in the case of identical twins). In comparison to using samples for basic research or clinical diagnosis, employing DNA tests to examine forensic samples—especially criminal evidence—is seen to be more difficult.

There is a great probability that crime scene samples will be of bad quality due to the wide diversity of environmental exposures they have experienced. The scientific validity of the detection procedures is a crucial consideration in the use of DNA as evidence. How well a test distinguishes between actual matches and true non-matches is what determines its validity. At first, the nature of the samples was a major source of scepticism about the reliability of DNA typing in forensics.

Several non-sterile materials (such as glass, wood, soil, and cloth) are used to collect samples, which are frequently exposed to sunlight, moisture, or desiccation. Unknown genetic elements such as bacterium, plant or animal secretions can also contaminate samples. Collecting evidence must be done with extreme attention to avoid contamination. The reliability of forensic DNA testing is the second factor to consider. Procedures, laboratory results, record keeping, quality control, and quality assurance are all part of ensuring reliable results¹⁰.

Despite the reality that forensic uses of DNA tests are accurate and trustworthy when handled properly, many individuals believe that DNA typing applied to forensic evidence always results in a “yes” or “no” answer. It is neither wrong nor unreliable to use a test that does not always result in a yes or no¹¹. After the biochemical test, the accused’s DNA profile will be compared to the sample’s to determine if they “match.” But, there are issues with this. The standard procedure up until now has been to establish an arbitrary level of similarity, exclude anything that

¹⁰ Roberta Julian & Sally Kelty, *Forensic Science and Justice: From Crime Scene to Court and Beyond*, 24 LA. L. REV 1–6 (2012)

¹¹ David Kaye, *The Limits of the Preponderance of the Evidence Standard: Justifiably Naked Statistical Evidence and Multiple Causation*, 7 MICH. L. REV 487–516 (1982)

doesn't meet that level, and consider convincing anything that does. Expertise in molecular biology, population genetics, and statistics is needed for effective utilisation of DNA samples. Expertise in biochemistry is needed for profile creation.

Contamination with bacterial, viral, or other human or nonhuman DNA at the scene of the crime is one of the risks associated with testing. Other risks include the probable mixing of samples prior to testing, mismanagement resulting in contamination at the time of sample collection or later in the laboratory. The test can be made more difficult and subsequent verification rendered impossible if only a tiny sample is used. Moreover, the test itself may be carried out improperly if only a little sample is used¹².

REGULATORY FRAMEWORK GOVERNING DNA PROFILING EVIDENCE IN CRIMINAL TRIALS - A COMPARATIVE ANALYSIS OF LEGAL SYSTEMS IN USA, ENGLAND AND INDIA

USA

Evidence gleaned from DNA identification analysis, like with all other forms of scientific evidence presented in Courts of the United States of America (USA), must pass whatever test of admissibility is currently in place in the relevant jurisdiction. The majority of jurisdictions apply some form of the so-called "Frye test," named after the decision made by the United States Court of Appeals for the District of Columbia Circuit in *Frye v. United States*¹³. For a novel scientific technique to be allowed in court under the Frye test, it must first have been widely accepted within the appropriate scientific community. Most state jurisdictions apply the second rule, which adheres to the fundamental relevancy criterion of the *Federal Rules of Evidence*¹⁴. These rules require that scientific evidence be relevant to the issues in the case and that its probative value outweigh the risk for prejudice for the evidence to be admitted. According to the Supreme Court's decision in *Daubert v. Merrell Dow*

¹² L. Heffernan, *Genetic Policing: The Use of DNA in Criminal Investigations*, 48 NEW CRIM. L. REV 699-701 (2008)

¹³ 293 F. 1013, 1014 (D.C. Cir. 1923).

¹⁴ Rules 401, 402, 403 and 702.

*Pharmaceuticals*¹⁵, the Frye test is no longer applicable in federal court trials and must be applied in accordance with the Federal Rules of Evidence. The court also established a new federal criterion, which states that the Trial Judge must ensure that any scientific testimony or evidence permitted is not only applicable to the case at hand, but also credible.

State courts typically still use the Frye test even when the Daubert standard is applicable at the federal level. DNA evidence is progressively being acknowledged as acceptable in state and federal courts generally. DNA evidence has been more likely to be admitted by courts applying the Daubert standard, however it has been accepted by numerous courts applying the Frye standard as well. The majority of cases where DNA evidence was deemed to be inadmissible occurred in jurisdictions that used Frye.

The New York State Supreme Court gave extensive consideration to various concerns regarding the validity of DNA evidence in *People v. Castro*¹⁶. The court ruled that the scientific community at large recognises the validity of DNA identification theory and practise. There is widespread consensus amongst scientists that DNA forensic identification methods are reliable. The results of the testing laboratory must be considered by the jury, so it is necessary to hold preliminary hearings to assess if the lab's methods were generally in line with scientific norms. The ruling in *Castro* lends credence to the idea that evidence of exclusionary DNA identification is more likely to be admitted in court than evidence of inclusionary DNA identification. In the case of *Schwartz v. State*¹⁷, the Minnesota Supreme Court stated that “*ideally, a defendant should be presented with the actual DNA sample(s) in order to repeat the results*”. Considering that forensic samples are frequently so little that the entire sample is utilised for testing, this might not be realistic. Thus, it is crucial that independent experts have access to the data, methodology, and real results.¹⁸

¹⁵ 509 US 579, 113 S.Ct. 2786 (1993).

¹⁶ 545 N.Y.S. 2d 985 Sup Ct. 1989

¹⁷ 447 N.W. 2d 422 (1989)

¹⁸ Hannes Leitgeb, *Forensic Identification and Criminal Justice: Forensic Science, Justice and Risk*, 123 OHIO ST. J. CRIM. L 131–171 (2014)

Wisconsin's expert witness relevancy criterion, which decides whether expert testimony is admissible, was upheld by the Wisconsin Supreme Court in *State v. Walstad*¹⁹.

Whether or not the evidence satisfies the reliability requirements set forth in Frye and Daubert, the Wisconsin Supreme Court's relevancy test in *Walstad* enables the inclusion of scientific evidence, including Genetic evidence. The admissibility of DNA evidence is a contentious topic in many other states, which contrasts with the position in this one. The Wisconsin Court of Appeals rejected the defendant's appeal position that DNA evidence should not have been accepted because the trial court failed to make a determination regarding the reliability of the evidence in *State v. Peters*²⁰, a case that specifically used DNA evidence.

England

The world's most successful and efficient application of DNA technology is largely acknowledged to be in England. The procedure of conducting a criminal investigation has been heavily reliant on DNA technology and DNA databases. England has become a global leader in developing cutting-edge methods to utilise DNA to identify suspects, safeguard the innocent, and condemn the guilty since the National DNA Database (NDNAD) was established in 1995. With the aid of DNA Evidence, Colin Pitchfork became the first murderer to be found guilty²¹. The Laws governing DNA Evidence in England are specifically found in Criminal Justice and Public Order Act and The Police and Criminal Evidence Act of 1984

The admissibility of expert testimony in criminal prosecutions in England and Wales was recently comprehensively investigated by the (English) Law Commission²². A rewrite of the rules governing the

¹⁹ 119 Wis. 2d 483, 351 N.W. 2d 469 (1984) – Wisconsin's Expert Witness Relevancy Criterion is Testimony of Expert— A witness who is qualified as an expert by knowledge, skill, experience, training, or education may testify as to the substance or interpretation of any scientific, technical, or other specialised information if such knowledge is necessary for the trier of fact to appreciate the evidence or determine a fact in dispute.

²⁰ 192 Wis. 674, 534 N.W. 2d 867 (1995).

²¹ [2009] EWCA Crim 963

²² Law Commission Consultation Paper No. 190 : The Admissibility of Expert Evidence in Criminal Proceedings in England and Wales: A New Approach to the Determination of Evidentiary Reliability (2009)

admissibility of expert testimony was strongly supported by the Law Commission. The group recommended formalising the rules and procedures for admitting expert testimony in order to increase transparency and predictability in the legal system. The fundamental tenet of the Law Commission was that in order to be admitted into court, expert testimony had to meet a minimal level of evidentiary credibility. A new statutory standard for establishing admissibility is proposed, together with supporting guidelines for both scientific and experiential expert testimony. The test would necessitate the participation of a judge as a gatekeeper. In order for the evidence to be admissible, the judge must be convinced that it is founded on credible concepts, technologies, methodologies, and assumptions; that these have been correctly applied to the case; and that the resulting conclusions are reasonable²³.

India

The existence of Fundamental Rights provided to Indian citizens and other individuals, which aids in securing human rights and fundamental freedoms, is a unique distinguishing element of our constitution.

An individual is protected from having to testify against himself under Article 20(3) of the Constitution. Article 20(3), which has elevated this norm to the status of constitutional proscription or embargo, serves as the constitutional embodiment of the principle of protection against the coercion of self-incrimination. This idea, adopted by the United States legal system by way of its adoption into their Constitution, is a cornerstone of British criminal law and was afterwards adopted by our own legal system as a Fundamental Right.

The Indian Constitution also protects life and personal liberty under Article 21 of Part III, which forbids unauthorised entry into or interference with a person's life or personal liberty. It is significant to remember that the stages of a criminal investigation's procedural process are directly related to the constitutional embargo imposed by Article 20(3). As a result, the Indian Constitution's Articles 20(3) and 21, as well as the

²³ David H. Kaye, *The Science of DNA Identification: From the Laboratory to the Courtroom (and Beyond)*, 8 OR. L. REV. 410 (2010)

golden triangle rule recognised in the widespread Supreme Court judgement in *Maneka Gandhi*²⁴, must be adhered to in order for DNA evidence to be admissible in court and for DNA profiling technology to be used.

Sections 51 and 52 of the Bharatiya Nagarik Suraksha Sanhita, 2023 (BNSS) permit for DNA tests implicitly, and they are widely employed for determining difficult criminal cases, even though there is no explicit DNA law passed in India. If a police officer has a good reason to believe that an examination of the suspect's person will reveal information regarding the commission of the crime, Section 51 deals with the examination of the suspect by a medical professional at the officer's request. When an arrested individual makes a request under Section 53 of the (BNSS), the arresting agency is required to allow the registered medical practitioner to examine the suspect.

Section 52 of BNSS requires a medical practitioner to examine a person accused of rape. This section expands the scope of the new explanation to encompass DNA profiling and forensic analyses of bodily fluids, including as blood, blood stains, semen, sputum, swabs, perspiration, hair samples, and fingernail clippings, when they are relevant to the investigation of sexual offences. Under sections 193 and 329 of the BNSS the court has the authority to direct the police officer to take blood samples from the accused and conduct a DNA test for the purpose of further investigation, even though section 52 only relates to the examination of the accused by a medical practitioner at the request of the police officer.

Section 39 (1) of the Bharatiya Sakshya Adhinyam, 2023 (BSA), is more significant in terms of the admissibility of DNA evidence than these other sections. Expert testimony is discussed in Section 39(1). Reports from specific government scientific experts are covered in Section 329 of the BNSS. The court has the discretion to call in and question any such expert regarding the contents of his report pursuant to Section 329. Furthermore, it is noted that the court cannot substitute its own opinion for that of the Expert unless there is something fundamentally faulty in the Expert report. A number of convictions have taken place in India as a

²⁴ *Maneka Gandhi v. Union of India*, 1978 AIR 597

result of section 45 of the Indian Evidence Act accepting DNA as scientific evidence, being the earlier form of the present Section 39 (1) BSA.

The acceptability of DNA test results in court is now a standard procedure, and DNA testing has its unique place in the criminal justice system. Due to India's adoption of an adversarial form of justice administration, unless there are exceptional circumstances, medical/scientific evidence is typically only admissible when the expert provides an oral deposition under oath in court.

The Andhra Pradesh High Court determined that because DNA is a flawless science, the expert's opinion is admissible in evidence in *Patangi Balarama Venkata Ganesh v. State of A.P.*²⁵. The Supreme Court demonstrated the greatest reluctance to use DNA evidence to resolve a paternity dispute that resulted from a maintenance suit in *Goutam Kundu v. State of West Bengal*²⁶. For the purposes of determining whether or not a child is entitled to receive support from the father under section 125 of the Cr PC²⁷, the father in this case denied paternity and insisted on a blood grouping test. The Supreme Court ruled on the issue at hand by saying: *The request for a blood test couldn't be approved if its sole intent was to avoid paying maintenance and there was no valid justification provided for doing the test in the first place.* In addition, it was decided that no one could force someone to submit a blood sample against their choice, and that no one could hold that person accountable for their decision to refuse to do so.

It was noted by the Orissa High Court in *Thogorani Alias K. Damayanti v. State of Orissa*²⁸ that the only limitation on giving a direction to collect the blood sample of the accused for performing DNA test would be for the court to weigh the public interest against the rights under articles 20(3) and 21 of the Constitution of India in gathering evidence tending to confirm or disprove that the accused committed the concerned offence before passing such a directive.

²⁵ 2003 Cri LJ 4508

²⁶ (1993) 3 SCC 418 at 428.

²⁷ See Sec 144 of the Bharatiya Nagarik Suraksha Sanhita

²⁸ 2004 Cri LJ 4003

The following factors may be crucial when striking a balance between competing interests:

- (a) the extent to which the accused may have engaged in the commission of the crime;
- (b) the seriousness of the offence and the circumstances surrounding its commission;
- (c) the age and, to the extent that it is known, the physical and mental health of the accused;
- (d) if there is a more efficient and less invasive means to gather evidence that supports or refutes the accused's guilt;
- (e) any justification the accused provided for withholding permission, if any.

The Bombay High Court ruled in *Sadashiv Mallikarjun Kheradkar v. Smt. Nandini Sadashiv Kheradkar*²⁹ that while the court has the authority to order a blood test, it shouldn't be conducted routinely or as part of an investigation that is not focused on one specific area. It was decided by the Bombay High Court that the court can issue a direction, but cannot compel the provision of a blood sample, and the court agreed that the legislature should make the necessary changes.

An order for a DNA test to be performed on a rape victim's foetus was made by a division bench of the Delhi High Court in *Geeta Saha v. NCT of Delhi*³⁰. The court ruled that the facts of this case are different from those of the Goutam Kundu case, where it was ruled that a woman cannot be compelled to provide a blood sample and that no adverse interference may be drawn against her for this refusal.

However, as stated by the Supreme Court in *Bhabani Prasad Jena v. Convener Secretary, Orissa State Commission for Women*³¹, the court should never as a rule grant applications directing any party to undertake DNA testing. Even if the individual was forced to take the test

²⁹ 1995 Cri LJ 4090.

³⁰ 1999 (1) JCC 101

³¹ AIR 2010 SC 2851 at 2857-58

against his or her will, there is no violation of the right to life and personal liberty in submitting to a DNA test ordered by a court. A forced DNA test to settle the parental dispute would therefore not be in breach of Article 21.

A person's right against testimonial compulsion is not violated if the court orders them to submit to DNA testing, whether they are male or female, according to the Punjab and Haryana High Court's decision in the case of *Harjinder Kaur v. State of Punjab*³².

The Madras High Court's ruling in the matter of *Shankar @ Palanisamy v. State by Inspector of Police* firmly declares that the immunity promised by A.20 (3) is not violated when a person is subjected to a DNA test by a court. The Learned Magistrate's order requiring the Petitioner to take a DNA test was affirmed by the court in its ruling.

The Kerala High Court ruled in *P.V. Valsan s/o Kannan Nambiar v. Station House Officer*³³ that it is legal for police to take DNA samples from an accused individual for the purpose of DNA profiling. Neither the right to privacy nor the privilege against self-incrimination have been compromised in any way. The DNA test's utility in the course of a judicial inquiry is now taken for granted.

In the case of *Mukesh v. State (National Capital Territory of Delhi)*³⁴, the Supreme Court found that DNA evidence is being relied on more and more frequently by the judicial system. DNA profiling has now been included in the statutory framework following the amendment to Cr PC with the addition of Section 53A³⁵. When biological remains are found at the site of the crime or blood is found on any items, clothes, etc., recovered from the accused or from witnesses, DNA evidence is now the most common forensic technique for identifying the source of the blood and identifying the culprit.

In *Selvi v. State of Karnataka*³⁶, the Supreme Court ruled that there are no constitutional restrictions on the collection and storage of

³² 2013(2) RCR (Criminal) 146 (P and H)

³³ CrI. Misc. No.1629/2008

³⁴ (2017) 6 SCC 1

³⁵ Sec 52 of the Bharatiya Nagarik Suraksha Sanhita

³⁶ AIR 2010 SC 1974.

DNA samples that have the status of physical evidence in India. It's possible that the judicial system could have trouble accepting DNA profiling evidence in the future if the technology is improved and put to use as a testimony identification tool. In light of this, using material samples like DNA for identification and comparison purposes does not qualify as a testimonial act under Article 20. (3).

LEGALITY OF COLLECTION AND USAGE OF DNA EVIDENCE – A HUMAN RIGHT'S PERSPECTIVE

A suspect must be given the opportunity to cast doubt on the accuracy of scientific testing if the trial is to be fair. DNA profiling requires access to specific bodily fluids and tissue samples. The sample might have been gathered by accident/chance or provided under instructions. The biological sample can be used for analysis and as evidence in India and many other nations if it was taken involuntarily (for instance, by removing a hair follicle from the defendant's clothing)³⁷.

The key legal concern is whether it is acceptable to use body samples that were acquired randomly for DNA testing. This issue has not been fully resolved. There are two possible lines of reasoning. The DNA test itself does not constitute a separate interference with the right to the integrity of the body, thus if the body material was obtained lawfully, it is also permissible to perform one on it. This standpoint is grounded in the belief that DNA testing is not subject to any unique legal considerations. All individuals have the right to decide what happens to their own bodily tissue, according to the second line of reasoning³⁸. In Health Law, this line of thinking is particularly persuasive. The concept stems from the realisation that progress in medical knowledge necessitates more stringent safeguards for living human tissue. This position holds that collecting a suspect's body parts without his or her consent constitutes an invasion of his or her right to bodily integrity and that DNA testing is an extension of that invasion.

³⁷ Peter Gill, *DNA as Evidence — The Technology of Identification* 352(26) SEATTLE U. L. REV 2663, 2669 (2005)

³⁸ Sonia M Suter, *All in the Family: Privacy and DNA Familial Searching* 23(2) SYRACUSE SCI. & TECH. L. REP. 310, 349. (Spring 2010)

The European Convention on Human Rights (ECHR) may be mentioned in relation to this situation (ECHR). Article 8 of ECHR should be weighed in any debate on the use of force to obtain DNA samples. Taking a blood sample without consent is obviously a violation of article 8 because it interferes with someone's privacy. As long as it is "essential in a democratic society for the prevention of crime and for the protection of other rights," it would be legal. Although coercion in the collection of DNA samples for analysis is not strictly prohibited, the introduction and use of these techniques should take full account of and not infringe such fundamental principle as the inherent dignity of the individual and respect for the human body, the rights of the defence, and the principle of proportionality in the administration of criminal justice.

The employment of DNA technology in a forensic setting raises many important questions, the most pressing of which being whether or not testing must be conducted under duress. The United Kingdom distinguishes between intimate and non-intimate bodily samples. It is acceptable to obtain a non-intimate sample without consent in certain situations. The donation of an intimate body part, such as a sample of bodily fluid, cannot be compelled from an accused person. The court may deduce whatever conclusions it deems appropriate from the suspect's reluctance to cooperate with a request to provide an intimate body sample if there is no reasonable reason given in England and Wales. The failure to provide a sample can therefore serve as proof of guilt. In addition, other evidence may be corroborated by the failure to provide samples when a proper request is made.

RIGHT TO PRIVACY AND DNA PROFILING IN INDIA

Evidence based on DNA is becoming increasingly popular as a result of the current worldwide trend regarding its admissibility. Governments all across the world are influenced to save DNA evidence for future investigations by the outcome of court cases deciding whether or not human DNA can be used as evidence in criminal investigations. The Countries have also enacted legislations to control the use of DNA Data Analyses technology in order to put into practise the process of using people's genetic information in criminal tracing activities.

But, in India, which lacks a DNA Law a legislative framework is needed to oversee the data collection and storage, accreditation, and regulation of DNA laboratories that use DNA-based analysis technology. To ensure the effective application of the people's right to privacy and personal liberty, it is equally, if not more, important to secure the due protection of DNA Data (stored with the state) against misuse³⁹. In this backdrop, it seems appropriate to examine the Supreme Court's decision on the Right to Privacy.

*Justice K.S. Puttaswamy v. Union of India*⁴⁰ was a landmark case in which the Supreme Court of India upheld the Right to Privacy as a fundamental right protected by Article 21 of the Constitution.

DNA evidence and genetic fingerprinting are said to have significant benefits over more conventional forms of evidence and methods of criminal detection. The government must ensure that DNA fingerprinting is constitutionally permissible in India before it can take advantage of these advantages in the criminal justice system, meaning that it must respect people's right to privacy. Since human DNA includes each person's most private information, it should not be utilised routinely in criminal investigations since the Right to Privacy has been recognised as a fundamental right⁴¹. There have been various court judgements in India that discourage and heighten caution regarding the use of DNA evidence in routine cases. This gives rise to an unofficial body of law concerning the use of DNA fingerprinting, which holds that while the technology has many benefits, the state should be wary of abusing it⁴².

The police have the ability to collect and store DNA of even innocent people who may not have been involved in the crime but were subjected to an investigative examination or DNA testing because they were on the police's list of suspects, owing to the authorisation for DNA

³⁹ Leigh M Harlan, *When Privacy Fails: Invoking a Property Paradigm to Mandate the Destruction of DNA Samples* 54 *TOURO INT'L L. REV.* 179, 179 (2004–05)

⁴⁰ AIR 2017 SC 4161

⁴¹ E Donald Shapiro and Michelle L Weinberg, *DNA Data Banking: The Dangerous Erosion of Privacy* 38 *U. ILL. L. REV.* 455, 477. (1990)

⁴² Fred W Drobner, *DNA Dragnets: Constitutional Aspects of Mass DNA Identification Testing* 28 *HASTINGS SCI. & TECH. L.J.* 479, 479–80, (2000)

fingerprinting of DNA samples in criminal or other investigations. This gives police the possibility to track down suspects and collect and store DNA of innocent people who may not have been involved in the crime. Hence, while this criminal investigation method may benefit the investigative agencies, its frequent usage in non-criminal instances may violate the Right to Privacy of several innocent people and allow the state to retain genetic data from citizens and non-citizens⁴³.

The preceding connotational analysis demonstrates that DNA evidence is admissible in India; yet, it also encourages care in its application. As privacy was not recognised as a human right until after court decisions concerning DNA profiling were made, there is need a relook at the admissibility of DNA Profiling Evidence through the prism of Privacy. The constitution itself therefore specifies a “restricted sphere of usage” for DNA fingerprinting/ profiling technology by the State under the acknowledgment of the fundamental right to privacy. So, it is against the fundamental policy of Indian law and a violation of the Right to Privacy of the people in India for the state to store DNA data or use it as part of its routine in addressing criminal or other civil or matrimonial issues. Considering the aforementioned court decisions and their implications for DNA fingerprinting, it is clear that the Indian legal system has always acknowledged the need for a cautious and circumspect approach to using DNA profiling.

CONCLUSION

The full potential of DNA testing to identify culprits and clear those wrongfully condemned has not yet been realised, despite the fact that it has greatly advanced the discovery of new forensic evidence sources. Further progress in testing technology and Genetic evidence collection and processing systems is needed to achieve this goal.

The use of DNA profiling to investigate criminal suspects represents the most significant departure from the right against self-incrimination established by the English common law tradition. DNA

⁴³ Mark A Rothstein and K Talbott Meagher, *The Expanding Use of DNA in Law Enforcement: What Role for Privacy?* 34(2) B.U. J. Sci. & Tech. L. 153, 159 (2006)

profiling is not a perfect investigative and probative technique, and lawyers dislike it since it is “machine” evidence, in which a scientific technology effectively controls a verdict. When used by a competent operator, it produces pinpoint accuracy. As expected, it yields nonsense when used by a fool.

Evidence provided by the odds ratio (Probability) is diminished if the quality of the sample is poor. There are a huge number of little procedures that must all be carried out accurately for the process to succeed. Transferring materials from one step to the next incorrectly is the most common cause of error. Also, issues exist with regards to rights of the defence to access the evidence, independent review, and the interpretation of the test. All this difficulty should, at the very least, lead to standardised approaches to testing and quality assurance.

DNA profiling has the potential to exclude the innocent, which is its greatest benefit to society, and this makes it a novel technology despite its many drawbacks. Conviction rates have increased dramatically as well. The courts and the general public must have a thorough comprehension of the technology to act justly.

There is widespread dissatisfaction among forensic professionals due to the lack of scientific expertise among lawyers, according to a recent survey. The DNA profile and its evidential significance in the administration of criminal justice require that the lawyers and judges be instructed on complicated scientific material before trial. It is important to highlight that while the Indian legal system authorises DNA fingerprinting and evidence to be admitted into the inquiry, it simultaneously ensures the limited use of technology in a number of investigative disciplines. In addition, the state has a constitutional duty to guarantee the right to privacy’s appropriate protection and protection from infringement when it was declared a fundamental right. Consequently, it becomes established constitutional jurisprudence reflecting the duty of the state to ensure limited and restricted collecting, keeping, analysis, and use of Genetic data and fingerprints of Indian citizens in order to provide adequate protection of their privacy and personal freedom.

The constitutional law not only specifies the state's duties under the constitution, but also makes clear a constitutional prohibition on the state's action regarding India's overuse of DNA fingerprinting. Hence, while DNA evidence and fingerprinting are permitted for use in the investigation under Indian law, such evidence and these methods may only be used under specific conditions. This methodology should not be used in routine investigations and courses by the state.

A large number of actors, including the government, scientists, attorneys, activists, and other non-governmental organisations, must collaborate in order to create a DNA database. Since that every nation will have its own unique technical, political, and socio-legal systems to contend with, there is no one set of rules that should be followed for the regulation and control of DNA technology. The effort to operationalize a data bank capable of identifying offenders based on their digital DNA profiles must be assessed in terms of whether it has the potential to promote or erode civil freedoms⁴⁴.

There needs to be a delicate equilibrium between freedom and safety in order to complete this task successfully. This intricacy has been acknowledged by the efficient governance of DNA Data Banks in the West, which has also collaborated with civil society to offer policy recommendations for controlling the application of DNA technology. To ensure that justice is served to the public in an efficient and effective manner, there ought to be a DNA Legislation in India based on advanced Forensic Techniques, yet not compromise on the Liberty and Privacy of people.

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⁴⁴ Yale H Yee, "Criminal DNA Data Banks: Revolution For Law Enforcement or Threat to Individual Privacy?" 22 HARV. J.L. & TECH 461, 480. (1995)