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ISSN: 2582-6433

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ISSN: 2582-6433

EMERGENCE OF DNA IN THE CRIMINAL JUSTICE SYSTEM

AUTHORED BY - SOMANJANA DUTTA CHATTAKHANDI[1]

Introduction

The accuracy and transparency of the investigation are improved by procedural fairness in the gathering of evidence. One of the investigation's weak points has been the possibility that even the principal testimony of the witness could have numerous flaws, such as antagonism, which would defeat the goal of justice. The Supreme Court of India stated, It is a general handicap attached to all eyewitnesses, if they fail to speak with precision, their testimony would be criticised as evasive and vague, but on the other hand, if they speak to all the events very well and correctly, their testimony becomes vulnerable to criticism as tutored (Bhag Singh V State of Punjab, 1997). DNA profiling allows examination of human biological materials at its most fundamental level - the deoxyribonucleic acid (DNA) molecule. This molecule which is found in every living cell within the body, carries the genetic information that makes one individual separate and distinct from every other individual. The DNA profiling process involves extracting the DNA from a specimen such as semen, blood or tissue and chemically dividing the DNA into fragments.

Concept of DNA

Deoxy ribo nucleic acid (DNA) was discovered by Swiss researcher
Johannes Friedrich Miescher in 1869 while he was studying blood cells later James Watson and Francis Crick later while doing an experiment found the double helix structure of a DNA which helps to preserve the genetic code of organisms. DNA is the monozygotic twins, DNA structure is the same because they come forth by the division of a single fertilized egg. Monozygotic twins are generally identical. The nucleotides stand as the backbone of each strand alternate between phosphate groups and deoxyribose sugar. Each sugar contains one of four bases: thymine (T), adenine (A), cytosine (C), or guanine (G). Chemical linkages between the strands bind the two strands together; cytosine binds to guanine and adenine to thymine. The DNA is the blueprint of the individual. The techniques of DNA profiling provides a degree of accuracy greater even than current methods of finger printing suspects. DNA profiling

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ISSN: 2582-6433

allows examination of human biological materials at its most fundamental level - the deoxyribonucleic acid (DNA) molecule. This molecule which is found in every living cell within the body, carries the genetic information that makes one individual separate and distinct from every other individual. The DNA profiling process involves extracting the DNA from a specimen such as semen, blood or tissue and chemically dividing the DNA into fragments. DNA is present in every living organism which helps to distinguish one from the other.

DNA profiling

Regardless of the type of test being run, a few fundamental procedures are followed during DNA analysis. The general process entails the following steps: 1) the isolation of DNA from a sample of evidence containing DNA of unknown origin, and typically later, the isolation of DNA from a sample (such as blood) from a known individual; 2) the processing of the DNA so that test results may be obtained; 3) the determination of the variations in the DNA test results (or types), from specific regions of the DNA; and 4) the comparison and interpretation of the test results from the unknown sample with the test results from the known sample. Following are the different types of DNA Profiling techniques: The procedure for processing forensic DNA samples with STR markers is reviewed below. The VNTR sequences that Dr. Jeffreys first described are now known as STRs. Samples collected from crime scenes or paternity investigations are put through specific biological, technological, and genetic processes.

Importance of DNA profiling

DNA is an essential piece of scientific evidence which solve lot of legal issues like sexual abuse, murder, and other heinous crimes. DNA profiling is required for the investigation of Criminal conduct.

DNA Profiling provides information from different kinds of trace evidence like hair, semen, sweat, tear, saliva and other trace evidences.

DNA profiling is mainly required for the following things,

- Identification of the crime scene
- Exclusion of any DNA found at the crime scene
- To find out any relation with any blood found on the suspect’s cloth
- To find relation with any blood found on potential weapons

ISSN: 2582-6433

Techniques of DNA profiling

The different types of DNA profiling techniques are,

a. DNA Extraction
b. RFLP Analysis
c. PCR Analysis
d. STR Analysis
e. Y Chromosomal Analysis
f. Mitochondrial Analysis

a. DNA Extraction

DNA extraction, both manual techniques and commercially available kits are employed. DNA can be extracted from a variety of tissues, such as blood, bodily fluids, direct fine needle aspiration cytology (FNAC) aspirate, formalin-fixed paraffin-embedded tissues, frozen tissue section, etc.

b. RFLP Analysis

RFLP probe is a labelled DNA sequence that, after being separated by gel electrophoresis from one or more digested DNA sample fragments, hybridises with those fragments to reveal a distinctive blotting pattern specific to a particular genotype at a particular locus. As RFLP probes, short, single- or low-copy genomic DNA or cDNA clones are frequently utilised.

c. PCR Analysis

The laboratory may be able to analyse DNA evidence that has been severely degraded because PCR analysis only needs a tiny amount of DNA. While identifying, gathering, and preserving DNA evidence, more consideration must be given to contamination.

d. STR Analysis:

Utilising short tandem repeat (STR) technology, particular loci (regions) of nuclear DNA are examined. One DNA profile from another can be distinguished using variations in STR regions.

e. Y Chromosomal Analysis:

Analysis of genetic markers on the Y chromosome is particularly helpful for tracking

ISSN: 2582-6433

relationships among males or for analysing biological evidence with numerous male contributors since the Y chromosome is passed straight from father to son. (Dhabarde, 2012)

f. Mitochondrial Analysis:

Analysis of Mitochondrial DNA When RFLP or STR analysis is not possible, mitochondrial DNA analysis (mtDNA) can be utilised to investigate the DNA from the samples. For RFLP, PCR, and STR analyses, samples must have nuclear DNA extracted; however Mitochondrial DNA analysis employs DNA isolated from a different cellular organelle called a mitochondrion. Mitochondrial DNA is quite important in the investigation of instances that have been unsolved for a long time.

International Perspective on Admissibility of DNA evidence

In most of the countries there are different legislation regarding admissibility of DNA evidence. In this paper admissibility of DNA evidence in US, UK and Canada has been discussed.

- **Admissibility of DNA evidence in US**

Frye v. United States[2] is the first case regarding the admissibility of DNA evidence. The Frye test had two aspects,

1. The principle or scientific technique
2. The acceptance.

Demerit of Frye test was found on two basis

i. Acceptance by the society regarding admissibility of scientific evidence is time consuming
ii. Scientific evidence was given more importance than judiciary.

Thus the Federal Rules Of Evidence enacted in 1975 stated the need of expert opinion to make the scientific evidence admissible. But the enactment of Federal Rules Of Evidence did not settle the dispute as the standard of acceptance was not mentioned.

So, the United States Supreme Court laid down the guidelines in the remarkable judgment of

[2] Frye v. United States 293 F.1013 (D.C. Cir. 1923)

ISSN: 2582-6433

Daubert v. Merell Dow Pharmaceuticals[3], by stating that the Federal Rules of Evidence superseded the Frye Rule and it also laid down the factors for the basis of scientific evidence which are also known as The Daubert Guidelines.

The Guidelines are as follows:

- The content of the scientific testimony can be tested using the scientific method
- The technique has been subject to a deep review.
- There must be professional standards for the application of the technique.
- The acceptance must be within the scientific experts.

Later in the Kumho Tire[4] the scope of Daubert Analysis has been expanded and Federal Rules Of Evidence were then amended in 2000. The Rule 702 now state about the admissibility of the expert evidence if the expert is qualified enough.

Admissibility in UK

R v. Turner case[5] provided four principles regarding admissibility of expert opinion in UK which are:

1) Assistance
2) relevant expertise
3) impartiality and
4) evidentiary reliability

In UK the Criminal Justice Act has been enacted to deal with the admissibility of DNA evidence.

Admissibility in Canada

DNA Identification Act 1998 was enacted in Canada by virtue of which Solicitor General of Canada established National DNA data bank. This Act also amended the Criminal Code by allowing judge to form a post-conviction DNA data bank order where bodily substances is to be collected from a person accused under Criminal Code offences and accused's DNA profile can be included in the National DNA data bank. This Act identifies two indexes, a crime scene index and a convicted offenders index.

[3] Daubert v. Merell Dow Pharmaceuticals, Inc 509 U.S. 579 (1993)
[4] Kumho Tire Company, Ltd. v. Carmichael, 526 U.S. 137 (1999)
[5] [R v. Turner [1975] QB 834]

ISSN: 2582-6433

Legislative Provisions regarding admissibility Of DNA evidence

In India there is no specific legislation regarding admissibility of DNA profiling techniques. To make DNA evidence admissible in the court, it must corroborate with thewith the circumstantial evidence. By the emergence of new criminal laws in the year 2023, followed by its coming into force on July1st of 2024, there seems to be some provisions has been incorporated relating to admissibility of DNA evidence.

Sec. 51 of the BNSS (Bharatiya Nagarik Suraksha Sanhita, 2023) provides about the examination of an accused person if there is necessity of such medical examination on the request of a police officer. Sec. 52 of the BNSS (Bharatiya Nagarik Suraksha Sanhita, 2023) speaks that if there is reasonable ground by virtue of which medical examination can reveal about commission of offence of rape then such examination can be conducted against an accused.

Sec. 53 of the BNSS (Bharatiya Nagarik Suraksha Sanhita, 2023) says that the accused must be subjected to compulsory medical examination by a government or a registered medical practitioner. The medical examination under section 53 of BNSS includes all the different types of forensic examination.

Section 176 (3) of the BNSS (Bharatiya Nagarik Suraksha Sanhita, 2023) provides compulsory forensic examination if an offence is punishable with seven years or more has been committed. Section 184 of the BNSS (Bharatiya Nagarik Suraksha Sanhita, 2023) incorporates the provision for the forensic examination of a rape victim. .

Previously, there was no provision for storage of any data that has been collected by the forensic examinations. The DNA evidence was stored by the State Forensic Laboratories for a certain time period, i.e., at most up to 50 years. But, the enforcement of the (Criminal Procedure (Identification) Act, 2022) permits the storage of such data up to 75 years.

Sec 39 (1) of the BSA (Bharatiya Sakshya Adhiniyam, 2023) speaks about the expert opinion. If an expert gives a report related to any scientific examination technique such as DNA profiling, then such expert opinion may be accepted by the court in the criminal proceedings.

ISSN: 2582-6433

Limitations on admissibility of DNA evidence

1. **Infringement of fundamental right**

The introduction of the DNA technology infringe "Right to privacy" under Article 21 and "Right against Self-incrimination" under Article 20(3) for which courts are reluctant in accepting the evidence based on DNA technology. Right to Privacy has been included under Right to Life and Personal liberty or Article 21of the Indian Constitution, and Article 20(3) provides Right against Self- Incrimination which protects an accused person in criminal cases from providing evidences against himself or evidence which can make him guilty but Supreme Court in some of its decisions has imposed limitations on the exercise of fundamental rights. In **Govind Singh v. state of Madhya Pradesh**, AIR 1975 SC 1378, (1975) 2 SCC 148 Supreme Court held that a fundamental right must be subject to restriction on the basis of compelling public interest. In another case **Kharak Singh v. state of Uttar Pradesh**, AIR 1963 SC 1295 Supreme Court held that Right to privacy is not a guaranteed right under our Constitution. It is clear from various decisions which have been delivered by the Supreme Court from time to time that the Right to Life and Personal Liberty which has been guaranteed under our Indian Constitutions not an absolute one and it can be subject to some restriction. And it is on this basis that the constitutionality of the laws affecting Right to Life courts in the country have allowed DNA technology to be used in the investigation and in producing evidence. To make sure that modern technologies can be used effectively, there is an urgent need of a specific legislation which would provide the guidelines regulating DNA testing in India. According to the Law Commission of India, (41st Report on The Code of Criminal Procedure, Law Commission of India, Government of India, Sept. 1969)"The commission has considered at length the question as to how far the physical examination of the arrested person is legally and constitutionally permissible and what provision, if any, should be made for the purpose of the code. It was determined that a provision on the issue was necessary, and it was suggested that a new section be added that would permit, under specific conditions and with certain safeguards, the accused's person to be examined by a licenced medical professional. We concur that such a provision will not violate Article 20(3) of the Constitution and is necessary for an efficient investigation. Taking the blood sample under the watchful eye of the law is neither cruel, disrespectful, or surprising.'' Chapter 53 of the Code imposes a responsibility on the person who has been arrested to submit to a medical examination at the request of a police officer in order to aid the inquiry.

ISSN: 2582-6433

The constitutional requirement does declare that no one shall ever be deprived of his or her own freedom. In **Ananth Kumar Naik v. State of Andhra Pradesh,** MANU/AP/0220/1977 case Andhra Pradesh High Court held that The Court stated that "Examination of a person by a medical practitioner must logically take in examination by testing his blood, semen, urine, etc." when examining the application of Section 53 of the Criminal Procedure Code. The Court Again Allahabad High Court in **Jamshed v. State of UP**, MANU/UP/0239/1976 case the Court concluded that I have also adopted the position that, even though Indian law does not specifically permit the collecting of a blood sample, "examination of a person" in a criminal case encompasses both the taking of a blood sample and the examination of any internal organ. It has been noted that obtaining a blood sample is not considered to be unpleasant or startling to the conscience in today's society and cannot be claimed to be offensive or against common decency. As a result, Section 53 of the Code may allow for even little pain during the process. In **Neeraj Sharma v. State of U.P** MANU/UP/0248/1992When addressing the authority of the Magistrate to order a medical examination under Section 53 of the Code, the Allahabad High Court held as follows: "It will not be proper to give a restricted meaning to the word 'examination' used in Section 53 of the Code. In order for a doctor to render an opinion, he or she may wish to examine the accused thoroughly using all available modern and scientific tools. This examination should not be limited to a cursory examination that involves only looking at the accused's body. More recently, the Supreme Court stated in the case of **Selvi,** (Smt. Selvi v. State of Karnataka, 2010) citing Kathi Kalu, that Article 20(3) is intended to prevent the compelled conveying of intimate knowledge that is pertinent to the facts at hand. It is impossible to classify the results of polygraph, narcoanalysis, and brain electrical activity profiling as physical evidence like human fluids and other tangible objects because they have a testimonial quality. The Court acknowledged that whereas body materials including blood, semen, sweat, hair, and fingernail clippings, as well as DNA profiling, can be considered physical evidence, the same cannot be true for the techniques in question.

2. Evidentiary Value

DNA is not thought to be a concrete piece of proof; rather, it is only an expert judgement that can be used to corroborate other evidence. The admissibility and relevance of expert opinion are covered by the Indian Evidence Act of 1872 (Dube D., 2012) . An

ISSN: 2582-6433

expert is a person who has spent a lot of time studying a certain field of knowledge and is therefore particularly knowledgeable on the subjects on which he is asked for his opinion. There are no specific exams established by legislation to establish the level of training or experience a person must have to be considered an expert. (State of Himachal Pradesh v. Jai Lal, 1999) The expert's report is not admissible until the affected party has had a chance to cross-examine him and the expert has been deposed as a witness. A conclusion made by an expert that is not backed up by evidence must also be disregarded. Therefore, DNA evidence may be considered acceptable as expert opinion under Indian law. Although the correctness, dependability, and certainty of its conclusions have been taken into consideration, it is treated on an equal footing with other scientific or expert information and has not been given any special weight. According to Indian law, a DNA test may be performed during an investigation by the police if they believe it will provide proof that the crime was committed. This proof may then be introduced during a trial as expert testimony under Section 45 of the Act. Based on his expertise and subject knowledge, the expert must persuade the court of the mode of conduct, authenticity, and accuracy of the findings. The Court may form an opinion based on the findings, which it may then accept if it seems likely in light of other evidence.

Impact of DNA evidence

1. DNA evidence increases the likelihood of accurate convictions and exonerations.
2. It helps to establish guilt beyond reasonable doubt in many murder cases.
3. The technology also aids in closing cold cases and providing closure to families.

Judicial analysis in regard to admissibility of DNA evidence

There have been different cases which have dealt by admissibility of DNA evidence. In many murder, paternity, rape cases judiciary has given various decisions relating to admissibility Of DNA evidence. In Selvi v. State of Karnataka, [6] is a significant ruling by the highest judicial body in India, i.e., the Apex Court. It recognized that DNA evidence does not involve the use of the accused's mental faculties to extract information. Consequently DNA evidence neither infringe upon the right to remain silent nor it avoid self-incrimination. The Court emphasized the need to protect the privacy and personal liberty of individuals by recomending that DNA

[6] Selvi v. State of Karnataka (2010) AIR SC 1974

ISSN: 2582-6433

profiling should be conducted with the consent of the individual and in accordance with legal procedures in Kishan Lal @ Champa Yadav vs State of Chhattisgarh (2023)[7] dealt with charges of rape and the subsequent birth of a child. The accused was convicted under Section 376(3) of the Indian Penal Code because of sexually assaulting a juvenile, which led to the birth of a female child. The victim was a minor during the occurrence of the incident. The prosecution's argument was primarily based on the DNA report which established the appellant and the victim as the biological parents of the child. However, both the victim and her father turned hostile during the trial even victim denied the occurrence of any incident, and the father refused the collection of blood samples in his presence. The court had to determine whether the conviction could be sustained solely based on the DNA evidence, given the lack of support from the victim and her father. The court referred to Sections 53A and 164A of the Criminal Procedure Code (CrPC), which outline procedures for the Forensic examination of both the perpetrator and the survivor in instances of sexual assault. The High Court upheld the trial court's conviction accordingly the appellant's guilt was conclusively established. In Pattu Rajan v. State of Tamil Nadu, (2019)[8] the Supreme Court of India addressed significant issues regarding the evidentiary value of DNA profiling and the use of superimposition techniques in criminal investigations. The issue involved here was if the conviction was valid despite the lack of DNA evidence and reliance on the superimposition technique. The Supreme Court upheld the conviction and clarified that DNA evidence is considered opinion evidence under Section 45 of the Indian Evidence Act. It further held that DNA testing depends on other corroborative evidence present in the case. The Court held that the lack of DNA evidence does not inherently raise presumption against the prosecution, particularly in cases when there is substantial other evidence. In State v. Nalini (1999) 5 SCC 25 case Rajiv Gandhi the former Prime Minister of India, was assassinated by a human bomb. DNA test was conducted. DNA profiling assisted to identify the victims and also helped to identity of the perpetrators through the belt collected from the crime scene where there was found body flesh tissue. In Nithari Murder Case, Surendra Koli v. State of Uttar Pradesh & Others (2011) 4 SCC 8 in this case Accused were convicted under Sections 302/364/376 of the Indian Penal Code, 1860 by Special Sessions Trial. Identity of the dead body was established by the DNA test. The DNA test was conducted by matching her DNA with that of her parents and brother. In S.Veeralakshmi v. The Superintendent of Police, Madurai,[9]and in Sakhivel v. Karpagam,[10] case court held that the if

[7] Kishan Lal @ Champa Yadav vs State of Chhattisgarh, (2022) Criminal Appeal No. 565
[8] pattu Rajan v. State of Tamil Nadu (2019) 4 SCC 771
[9] 2015 (2) Mad LJ (Cri) 39 : 2015 (1) LW(Cri) 202
[10] (2005) 3 MLJ 483.

ISSN: 2582-6433

there is no justified defect in the prior second DNA test cannot be ordered. Since the order passed by trial court to conduct DNA test again had no mention of any infirmity in the earlier DNA report, the order was set aside by the high court. In Bijender v. Manjeet,[11] upheld the order of the trial court on the prayer of the husband for conducting DNA test to determine paternity of the child. The high court observed that ordering DNA test does not violated the basic principles laid down in the Goutam Kundu[12] as contended by the wife. In Kailash Devi v. Pyare Lal,[13] the wife who was petitioner filed an appeal to conduct the DNA test of husband who was the accused in this case and wife and the children of the who were born from his illegal marriage the High Court of Punjab and Haryana observed that DNA test can prove the physical relation between the two individuals, accordingly children have born out of such marriage can be proved by DNA test. In State (NCT of Delhi) v. Badruddin,[14] case the accused was charged for penetrative carnal intercourse with nine years old boy who stayed in the neighbourhood of the accused. DNA test was conducted on the anal swab and the blood stain and semen stain found on the clothes of the victim and consequently it matched with that of the accused. This evidence corroborated the commission of the offence which automatically resulted in conviction of the accused. In Nirbhaya case,[15] where the victim, was molested heinously in bus by four notorious criminals by virtue of which many organs of the victims were destroyed. Supreme Court matched evidence of the accused's presence in the bus and their involvement in the offence from DNA identification, fingerprints, witness accounts, and odontology. Thus from the above approach of judiciary it is evident that in many cases DNA evidence has played a role in the identification of the accused and hence it resulted in conviction of the accused but this DNA evidence needs to be corroborated with the circumstantial evidence.

Conclusion and Suggestion

Examining the evidence leads to the conclusion that, given the "progress" of criminals and changes in crime patterns, it is absolutely necessary to systematically conduct inquiries and allow for the admission of any and all scientific evidence in court. Many unresolved crime cases can be resolved with the help of forensic evidence, including DNA analysis. If the investigating officer had properly and promptly gathered the DNA evidence, the murder of

[11] 2015 SCC OnLine P&H 13586.
[12] AIR 1993 SC 2295; (1993) 3 SCC 488.
[13] 2015 LawSuit(P&H) 7419.
[14] 2015 LawSuit (Del) 2585
[15] Mukesh v State (NCT Delhi),2017 6 SCC1

ISSN: 2582-6433

Arushi Talwar-Hemraj would not still be a mystery today. Forensic evidence has, to date, assisted in the resolution of numerous complex cases, and because of factors like correctness, dependability, and authenticity, forensic evidence is given a very high evidentiary value in court. The science of forensic evidence is currently developing and evolving, necessitating changes to the nation's current laws, particularly in light of forensic evidence.

Suggestion

1. The requirement for efficacy under the expanded advancements of forensic evidence's collection methodologies under the authority or jurisdiction of the Police Act, 1861, is extremely important or required on a wider scale. In other words, they easily with lack of concrete or strong evidence gets an easier acquittal from the Hon'ble Court of Law because without any reformation under the Police Act, 1861, the Forensic Evidences have been left unexposed and the Police Authorities are not having such bright or broad knowledge about these things.
2. According to the Police Act of 1861, there will be a pressing need in the scientific and forensic fields that must involve forensic instruments or methodologies for collecting forensic evidence, or police authorities must be aware of or receive basic training in the collection of forensic evidence through various means of criminal agencies like the NIA (National Investigation Agency), CBI (Central Bureau of Investigation), and others.[16]

[16] Dr. Chinmaya Kumar Mohapatra and Mr. Rudra Narayan Sahoo, DNA Evidence In Criminal Justice System: Admissibility, Reliability, And Accuracy, Nanotechnology Perceptions, available at http://www.nano-ntp.com