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Understanding the Challenges of Forensic Evidence in Courts and Criminal Investigations

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ABSTRACT

This paper examines the legal and ethical challenges surrounding the admissibility and use of forensic evidence in Indian criminal trials. As the Indian judiciary increasingly relies on forensic science, ranging from DNA profiling and fingerprint identification to cyber forensics, the reliability and validity of such evidence have become central to fair-trial standards. The paper analyses the statutory framework governing scientific evidence, principally the Bharatiya Sakshya Adhiniyam, 2023, alongside the Bharatiya Nagarik Suraksha Sanhita, 2023 and the Bharatiya Nyaya Sanhita, 2023, and identifies persistent problems of inconsistent judicial interpretation, weak chain of custody, inadequate infrastructure, a shortage of trained experts, and the absence of uniform national standards. It further considers the ethical and constitutional concerns raised by procedures such as narco-analysis, polygraph testing and compelled sample collection, particularly in relation to the right against self-incrimination under Article 20(3) and the right to privacy under Article 21. Drawing on leading judicial decisions, the paper proposes reforms to ensure that forensic science is applied in a manner that upholds both scientific rigour and constitutional protections.

Keywords: Forensic evidence, Criminal trials, Legal and ethical challenges.

I. INTRODUCTION

The criminal justice system is no exception to the influence of technological change, and it too has been profoundly shaped by recent advances. Over the past several decades, the integration of technology into crime investigation has substantially transformed the administration of criminal justice. Law-enforcement agencies now rely on scientific methods and tools to investigate crimes, reconstruct crime scenes, identify suspects, and establish critical connections. Courts, in turn, consider such physical evidence, which is often difficult to dispute, in order to reach more accurate determinations of guilt or innocence.¹ As a result, the efficiency

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¹ K.S. Narayan Reddy, THE ESSENTIALS OF FORENSIC MEDICINE AND TOXICOLOGY 87 (34th ed. 2022).

and effectiveness of the criminal justice system are increasingly linked to the degree of technological integration in crime investigations.

The admissibility and use of forensic evidence in criminal trials raise significant legal and ethical issues, owing to incoherent judicial practices, the absence of uniform procedures, and the potential for violations of fundamental rights.² This paper seeks to critically analyse these challenges, so as to ensure that forensic evidence is applied in a manner that upholds both scientific principles and constitutional protections.

One of the principal problems is the inconsistency in legal standards and judicial interpretation regarding the admissibility of forensic evidence under the Bharatiya Sakshya Adhiniyam, 2023.³ While Sections 39 and 40 provide for expert opinion,⁴ there is ambiguity about the extent to which such opinions should influence judicial decisions. This paper examines the key challenges and significant judicial decisions that have shaped the criminal justice system in India. In the Indian context, the law relating to forensic science is most prominently reflected in the Bharatiya Sakshya Adhiniyam, 2023, which replaced the Indian Evidence Act, 1872, rather than in the Bharatiya Nagarik Suraksha Sanhita, 2023 (which replaced the Code of Criminal Procedure) or the Bharatiya Nyaya Sanhita, 2023 (which replaced the Indian Penal Code). The Bharatiya Sakshya Adhiniyam, 2023 sets out the rules governing the admissibility of scientific evidence in court. A prominent aspect of forensic science is DNA testing. Although there is no dedicated legislation governing DNA testing, the Bharatiya Nagarik Suraksha Sanhita, 2023 recognises medical examination during criminal investigations. Sections 51 and 52 of the Sanhita provide for the examination of an accused person by a registered medical practitioner on reasonable grounds during the course of an investigation, and such examination may include the collection of bodily substances, including DNA samples, where necessary for evidentiary purposes.⁵

A further primary concern relates to the ethical and human-rights implications of certain forensic procedures, such as narco-analysis, polygraph testing, and DNA profiling conducted without consent. These methods frequently raise questions concerning bodily autonomy, self-incrimination, and the right to privacy under Articles 20(3) and 21 of the Constitution of India. In addition, the absence of uniform national guidelines or legislation regulating forensic procedures can lead to abuse, manipulation of evidence, or violation of due process. This paper

² BATUK LAL, *THE LAW OF EVIDENCE* 56 (8th ed. 2023).

³ INDIA CONST. arts. 20-21.

⁴ Bharatiya Sakshya Adhiniyam, 2023, ss. 39-40, No. 47, Acts of Parliament, 2023 (India).

⁵ Bharatiya Nagarik Suraksha Sanhita, 2023, ss. 51-52, No. 46, Acts of Parliament, 2023 (India).

addresses these issues by analysing existing legal frameworks, identifying procedural and ethical shortcomings, and proposing reforms to ensure the just and responsible use of forensic science in India's criminal justice system.⁶

The increasing use of forensic investigation in criminal trials has significantly influenced the investigation and adjudication of criminal cases. However, this growing reliance has not been matched by the development of clear and consistent legal standards governing the admissibility and use of forensic evidence in courts. Judicial interpretations often vary, and in many cases evidence obtained through questionable means, such as narco-analysis or polygraph testing, is accepted without adequate scrutiny of its scientific validity or ethical implications.⁷ This creates a serious risk of miscarriage of justice, particularly in a system where forensic capacity is still developing and procedural safeguards are often weak or inconsistently applied.⁸

II. CHALLENGES OF FORENSIC EVIDENCE IN COURT

A. Lack of chain of custody

A proper and continuous record of evidence must be maintained from the time it is collected at the crime scene until it is produced before the court. The principal purpose of this record is to ensure that the evidence remains secure, genuine, and free from tampering throughout the investigation and trial. In forensic investigations, every individual who handles the evidence must carefully record key details, such as when and where the evidence was collected, who handled it, how it was stored, and when it was transferred to another person or laboratory.⁹ This helps create a clear and transparent history of the evidence at every stage.

For instance, if a blood sample is taken from a crime scene, the police officer collecting it, the forensic expert examining it, and the laboratory staff testing it must all maintain accurate records. If proper procedures are not followed and the chain of custody is broken, the court may question the reliability and authenticity of the evidence, which can weaken the case and affect the delivery of justice.

B. Outdated technology and a shortage of trained experts

In India, forensic science has become an important part of criminal investigations, yet the system continues to face serious problems arising from outdated technology and a shortage of

⁶ Praveen Singh & Vaishali Patel, *A Comprehensive Study of Forensic Science in the Indian Legal Context: Challenges, Opportunities, and Implications for Criminal Investigations and Trials*, 4(2) INDIAN J.L. & JUST. (2024).

⁷ LAW COMM'N OF INDIA, REPORT ON THE USE OF DNA TECHNOLOGY IN CIVIL AND CRIMINAL MATTERS (2017).

⁸ B.R. Sharma, *FORENSIC SCIENCE IN CRIMINAL INVESTIGATION AND TRIALS* (5th ed. 2018).

⁹ RICHARD SAFERSTEIN, *CRIMINALISTICS: AN INTRODUCTION TO FORENSIC SCIENCE* (12th ed. 2016).

trained experts. Many forensic laboratories still operate with old equipment, limited resources, and poor infrastructure. While modern crimes often require advanced techniques such as DNA testing, cyber forensics, digital-evidence analysis, and scientific fingerprint examination, several laboratories lack access to the latest equipment or updated software. As a result, investigations can become slow, and the accuracy of forensic reports may be affected.

Another significant problem is the shortage of skilled forensic professionals. In many laboratories, a small number of experts must handle a large volume of cases, which increases pressure and causes delays in preparing reports. Adequate training is not always available, and some forensic officers do not receive regular opportunities to learn about new technologies and scientific developments.¹⁰ As crime becomes more sophisticated and technology-driven, the need for qualified and well-trained experts is increasing rapidly. Without modern technology and experienced professionals, it becomes difficult for the forensic system to function efficiently and to support the courts in delivering swift and fair justice.

C. Poor coordination between agencies

Poor coordination between different agencies is a serious problem in criminal investigations and in the use of forensic evidence. During an investigation, many bodies, such as the police, forensic laboratories, medical practitioners, prosecutors, and courts, must work together. However, owing to weak communication and a lack of teamwork, important information is often delayed or misunderstood. Sometimes evidence is not collected properly, important documents are missing, or forensic reports arrive late, which impedes the progress of the case.¹¹ In some situations, evidence may even be damaged or lost because responsibilities are not clearly assigned. Different departments also follow different procedures, creating confusion and slowing the justice process. Better communication, proper training, and stronger coordination among agencies can help make investigations faster, more accurate, and more reliable in the delivery of justice.

D. Lack of proper infrastructure

The lack of proper infrastructure is a major problem in the field of forensic science and criminal investigation. Many forensic laboratories do not have modern equipment, updated technology, or sufficient space to handle cases properly. In several places there is also a shortage of trained experts and staff, which increases the workload and causes delays in testing evidence. Because

¹⁰ COMM. ON REFORMS OF THE CRIMINAL JUSTICE SYS., REPORT (2003); BUREAU OF POLICE RSCH. & DEV., Government of India.

¹¹ *Forensic Evidence in Indian Courts: Analyzing the Role of Investigating Agencies in Justice Delivery*, 4(2) INT'L J. CRIM., COMMON & STATUTORY L. 141 (2024).

of these limitations, forensic reports may take months or even years to reach the courts, slowing the justice process. Important evidence can also be damaged owing to poor storage or transportation facilities. Smaller towns and rural areas are often more severely affected, as they lack advanced forensic centres.¹² These problems reduce the efficiency and reliability of investigations. To improve the system, there is a strong need for better laboratories, modern equipment, adequate funding, and skilled professionals across the country.

E. Ethical and privacy concerns

Ethical and privacy concerns have become increasingly important in the field of forensic science and criminal investigations. Modern forensic methods often require the collection of sensitive personal information, including DNA samples, fingerprints, telephone records, and digital data. While such evidence plays a significant role in solving crimes, its misuse or careless handling can seriously affect an individual's privacy and dignity. Unauthorised access, data leaks, or the improper sharing of confidential information may harm innocent people and reduce public trust in the justice system.¹³ Ethical issues also arise where investigations are conducted without proper consent, transparency, or accountability. It is therefore essential for forensic agencies and legal authorities to follow strict ethical standards, maintain confidentiality, and ensure that scientific investigations respect both justice and individual rights.

F. Risk of human error and expert bias

The risk of human error and expert bias is an important challenge in forensic investigations. Forensic experts are responsible for examining evidence and presenting scientific opinions before the court. However, mistakes can occur during the collection, testing, analysis, or interpretation of evidence owing to negligence, lack of training, pressure, or fatigue. Even a small error may affect the outcome of a criminal case. In some situations, personal opinions, external influence, or pressure from investigating agencies can produce expert bias, where the expert may unintentionally favour one side of the case. This can lead to unfair investigations or wrongful convictions.¹⁴ In addition, different experts may sometimes reach different conclusions on the same evidence, creating confusion in court. Proper training, strict quality control, independent forensic examination, and ethical standards are therefore necessary to reduce human error and ensure fair and accurate justice.

¹² Shristi, *Forensic Science in India: Problems and Prospects* (Feb. 24, 2024).

¹³ *Legal and Ethical Considerations in the Use of DNA Fingerprinting*, 30(3) (2024).

¹⁴ B.V. SUBRAMANYAM, PARIKH'S TEXTBOOK OF MEDICAL JURISPRUDENCE, FORENSIC MEDICINE AND TOXICOLOGY (8th ed.).

G. Lack of uniform standards and regulations

The lack of uniform standards and regulations creates serious problems in forensic investigations and in the use of scientific evidence in courts. Different forensic laboratories and agencies often follow different methods for collecting, examining, and storing evidence. Because no uniform system applies everywhere, the quality and accuracy of forensic reports can vary from one place to another. This sometimes creates confusion during investigations and trials. In some cases evidence may not be handled properly, which can affect its reliability and delay justice. Many laboratories also operate without proper monitoring or standard guidelines.¹⁵ As forensic science plays an important role in criminal cases, clear national rules, proper laboratory accreditation, and a uniform system are necessary so that investigations become more accurate, fair, and trustworthy across the country.

H. Cybercrime and digital-evidence challenges

A lack of judicial understanding means that judges and other legal professionals may not always possess sufficient knowledge of the scientific and forensic methods used in criminal investigations. Today, forensic science plays an important role in solving crimes through techniques such as DNA profiling, fingerprint examination, cyber forensics, and digital-evidence analysis. However, these methods are highly technical and often difficult for those without scientific training to fully understand.¹⁶ When courts are unable to properly comprehend forensic evidence, there is a risk that the evidence may be misunderstood or incorrectly interpreted during a trial. This can affect the fairness of judicial decisions and may sometimes lead to wrongful convictions or acquittals. In India, this issue is mainly caused by limited forensic training for judges and lawyers, a lack of scientific awareness, and the rapid development of new technologies in the field of forensic science.¹⁷

As the Indian criminal justice system increasingly depends on scientific evidence, it has become important for judges and legal professionals to develop a better understanding of forensic techniques. Proper judicial knowledge can help courts evaluate evidence more accurately, ensure fair trials, protect the rights of individuals, and strengthen the overall delivery of justice.¹⁸

¹⁵ *Uniform Education Policy: Problems and Prospects*, 10(5) J. EMERGING TECHS. & INNOVATIVE RSCH. (May 2023).

¹⁶ Available at <https://papers.ssrn.com/sol3/Delivery.cfm?abstractid=3499592> (last visited May 20, 2026).

¹⁷ Neeraj Malik, *The Use of Forensic Evidence in Indian Criminal Trials: Admissibility, Reliability, and Constitutional Safeguards*, SHODH SAGAR (Dec. 31, 2015).

¹⁸ *Navigating Challenges: Factors Compromising Scientific Evidence's Efficacy*, CRIM. JUST. ADMIN. (Dec. 4, 2004).

III. LEGAL AND ETHICAL CHALLENGES

Despite the increasing reliance on forensic science to improve accuracy and fairness in criminal investigation, the admissibility and use of forensic evidence in Indian criminal trials confront significant legal and ethical challenges.¹⁹ From a legal standpoint, outdated evidentiary laws, inconsistent procedures, insufficient infrastructure, and conflicting judicial rulings weaken the reliability and acceptance of forensic material in court. From an ethical standpoint, problems associated with privacy, consent, coercion, expert bias, and data misuse erode the fundamental rights and dignity of individuals.²⁰ Inadequate regulatory mechanisms and ethical frameworks have produced inconsistencies in the manner in which forensic evidence is gathered, examined, and presented, giving rise to significant concerns relating to due process, fairness, and the integrity of the criminal justice system in India.²¹

The incorporation of forensic evidence into criminal trials has meaningfully transformed investigative and adjudicative processes. Yet its use in courtrooms remains beset by serious legal challenges, which arise from statutory inadequacies, procedural irregularities, and inconsistencies in judicial interpretation.

A. Deficient legislative framework

The principal law of evidence in India, the Indian Evidence Act, 1872, was drafted in a pre-scientific era. Sections 45 to 51 permitted expert opinion, but they did not define standards for forensic methodology, accreditation, or reliability testing. The Act therefore offered limited guidance on how forensic evidence should be collected, preserved, or interpreted. While statutes such as the Code of Criminal Procedure, 1973 (Sections 53, 53A and 164A) and the Information Technology Act, 2000 supplemented the Indian Evidence Act, the absence of a unified forensic-science law resulted in a fragmented framework that undermined evidentiary credibility.

B. Deficiency in uniform standards and certification

The lack of standard procedures for forensic collection and testing leads to wide discrepancies across laboratories. India has more than thirty state and central forensic science laboratories, but most lack accreditation from the National Accreditation Board for Testing and Calibration Laboratories (NABL). This lack of standardisation results in inconsistent analytical results and

¹⁹ S.K. Verma & Aditi Verma, *Admissibility of Forensic Evidence in Indian Courts*, INDIAN INTERNET J. FORENSIC MED. & TOXICOLOGY.

²⁰ Neeraj Malik, *The Use of Forensic Evidence in Indian Criminal Trials: Admissibility, Reliability, and Constitutional Safeguards*, SHODH SAGAR (Dec. 31, 2015).

²¹ R. Abishieke & Anumeha Sahai, *Ethical and Legal Challenges in India's Forensic Framework*, INDIAN J. LEGAL REV., ISSN 2583-2344.

poor reproducibility, which courts often view with scepticism. The problem is aggravated by outdated equipment and a severe shortage of trained personnel, leading to delays and questionable reliability.²²

C. Problems with electronic evidence

The growth of digital forensics has introduced new complexities under Sections 65A and 65B of the Indian Evidence Act. In *Anvar P.V. v. P.K. Basheer*,²³ the Supreme Court held that electronic evidence is admissible only if accompanied by a valid certificate under Section 65B(4). In practice, however, law-enforcement agencies frequently fail to provide such certificates, leading to the rejection of critical digital evidence. The subsequent ruling in *Arjun Panditrao Khotkar v. Kailash Kushanrao Gorantyal*²⁴ reaffirmed this procedural rigidity, thereby highlighting the tension between technical compliance and substantive justice.

D. Delay and backlog of cases

Forensic laboratories in India face significant case backlogs, with some reports taking months or even years. This delay not only prolongs trials but also affects the quality of analysis, owing to the degradation of biological samples. The Malimath Committee Report noted that the forensic infrastructure was grossly inadequate for India's caseload. This issue remains largely unresolved, creating a systemic bottleneck in the evidentiary process.

E. Judicial discretion

The determination of the probative value of forensic evidence ultimately rests with the judiciary, which often lacks the necessary scientific literacy. Under Section 45 of the Indian Evidence Act, the judge decided how much weight to give to an expert opinion. This inconsistency leads to unpredictable judicial outcomes and occasionally results in miscarriages of justice.

F. Varied specialist opinions

Forensic cases often involve multiple expert opinions, particularly in high-profile trials. Conflicting conclusions from different experts or laboratories can confuse courts and weaken the prosecution's case. Since the Indian Evidence Act provided little guidance on resolving such conflicts, courts must rely on discretion rather than clear legal criteria, thereby weakening evidentiary certainty.

²² J.K. Sinha, FORENSIC FIREARMS IN CRIMINAL TRIALS: LEGAL AND INVESTIGATIVE PERSPECTIVES (Taylor & Francis, 2024).

²³ *Anvar P.V. v. P.K. Basheer*, (2014) 10 SCC 473 (India).

²⁴ *Arjun Panditrao Khotkar v. Kailash Kushanrao Gorantyal*, (2020) 7 SCC 1 (India).

IV. MAJOR ETHICAL ISSUES OF FORENSIC EVIDENCE IN CRIMINAL TRIALS

Beyond legal hurdles, the ethical dimensions of forensic evidence raise serious concerns about privacy, consent, fairness, and human dignity.

A. Personal privacy and bodily integrity

Forensic evidence collection often involves the extraction of biological samples such as blood, semen, saliva, and hair, which directly engage the right to privacy under Article 21 of the Constitution. The Supreme Court's landmark ruling in *Justice K.S. Puttaswamy v. Union of India*²⁵ affirmed privacy as a fundamental right. However, many forensic procedures are carried out without informed consent, particularly in respect of accused persons or victims of sexual assault. The absence of privacy safeguards or consent protocols raises significant ethical concerns about bodily integrity and individual autonomy.

B. Duress and compelled testimony

Ethical issues also arise where forensic methods are used coercively. In *Selvi v. State of Karnataka*,²⁶ the Supreme Court held that the involuntary use of narco-analysis, polygraph testing, and brain-mapping violates the right against self-incrimination under Article 20(3). Nevertheless, reports persist of suspects being pressured into such tests, reflecting the gap between judicial safeguards and investigative practice.

C. Misuse and exploitation of forensic evidence

Ethical lapses in forensic procedures can lead to devastating miscarriages of justice. Tampering, selective presentation, and the practice of seeking out favourable expert opinions are serious problems. Since many forensic experts work within police departments, questions arise about their independence and objectivity. This institutional bias undermines public confidence in forensic neutrality and compromises the adversarial balance essential for fair trials.

D. Bias and inequality in technology

Emerging forensic technologies, such as facial recognition and predictive policing, pose new ethical risks. These systems often rely on biased data sets that may disproportionately affect marginalised groups. In a society where social and economic inequalities persist, such technological profiling carries a risk of reinforcing structural discrimination, and its deployment therefore warrants careful safeguards.

²⁵ *Justice K.S. Puttaswamy v. Union of India*, (2017) 10 SCC 1 (India).

²⁶ *Selvi v. State of Karnataka*, (2010) 7 SCC 263 (India).

E. Rights and dignity of the victim

In cases of sexual assault and homicide, forensic procedures can be deeply intrusive. Ethical challenges arise where victims are subjected to repeated examinations, sometimes in insensitive or degrading conditions.

F. Transparency and liability

A critical ethical issue is the lack of transparency in forensic processes. Reports are often withheld from the defence until the late stages of trial, limiting the accused's ability to challenge expert findings. This violates the principle of equality of arms and the ethical duty of fairness in criminal proceedings. Ethical forensic practice requires open disclosure and peer review in order to ensure impartiality.

In *Nandlal Wasudeo Badwaik v. Lata Nandlal Badwaik*,²⁷ decided by the Supreme Court of India in 2014, the Court established the evidentiary importance of DNA testing in paternity disputes. It held that, where DNA evidence conclusively disproves paternity, it can override the presumption of legitimacy under Section 112 of the Indian Evidence Act, 1872. The judgment emphasised that courts must prioritise scientific truth and modern forensic methods in delivering justice, thereby significantly influencing family law and evidentiary standards in India.

*Rohit Shekhar v. N.D. Tiwari*²⁸ became a landmark judgment in Indian family and privacy law. Filed in 2008, the case involved Rohit Shekhar's claim that the politician N.D. Tiwari was his biological father. After prolonged litigation, the Supreme Court upheld the Delhi High Court's order directing DNA testing, emphasising that the right to identity can outweigh privacy claims in the interest of justice. The DNA test confirmed Tiwari's paternity in 2012, strengthening the legal recognition of scientific evidence in civil disputes and individual-rights jurisprudence in India.

*State of Maharashtra v. Damu*²⁹ is an important judgment of the Supreme Court of India concerning circumstantial evidence and evidentiary standards in criminal trials. The case arose from charges of abduction and murder where the prosecution relied mainly on circumstantial evidence. The Court held that, in such cases, all circumstances must form a complete and unbroken chain pointing only toward the guilt of the accused, leaving no scope for alternative explanations. The judgment also clarified the evidentiary value of witness testimony and of the

²⁷ *Nandlal Wasudeo Badwaik v. Lata Nandlal Badwaik*, (2014) 2 SCC 576 (India).

²⁸ *Rohit Shekhar v. Narayan Dutt Tiwari*, AIR 2012 SC 1727 (India).

²⁹ *State of Maharashtra v. Damu*, (2000) 6 SCC 269 (India).

recovery of material objects under Section 27 of the Indian Evidence Act, 1872. This ruling significantly strengthened the principles of procedural fairness and proof beyond reasonable doubt in Indian criminal jurisprudence.

In *Ritesh Sinha v. State of Uttar Pradesh*,³⁰ the Supreme Court of India addressed whether a Magistrate could order an accused person to provide a voice sample during a criminal investigation. The Court held that obtaining a voice sample does not violate Article 20(3) of the Constitution, because it is physical evidence and not testimonial compulsion. The judgment recognised the growing importance of scientific and technological methods in criminal investigations. The Court also emphasised the need to balance investigative requirements with individual privacy rights under Article 21. This case significantly strengthened the admissibility and use of forensic voice analysis in the Indian criminal justice system.

Mukesh v. State (NCT of Delhi),³¹ decided by the Supreme Court of India in 2017, is a landmark judgment relating to the 2012 Delhi gang-rape and murder case, popularly known as the Nirbhaya case. The Court upheld the death penalty awarded to four convicts for the brutal rape and murder of a young woman in a moving bus in Delhi. The bench described the crime as falling within the rarest-of-rare category warranting capital punishment. The judgment emphasised deterrence, the safety of women, and societal justice, while also reinforcing the importance of forensic and medical evidence in criminal trials.

*Santosh Kumar Singh v. State through CBI*³² is a landmark judgment delivered by the Supreme Court of India in 2010 concerning the rape and murder of the law student Priyadarshini Mattoo in 1996. The accused, Santosh Kumar Singh, was initially acquitted by the trial court owing to a lack of evidence and investigative lapses, but the Delhi High Court later reversed the acquittal and awarded the death penalty. The Supreme Court upheld the conviction while commuting the death sentence to life imprisonment. The case highlighted the importance of forensic and circumstantial evidence in criminal trials and exposed deficiencies in police investigation and prosecution. It also became a significant example of judicial correction of a miscarriage of justice in India.

*Arjun Panditrao Khotkar v. Kailash Kushanrao Gorantyal*³³ is a landmark judgment of the Supreme Court of India that clarified the admissibility of electronic evidence under Section 65B of the Indian Evidence Act, 1872. The case arose from a dispute regarding the 2014 Maharashtra

³⁰ *Ritesh Sinha v. State of Uttar Pradesh*, (2019) 8 SCC 1 (India).

³¹ *Mukesh v. State (NCT of Delhi)*, (2017) 6 SCC 1 (India).

³² *Santosh Kumar Singh v. State through CBI*, (2010) 9 SCC 747 (India).

³³ *Arjun Panditrao Khotkar v. Kailash Kushanrao Gorantyal*, (2020) 7 SCC 1 (India).

Assembly election, where the Bombay High Court had relied on video recordings to invalidate the election of Arjun Panditrao Khotkar. The Supreme Court held that electronic records, such as videos and digital documents, are admissible only when accompanied by a mandatory certificate under Section 65B(4), unless the original device itself is produced before the court. The Court overruled the earlier decision in *Shafhi Mohammad v. State of Himachal Pradesh* and reaffirmed the ruling in *Anvar P.V. v. P.K. Basheer*, thereby strengthening the procedural safeguards for digital evidence in India.

V. LEGAL FRAMEWORK

The Bharatiya Sakshya Adhiniyam, 2023 replaced the Indian Evidence Act, 1872, which had been introduced during the British period to regulate the admissibility and relevance of evidence in Indian courts. The new law aims to make the system of evidence more modern and practical by recognising the growing importance of electronic and digital evidence in a technology-driven world. At the same time, it continues to provide the basic legal framework for determining how evidence is presented and evaluated in courts across India.

Similarly, the Bharatiya Nyaya Sanhita, 2023 replaced the Indian Penal Code and now forms the core of India's criminal justice system. It defines various criminal offences and prescribes punishments, while also reflecting the changing social and technological realities of modern society.

Section 349 of the Bharatiya Nagarik Suraksha Sanhita, 2023 empowers a First-Class Magistrate to direct a person, including an accused individual, to provide specimen signatures, handwriting samples, finger impressions, voice samples, or other required samples during an investigation or legal proceeding.³⁴ This provision reflects the growing importance of forensic science and modern technology in criminal investigations.

An important feature of this section is that such samples may be collected even where the person has not been formally arrested. This provides greater flexibility to investigating agencies and helps them gather scientific evidence more efficiently, ultimately supporting a fair and effective criminal justice process.

Section 329 of the Sanhita allows the submission of a report by a government scientific expert without requiring oral testimony in court, thereby expanding the categories of exempted experts.³⁵ While both the Bharatiya Nagarik Suraksha Sanhita and the Code of Criminal Procedure included government scientific experts, the Sanhita extends its applicability to any

³⁴ Bharatiya Nagarik Suraksha Sanhita, 2023, s. 349, No. 46, Acts of Parliament, 2023 (India).

³⁵ Bharatiya Nagarik Suraksha Sanhita, 2023, s. 329, No. 46, Acts of Parliament, 2023 (India).

other scientific expert specified or certified by the State or Central Government. By contrast, the Code limited the provision to any other government scientific expert specified only by the Central Government. The Sanhita provision thus allows a broader range of scientific experts to be involved in legal proceedings.³⁶

Under the Sanhita, when any document is filed, its particulars must be included in a list. The prosecution or the accused, together with their advocates, are required to admit or deny the genuineness of each document within thirty days of supply. The Court, at its discretion, may relax this time limit, and no expert may be called unless the expert's report is disputed.

Both Section 330 of the Bharatiya Nagarik Suraksha Sanhita and Section 294 of the Code of Criminal Procedure set out a similar process for handling documents filed in court, including the admission or denial of genuineness. However, the Sanhita introduces a time limit for admission or denial, together with the provision concerning expert reports.³⁷ Section 330 of the Sanhita simplifies the document-admission process by introducing time limits and restricting expert testimony unless reports are disputed. As with Section 294 of the Code, the Sanhita offers added flexibility through judicial discretion, enhancing procedural efficiency.

The Bharatiya Nagarik Suraksha Sanhita, 2023 deals with the procedural aspects of criminal law in India, making forensic science a crucial part of the process. The evidence so obtained plays a role in further investigation and in determining punishment or remedial action. Under provisions relating to the summoning of witnesses, forensic experts may also be called upon to give evidence.

Section 51 allows the police to collect biological and physical samples, such as fingerprints, palm prints, handwriting, and signatures, which forensic scientists then analyse.³⁸

Section 176 mandates forensic testing in every offence punishable with imprisonment exceeding seven years.³⁹

VI. JUDICIAL APPROACH

In *Forest Range Officer v. P. Mohammed Ali*,⁴⁰ the Supreme Court of India observed that forensic evidence should be regarded as admissible only when supported by expert opinion, and that only then can conclusions properly be drawn from such evidence. This requirement does

³⁶ BUREAU OF POLICE RSCH. & DEV., Forensic, <https://bprd.nic.in/uploads/pdf/202401261016313612262Forensic.pdf> (last visited May 21, 2026).

³⁷ Bharatiya Nagarik Suraksha Sanhita, 2023, s. 330, No. 46, Acts of Parliament, 2023 (India).

³⁸ Bharatiya Sakshya Adhinyam, 2023, s. 51, No. 47, Acts of Parliament, 2023 (India).

³⁹ Bharatiya Nagarik Suraksha Sanhita, 2023, s. 176, No. 46, Acts of Parliament, 2023 (India).

⁴⁰ *Forest Range Officer v. P. Mohammed Ali*, AIR 1994 SC 120 (India).

not, however, limit the court's ability to interpret the evidence. The Court established the principle that expert opinion is essential before reaching a conclusion in such matters.

Through key rulings such as *Selvi v. State of Karnataka*,⁴¹ the judiciary has laid down important standards, including the maintenance of the chain of custody, the authentication of electronic records, and the protection of constitutional rights such as the right to a fair trial and the protection against self-incrimination. The broader challenges of relying heavily on forensic methods also merit attention, particularly in a justice system often hindered by inadequate infrastructure, a shortage of skilled experts, and the potential for judicial overconfidence in scientific evidence. While forensic tools can be highly persuasive, they are not immune to error and must be corroborated by other forms of evidence.

Judicial decisions illustrate how courts balance the scientific validity of DNA evidence with the procedural integrity required to ensure its admissibility. The growing reliance on DNA evidence in the criminal justice system calls for the continued development of forensic infrastructure, improved training for forensic experts, and adherence to scientific standards, so that DNA evidence is accurately and reliably used to support the pursuit of justice.

In *Banarsi Dass v. Teeku Dutta*,⁴² the Court ruled that, although the outcome of a DNA test is said to be scientifically accurate, it is insufficient to displace the conclusiveness of Section 112 of the Indian Evidence Act. According to the Court, where the husband and wife were cohabiting at the time of conception, but the DNA test showed that the husband was not the biological father of the child, the conclusive legal presumption would stand un rebutted.

VII. CONCLUSION

The admissibility and application of forensic evidence in criminal proceedings give rise to significant legal and ethical challenges. From a legal perspective, the absence of uniform procedures, contradictory legal interpretations, and delay in forensic reporting often weaken the reliability of such evidence. Landmark rulings of the courts underscore the pivotal role of strict compliance with the rules of evidence, especially Section 65B of the Indian Evidence Act, in relation to digital evidence. Furthermore, deficiencies in regulatory oversight, insufficient infrastructure, and a shortage of skilled personnel contribute to procedural lapses, heightening the risk of wrongful conviction.

From an ethical standpoint, forensic experts face the dual responsibility of maintaining scientific integrity while safeguarding the interests of justice. The misuse or manipulation of

⁴¹ *Selvi v. State of Karnataka*, AIR 2010 SC 1974 (India).

⁴² *Banarsi Dass v. Teeku Dutta*, (2005) 4 SCC 449 (India).

forensic evidence can undermine fundamental rights, including the right to a fair trial. Ensuring transparency, accountability, and compliance with professional standards is vital to maintaining public faith in the criminal justice system. Strengthening legislative mechanisms, implementing standardised protocols, and promoting ethical training for forensic professionals are key measures towards preserving both the reliability of evidence and the individual rights at stake in criminal trials.

VIII. SUGGESTIONS

India should establish a National Forensic Science Regulatory Authority and make NABL accreditation compulsory for all forensic laboratories, in order to maintain proper standards and improve the reliability of investigations.

Judges, police officers, investigators, and prosecutors should receive regular training so that they can better understand and handle forensic evidence during investigations and trials.

Clear chain-of-custody rules and dedicated legislation for DNA and forensic evidence are needed to ensure that evidence is collected, stored, and used properly in courts.

The privacy and legal rights of individuals must be protected, while more fast-track forensic laboratories and modern facilities should be developed to reduce delays and pending cases.

Forensic infrastructure should be strengthened: the government should establish more modern forensic laboratories with advanced technology, proper funding, and sufficient manpower to improve the speed and quality of investigations.

Uniform standards and accreditation should be established: all forensic laboratories should follow standardised procedures and obtain accreditation to ensure reliability, accuracy, and consistency in forensic analysis.

Mobile and regional forensic units should be used: mobile forensic laboratories and regional centres should be established, especially in rural areas, to provide quick access to forensic services.
