

# INTERNATIONAL JOURNAL FOR LEGAL RESEARCH AND ANALYSIS



Open Access, Refereed Journal Multi-Disciplinary  
Peer Reviewed

[www.ijlra.com](http://www.ijlra.com)

## DISCLAIMER

No part of this publication may be reproduced, stored, transmitted, or distributed in any form or by any means, whether electronic, mechanical, photocopying, recording, or otherwise, without prior written permission of the Managing Editor of the *International Journal for Legal Research & Analysis (IJLRA)*.

The views, opinions, interpretations, and conclusions expressed in the articles published in this journal are solely those of the respective authors. They do not necessarily reflect the views of the Editorial Board, Editors, Reviewers, Advisors, or the Publisher of IJLRA.

Although every reasonable effort has been made to ensure the accuracy, authenticity, and proper citation of the content published in this journal, neither the Editorial Board nor IJLRA shall be held liable or responsible, in any manner whatsoever, for any loss, damage, or consequence arising from the use, reliance upon, or interpretation of the information contained in this publication.

The content published herein is intended solely for academic and informational purposes and shall not be construed as legal advice or professional opinion.

**Copyright © International Journal for Legal Research & Analysis.  
All rights reserved.**

## ABOUT US

The *International Journal for Legal Research & Analysis (IJLRA)* (ISSN: 2582-6433) is a peer-reviewed, academic, online journal published on a monthly basis. The journal aims to provide a comprehensive and interactive platform for the publication of original and high-quality legal research.

IJLRA publishes Short Articles, Long Articles, Research Papers, Case Comments, Book Reviews, Essays, and interdisciplinary studies in the field of law and allied disciplines. The journal seeks to promote critical analysis and informed discourse on contemporary legal, social, and policy issues.

The primary objective of IJLRA is to enhance academic engagement and scholarly dialogue among law students, researchers, academicians, legal professionals, and members of the Bar and Bench. The journal endeavours to establish itself as a credible and widely cited academic publication through the publication of original, well-researched, and analytically sound contributions.

IJLRA welcomes submissions from all branches of law, provided the work is original, unpublished, and submitted in accordance with the prescribed submission guidelines. All manuscripts are subject to a rigorous peer-review process to ensure academic quality, originality, and relevance.

Through its publications, the *International Journal for Legal Research & Analysis* aspires to contribute meaningfully to legal scholarship and the development of law as an instrument of justice and social progress.

## ***PUBLICATION ETHICS, COPYRIGHT & AUTHOR RESPONSIBILITY STATEMENT***

The *International Journal for Legal Research and Analysis (IJLRA)* is committed to upholding the highest standards of publication ethics and academic integrity. All manuscripts submitted to the journal must be original, unpublished, and free from plagiarism, data fabrication, falsification, or any form of unethical research or publication practice. Authors are solely responsible for the accuracy, originality, legality, and ethical compliance of their work and must ensure that all sources are properly cited and that necessary permissions for any third-party copyrighted material have been duly obtained prior to submission. Copyright in all published articles vests with IJLRA, unless otherwise expressly stated, and authors grant the journal the irrevocable right to publish, reproduce, distribute, and archive their work in print and electronic formats. The views and opinions expressed in the articles are those of the authors alone and do not reflect the views of the Editors, Editorial Board, Reviewers, or Publisher. IJLRA shall not be liable for any loss, damage, claim, or legal consequence arising from the use, reliance upon, or interpretation of the content published. By submitting a manuscript, the author(s) agree to fully indemnify and hold harmless the journal, its Editor-in-Chief, Editors, Editorial Board, Reviewers, Advisors, Publisher, and Management against any claims, liabilities, or legal proceedings arising out of plagiarism, copyright infringement, defamation, breach of confidentiality, or violation of third-party rights. The journal reserves the absolute right to reject, withdraw, retract, or remove any manuscript or published article in case of ethical or legal violations, without incurring any liability.

# FORENSIC EVIDENCE IN CRIMINAL TRIALS: LEGAL CHALLENGES, EVIDENTIARY STANDARDS AND JUDICIAL SCRUTINY

AUTHORED BY - ATHISH NARAYANAN K.C  
LAW STUDENT, VISTAS CHENNAI

CO-AUTHOR - MRS. ANUSREE J  
ASSISTANT PROFESSOR

## **Abstract**

The integration of forensic science into criminal trials has significantly transformed the administration of justice by introducing scientific objectivity into evidentiary processes. While forensic evidence enhances accuracy in identifying perpetrators and reconstructing crime scenes, it also raises complex legal concerns regarding admissibility, reliability, and constitutional safeguards. This article critically examines the evolution of forensic science, the legal framework governing its use, judicial interpretation, and systemic challenges such as cognitive bias, “junk science,” and infrastructural deficiencies. It argues for a balanced approach that strengthens scientific reliability while safeguarding the rights of the accused.

## **1. Introduction**

The criminal justice system is founded on the principle that guilt must be proven **beyond reasonable doubt**. Traditionally, reliance was placed on eyewitness testimony and confessions, both of which are susceptible to error and manipulation. The emergence of forensic science marked a paradigm shift by introducing objective, scientific methods into criminal investigations.

Forensic evidence, often described as the “silent witness,” provides impartial and verifiable information derived from scientific analysis. However, the increasing reliance on such evidence has introduced legal complexities, particularly regarding admissibility, interpretation, and potential misuse.

## 2. Evolution of Forensic Science

The development of forensic science can be traced to **Locard's Exchange Principle**, which asserts that every contact leaves a trace.<sup>1</sup> This foundational idea established the scientific basis for linking suspects to crime scenes.

The evolution progressed from fingerprint analysis to advanced disciplines such as:

- DNA profiling
- Forensic toxicology
- Ballistics
- Digital forensics

The discovery of DNA profiling by Alec Jeffreys revolutionized criminal investigations by providing near-conclusive identification methods.<sup>2</sup> In contemporary times, digital forensics has emerged as a critical field due to the proliferation of cybercrime.

## 3. Nature and Scope of Forensic Evidence

Forensic evidence differs fundamentally from traditional evidence due to its scientific basis.

Its key characteristics include:

- **Objectivity:** Based on scientific principles rather than human perception
- **Probabilistic Nature:** Often expressed in statistical terms rather than certainty
- **Expert Dependency:** Requires interpretation by trained professionals
- **Vulnerability:** Susceptible to contamination without proper handling

Common types of forensic evidence include DNA samples, fingerprints, digital data, toxicological reports, and ballistic analysis.

## 4. Legal Framework Governing Forensic Evidence

### 4.1 Indian Evidence Act, 1872

Section 45 recognizes expert opinions as relevant evidence. However, such opinions are generally **corroborative rather than conclusive**.<sup>3</sup>

Section 65B governs admissibility of electronic evidence, requiring certification for digital records.

### 4.2 Code of Criminal Procedure, 1973

Provisions under Sections 53 and 54 allow medical examination and collection of biological samples.

### 4.3 Constitutional Safeguards

- **Article 20(3):** Protection against self-incrimination

- **Article 21:** Right to life and personal liberty

The judiciary has clarified that collection of physical evidence (e.g., fingerprints) does not violate self-incrimination rights.<sup>4</sup>

## 5. Judicial Interpretation

Judicial scrutiny has played a vital role in shaping forensic jurisprudence.

### 5.1 Right Against Self-Incrimination

In *State of Bombay v. Kathi Kalu Oghad*, the Supreme Court distinguished between testimonial evidence and physical evidence, allowing the latter.<sup>5</sup>

### 5.2 Privacy and Scientific Techniques

In *Selvi v. State of Karnataka*, involuntary narcoanalysis and polygraph tests were declared unconstitutional.<sup>6</sup>

### 5.3 DNA Evidence

In *Nandlal Wasudeo Badwaik v. Lata*, the Court held that DNA evidence prevails over statutory presumptions.<sup>7</sup>

### 5.4 Digital Evidence

Judgments such as *Anvar P.V. v. Basheer* established strict compliance requirements for electronic evidence.<sup>8</sup>

## 6. Challenges in Forensic Evidence

### 6.1 Admissibility Issues

Courts must ensure scientific validity before admitting evidence, preventing reliance on unverified techniques.

### 6.2 “Junk Science”

Certain forensic methods lack empirical validation, leading to wrongful convictions.<sup>9</sup>

### 6.3 Chain of Custody

Breaks in documentation can render evidence inadmissible.

### 6.4 Cognitive Bias

Experts may be influenced by external information, affecting impartiality.

### 6.5 Infrastructure Deficiencies

Underfunded laboratories and delays impact efficiency and justice delivery.

## 7. Role of Forensic Evidence in Criminal Trials

Forensic evidence serves multiple purposes:

- Identification of suspects
- Reconstruction of crime events
- Corroboration of witness testimony

It bridges the gap between the crime scene and courtroom, enhancing accuracy in judicial outcomes.

## 8. Emerging Trends

### 8.1 Digital and Cyber Forensics

Increasing reliance on electronic data such as mobile records and cloud storage.

### 8.2 Genetic Technologies

Use of DNA databases and genetic genealogy raises privacy concerns.

### 8.3 Artificial Intelligence

AI-based forensic tools are emerging but require regulatory oversight.

## 9. Critical Analysis

Despite its advantages, forensic evidence is not infallible. Over-reliance without proper scrutiny can undermine justice. The adversarial system further complicates matters, as experts may be influenced by prosecutorial or defense interests.

There is a pressing need to:

- Improve scientific literacy among legal professionals
- Strengthen evidentiary standards
- Ensure independence of forensic laboratories

## 10. Conclusion

Forensic science has undeniably enhanced the criminal justice system by introducing scientific rigor and objectivity. However, its effectiveness depends on proper regulation, judicial scrutiny, and adherence to constitutional safeguards.

A balanced approach is essential—one that embraces technological advancement while protecting individual rights. Strengthening legal frameworks, ensuring accountability, and promoting scientific integrity are crucial to maintaining public confidence in the justice system.

## Footnotes

1. Edmond Locard, *Exchange Principle*, early 20th century forensic theory.
2. Alec Jeffreys, *Discovery of DNA Profiling* (1985).

3. Indian Evidence Act, 1872, §45.
4. Constitution of India, Article 20(3).
5. *State of Bombay v. Kathi Kalu Oghad*, AIR 1961 SC 1808.
6. *Selvi v. State of Karnataka*, (2010) 7 SCC 263.
7. *Nandlal Wasudeo Badwaik v. Lata Nandlal Badwaik*, (2014) 2 SCC 576.
8. *Anvar P.V. v. P.K. Basheer*, (2014) 10 SCC 473.
9. National Academy of Sciences, *Strengthening Forensic Science in the United States* (2009).

