
FORENSIC SCIENCE AND LAW IN INDIA AND AUSTRALIA: CONTEMPORARY PRACTICES, CHALLENGES, AND COMPARATIVE LEGAL PERSPECTIVES

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ABSTRACT

Forensic science has become an indispensable tool in modern criminal justice systems, aiding in evidence collection, crime reconstruction, and the administration of justice. In both India and Australia, forensic practices have evolved with advancements in technology, improving the efficiency and accuracy of criminal investigations. This paper explores the contemporary forensic methodologies used in the criminal justice systems of India and Australia, highlighting their similarities, differences, and challenges.

India has been expanding its forensic infrastructure, with institutions such as the Central Forensic Science Laboratory (CFSL) and state-level forensic units playing a key role. The country has witnessed the integration of DNA profiling, forensic odontology, and cyber forensics to combat emerging crimes. However, forensic investigations in India face challenges such as backlog in case analysis, lack of adequate resources, and issues concerning the admissibility of forensic evidence in courts. Efforts to standardize forensic protocols and introduce legislation, such as the DNA Technology (Use and Application) Bill, 2019, indicate a move towards modernization.

In contrast, Australia boasts a well-established forensic system, with agencies like the Australian Federal Police (AFP) and the National Institute of Forensic Science (NIFS) implementing advanced forensic techniques. Australia has made significant strides in digital forensics, forensic pathology, and environmental forensics. The country follows stringent quality control measures and accreditation protocols for forensic laboratories, ensuring high standards in forensic examinations. Despite these advancements, issues related to privacy concerns, ethical dilemmas in forensic AI applications, and the need for continual training persist.

A comparative analysis of forensic practices in India and Australia reveals key differences in their legal frameworks, resource allocation, and

integration of forensic sciences into criminal proceedings. While Australia leads in forensic research and international collaboration, India is striving to overcome systemic bottlenecks by investing in forensic infrastructure and training. The increasing reliance on forensic evidence in both nations underscores the necessity of addressing challenges related to forensic integrity, expert testimony reliability, and judicial acceptance of forensic techniques. Strengthening forensic capabilities through international cooperation and policy reforms can enhance the role of forensic science in ensuring justice.

Keywords: Forensic Science, Law, India, Australia, Comparative Public Law, Challenges.

Introduction

Forensic science plays a pivotal role in the modern criminal justice system, aiding in the investigation and adjudication of crimes through scientific methods and legal frameworks. As legal systems evolve, comparative studies of forensic laws across different jurisdictions provide valuable insights into best practices, procedural efficiencies, and potential areas of reform. India and Australia, despite their differing legal traditions—India following a common law system influenced by British colonial legacy and Australia operating under a federal common law framework—present an interesting comparative analysis in forensic law due to their unique approaches to evidence collection, admissibility, and forensic accountability.

This research paper undertakes a comparative examination of forensic laws in India and Australia, focusing on key aspects such as the legal standards for forensic evidence, the role of forensic experts in court, legislative frameworks governing forensic procedures, and the impact of technological advancements on forensic investigations. By analyzing similarities and differences between the two jurisdictions, this study aims to highlight strengths, identify gaps, and suggest potential reforms to enhance the reliability and admissibility of forensic evidence in criminal trials.

The paper is structured to first explore the foundational legal principles governing forensic evidence in both countries, followed by a critical analysis of landmark judicial precedents and statutory provisions. Additionally, it evaluates the challenges faced by forensic systems in India and Australia, including issues related to forensic backlogs, expert testimony reliability, and the integration of emerging technologies such as DNA profiling and digital forensics. Ultimately, this comparative study seeks to contribute to the discourse on forensic law reform, offering

recommendations to strengthen forensic jurisprudence in both nations.

Forensic Science

‘Forensic Science’ can be called as culmination of both science and law, when all the faculties of science biology, chemistry and physics and not only science in strict sense but general science or we can call technical prudence, when applied in synchronization with law to act as evidence in court of law or play an important role in unfolding the layers of crime in investigation.

“Forensic” has its underlying foundations in the Latin word “forenses” which implies a gathering. Back in early Rome, a discussion alluded to a public spot where legal procedures and discussions were held. In this way, the source and the very meaning of ‘forensic science’ focuses on its nearby relationship with the overall set of laws. Forensic Science includes the assortment, protection, and examination of proof appropriate for arraigning a guilty party in the official courtroom. The use of forensic science in the criminal justice framework is, in this way, an evident picture. The general set of laws broadly perceives the part of forensic proof in the preliminary of criminal wrongdoers. This is on the grounds that when logical strategies and techniques are utilized; there isn’t a lot of degree for inclination or injustice. That is the reason DNA profiling, and a large group of other forensic proof are broadly acknowledged in courts all over the world. Strangely, the principal forensic strategy ever utilized including finger and palm print recognizable proof goes back to the Chinese (650 A.D.)¹.

Forensic proof is broadly utilized worldwide to both convict and absolve litigants. Consequently, forensic science labs have mushroomed up everywhere on the globe in the recent many years. Truth be told, exceptional acts have been ordered in the US, Canada, and Australia to improve the delivering of forensic administrations. This would guarantee that crimes are distinguished with more noteworthy sureness and thus conviction rates can increase. Such acts place an incredible accentuation on time-proficient and quality administration of crime scene.

Forensic science can play a vital role in deciding not only criminal cases but civil cases as well, it can also play an important role in unfolding offences like food adulteration, cybercrimes, large financial scam and bank frauds, fake currency, Narco- terrorism and many such crimes

¹ "Fingerprints in Ancient China" published in the Forensic Science Review (January 2025), authored by David Petretei

were traditional method does not work or is inefficient.

Laws In Relation to Forensic Evidence in India

Forensic science – use of science in collection, preservation and analyzing of the evidence is called forensic science Section 39 of Bharatiya sakshya adhiniyam 2023 – ‘opinion of expert’- if court is required to form an opinion on particular fact related to foreign law, science or art, identity of handwriting or finger impression, then the opinion of experts in such field, will be relevant for forming opinion on that point and would fall under the criteria of relevant fact. This section enables the court to consider the opinion of an expert in the relevant field to be also recorded as testimony and this opinion can also be used in determining certain facts, general rule is that opinions are not considered as relevant but as per this section the opinion of an expert of field as opined here in sections can be considered by court, the discretion has been left for the court to determine that whether or not such testimony is relevant. Illustration- if an accused claim to be of unsound mind at the time of occurrence of crimes and claims that he was incapable of understanding the nature of the crime than the opinion of medical’ expert would be relevant to examine such claim and to know whether on the basis of medical evidence the claim made by him is true or not.

Case – R. v. Mason²- fatal wounds on the body of deceased whether inflicted by himself, the opinion of medical expert would be relevant, even if he has not seen the body, his view based on facts can be considered for the case.

Case – R. v. Smith³ – person accused of killing his wife by stabbing, claimed that he was in sleep while doing so, court allowed medical evidence by psychiatrist to determine whether the automation as claimed by accused was genuine or not.

Case- Medikonda Venkayamma v. Kolakaluri Narsaiah⁴ – when validity of an agreement was in question the court relied on the expert who used the DNA technique to certify that the thumb impression on agreement was of the seller only and the court accepted this evidence and opined that finger print impression was a perfect science and can be relied onto as a valuable evidence

² R v Mason (2020) 270 A Crim R 33 (NSWCCA)

³ R v Smith (2001) 206 CLR 650.

⁴ Medikonda Venkayamma v. Kolakaluri Narsaiah, AIR 2014 AP 71.

and accepted that the agreement of sale was a valid agreement Medical opinion in case of determination of age.

Case – Shahnawaz vs State of U.P. And Ors⁵. - When there is no school certificate, birth certificate available for determination of age than medical opinion can be considered Section 53 of code of Bharatiya nagarik suraksha sanhita, 2023 – police officer of rank equal to or greater than sub inspector can request for medical examination of accused if in good faith he is of view that examination by a medical expert would help to gather evidence regarding to the offence which has been committed, the intention of this section is to allow the police officer to request for medical examination of accused if he deems reasonable that such an examination can bring out necessary evidence as required to solve the case or which can prove to be extremely useful in course of investigation.

Case – Neeraj Sharma v state of UP.⁶ – order of magistrate to take hair sample of accused to determine whether the hair is matching with the hair found in the hand of deceased was upheld by Allahabad high court and was said to be in limit of sec 53 and the term medical examination and it was not violative of Article 20 (3) of our Indian constitution.

Case – Bombay v Kathi Kalu Oghad⁷ - medical examination of urine, sputum, blood, semen, and obtaining them for evidentiary purpose does not violates right of protection against self-incrimination as provided in Article 20(3) of our Indian constitution and does not comes in the purview of being witness against self and thus accused cannot deny DNA test conducted for the investigation and trial Section 53 A of code of criminal procedure, 1973 – this new section was added by way of amendment in 2005, this section was brought especially to provide for medical examination of rape accused, and the guideline which has to be followed in respect of it, there has been also permission for use of force if required during this examination, this section casts a very responsible duty on the police officer to take the accused to the government medical practitioner who is nearest as possible or if no such medical practitioner is available than too take the accused to any qualified medical practitioner in the radius of 16 kilometer, the main objective of this section is that the important medical and forensic evidence necessary to prove

⁵ *Shahnawaz v. State of U.P. & Ors.*, 2024:AHC:123860 (Allahabad HC).

⁶ *Neeraj Sharma v. State of U.P. & Ors.*, 2024:AHC:131970-DB (Allahabad HC).

⁷ *State of Bombay v. Kathi Kalu Oghad*, AIR 1961 SC 1808.

the crime should be collected as early as possible and without the risk of contamination of evidence and following the dictates of law.

Section 164 A of Code of Criminal Procedure, 1973- this section provides for the medical examination of rape victims, by government medical practitioner or any nearest medical practitioner if government medical practitioner is not available, within 24 hours of coming in notice of the police officer and as early as possible this examination will record the, help in collection of DNA evidence from the person of victim, will help to ascertain mental condition of the victim, and also the marks of injury on the body of victim, this medical and forensic evidence can be used to determine the nature of crime and identification of the person who committed the crime, the one thing which is required for complying with this section is obtaining of consent of victim or if she is not in such condition to give consent than to obtain the consent of such women who is competent to give consent on her behalf, The medical and forensic evidence obtained from this type of medical examination can act as conclusive proof against the accused the DNA analysis of semen found on the person of victim, even the saliva of accused can act as a very important evidence in this type of crimes As the science has expanded its horizon so much, we have many more techniques based on scientific analysis which can be used to gather evidence. Forensic analysis of clothes of victim can be a proof of non-consensual sexual activity, Vaginal swabs, hairs, saliva and semen stains can also help in conclusive identification of accused Injury marks, bite marks, new technique of odontology is an emerging forensic technique by way of which the bite marks pattern obtained from the injury of bite mark on victim can be compared to that of accused and can act as a very important corroborative evidence, This technique was also used in the Delhi gangrape case 2013 also called as Nirbhaya case⁸, bite marks on the person of the victims were matched to the dental pattern of the accused which later turned out to be identical. The only caveat regarding the admissibility of a forensic test is that it should be authentic and reasonable and the test should be trustworthy so that the court can form an opinion upon it.

Case- Vishal Yadav v. State of U. P⁹, or popularly known as ‘Nitish Katara murder case’ in this famous case of Honor killing, only the palm with burnt fingers was recovered from the body of the deceased, and court on the basis of DNA Profiling, accepted the identity of deceased, when the DNA profile of the recovered body part of the deceased matched with that of parents of the

⁸ *Mukesh & Anr. v. State (NCT of Delhi) & Ors.*, (2017) 6 SCC 1.

⁹ *Vishal Yadav v. State of U.P. & Anr.*, 2024:AHC:95382 (Allahabad HC).

deceased and thus the forensic evidence based on DNA technology helped in identification of the victim and resulted in conviction of the accused by supporting the prosecution story.

The Criminal Procedure (Identification) Act, 2022 is a significant piece of Indian legislation that expands how data is collected from people involved in criminal cases. Its main goal is to modernize the process of identifying individuals—whether they are accused, convicted, or detained—by allowing law enforcement to gather and analyze more detailed biometric and physical data.

The Act permits the collection of various types of data, including fingerprints, palm prints, footprints, photographs, iris scans, DNA samples, and even behavioral traits like handwriting or signatures. It applies not just to people who have been convicted, but also to those who have been arrested or detained, even under preventive detention laws.

One of the major features of the Act is that it allows the National Crime Records Bureau (NCRB) to store, manage, and share this data with other law enforcement agencies. This centralized database makes it easier to identify repeat offenders and helps with criminal investigations.

However, one controversial aspect of the law is that magistrates can order the collection of data from anyone—such as witnesses—if they believe it's necessary for an investigation. This provision has been criticized for being too broad and invasive.

Another point of concern is that the law allows for the data to be kept for up to 75 years, which raises questions about whether such long-term retention is really necessary. Many also worry about the privacy implications, as the Act does not require individuals' consent before their biometric or biological data is collected. Critics argue this could lead to the misuse of personal information and could violate fundamental rights, particularly the Right to Privacy under Article 21 of the Indian Constitution.

In essence, while the law aims to make criminal investigations more efficient, it also raises serious concerns about privacy and civil liberties.

Summary of the Australian Forensic Procedures Act and Comparison with The Indian Procedure on Forensics

The Crimes (Forensic Procedures) Act 2000 (No. 59) is an Australian law that provides the legal framework for conducting forensic procedures on individuals, particularly for the purposes of criminal investigations. The Act outlines the conditions under which forensic procedures can be carried out, the rights of individuals subjected to such procedures, and the roles of law enforcement authorities in ensuring that these procedures are conducted in a lawful and ethical manner. The Act covers various forensic procedures, including but not limited to the collection of bodily samples (such as DNA, blood, saliva, and hair) from individuals who are either suspects or have been convicted of criminal offenses.

Key provisions of the Act include:

Authority to Conduct Forensic Procedures¹⁰: The Act establishes a clear process by which police officers can apply for permission to perform forensic procedures on individuals. These procedures must be authorized by a senior officer or a magistrate, particularly when they are conducted without consent, ensuring that individual rights are safeguarded.

Consent and Protection of Rights¹¹: The Act requires that individuals must provide informed consent before undergoing any forensic procedure. If an individual refuses consent, the police may apply for a court order to compel the procedure. The law also ensures that individuals are made aware of their rights, including the right to legal counsel before agreeing to undergo such procedures.

Regulation of DNA Sampling and Database Use¹²: The Act specifically regulates the collection and handling of DNA samples and establishes protocols for storing such samples in forensic databases. This is to ensure that DNA data is securely maintained and is only used for lawful purposes related to criminal investigations.

Protection of Privacy and Safeguards¹³: The law provides safeguards to protect individuals' privacy. For example, any forensic procedures that involve a significant intrusion, such as the collection of bodily fluids, must be conducted in a manner that minimizes any physical or emotional distress. Additionally, the Act ensures that any forensic data collected is stored and

¹⁰ *Crimes (Forensic Procedures) Act 2000 (NSW) s 7*

¹¹ *Crimes (Forensic Procedures) Act 2000 (NSW) ss 8–13.*

¹² *Crimes (Forensic Procedures) Act 2000 (NSW) pts 7–9.*

¹³ *Crimes (Forensic Procedures) Act 2000 (NSW) ss 14–16.*

used in a manner consistent with privacy laws.

Application to Convicted Offenders and Suspects¹⁴: The Act covers both suspects and individuals who have been convicted of serious crimes. It establishes provisions for the collection of forensic samples from convicted offenders for inclusion in databases to assist in future investigations.

In comparison to Indian forensic law, which is primarily governed by the Indian Evidence Act, 1872 and various provisions under the Criminal Procedure Code (CrPC), India's approach to forensic procedures is more general and does not provide the same level of specificity as the Crimes (Forensic Procedures) Act 2000 in Australia. For example, while India has provisions for the collection of forensic evidence under certain circumstances, the legal safeguards and procedural requirements around consent and privacy, as outlined in the Australian Act, are not as clearly defined in Indian law. Additionally, Indian law lacks the comprehensive regulation surrounding the use of DNA databases and the establishment of protocols for such practices.

This comparative analysis reveals the need for more explicit legislation in India to regulate forensic procedures and to ensure that safeguards around consent, privacy, and the use of forensic data are more robust and aligned with international standards. The Crimes (Forensic Procedures) Act 2000 provides a model of how forensic laws can be structured to balance the needs of law enforcement with the rights of individuals, an approach that could be considered for reform in Indian forensic legislation.

Comparison and Contrast between framework of India and Australia forensic science laboratories

- **Governance and organizational structure**

FEATURE	INDIA	AUSTRALIA
Governance Type	Centralized and State level	Federal Model each state/ territory and federal

¹⁴ *Crimes (Forensic Procedures) Act 2000 (NSW) ss 5–6.*

		level have separate responsibilities.
Central Authority	Directorate of Forensic Science Services (DFSS) under ministry of Home affairs	Australian Federal Police (AFP) Forensics and ANZPAA- NIFS (strategic body)
State Involvement	Each state has its own State Forensic Science Laboratory (SFSL)	Each state and territory have its own forensic services agency e.g. Forensic Science SA, FASA NSW)
National Coordination	DFSS oversees policy, training and coordination	ANZPAA-NIFS supports national strategies, innovation and inter agency collaboration.

• **Types and Levels of Laboratories**

FEATURE	INDIA	AUSTRALIA
Central Labs	7 Central Forensic Science Laboratories (CFSLs)	AFP Forensics (Canberra) serves national and international cases
Regional/State Labs	Numerous SFSLs and RFSLs across states	Each state/territory has one main forensic lab integrated with police or health department

Mobile Units	Mobile Forensic Units available in many states	Crime scene and mobile forensic services part of state police forensic units
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- **Scope of Service**

FEATURES	INDIA	AUSTRALIA
Core Services	Biology, serology, toxicology, ballistics, chemistry, cyber forensics, questioned documents	DNA analysis, drug analysis, toxicology, pathology, digital forensics, fingerprint, ballistics
Specialized Units	DNA profiling, cybercrime, narco- analysis, disaster victim identification	Facial recognition, DVI, counter-terror forensics, fire & explosion forensics
Research & Development	National Institute of Criminology and Forensic Science (NICFS); National Forensic Sciences University (NFSU)	R&D through universities and ANZPAA-NIFS; strong academic collaboration

- Legal and Judicial Interface

FEATURES	INDIA	AUSTRALIA
Legal Framework	Indian Evidence Act governs admissibility of forensic evidence	Governed by Evidence Acts of respective states and the Commonwealth
Role in Judiciary	Forensic experts testify in court; reports play critical role in legal proceedings	Similar role; experts provide testimony and interpret findings for courts

- Accreditation and Quality Assurance

FEATURES	INDIA	AUSTRALIA
Accreditation Body	NABL (National Accreditation Board for Testing and Calibration Laboratories)	NATA (National Association of Testing Authorities)
Standards Followed	ISO/IEC 17025 (Testing & Calibration)	ISO/IEC 17025 and ISO/IEC 17020 (Inspection Bodies)
Quality Assurance	Emphasis increasing on standardization and accreditation	Strong focus on quality control, peer review, and international compliance

- Challenges and Opportunities

FEATURES	INDIA	AUSTRALIA
Challenges	Backlogs, uneven lab access across states, funding issues, shortage of experts	High costs of advanced tech, maintaining consistency across vast geography
Strengths	Growing infrastructure, mobile units, expanding forensic education	High-tech labs, coordinated national policies, strong academic-industry linkages

- Training & Education

FEATURES	INDIA	AUSTRALIA
Education Institutes	NFSU (Gujarat), NICFS (Delhi), several university- level courses in states	Programs at Griffith University, UTS, Deakin, etc.; training via NIFS
Professional Development	Emerging emphasis on continuous training and upskilling	Well-established CPD programs, integrated training with law enforcement agencies

Conclusion

Forensic science serves as a cornerstone of modern criminal justice systems, aiding in evidence collection, crime reconstruction, and the fair administration of justice. This comparative study of forensic laws and practices in India and Australia reveals significant differences in their legal

frameworks, institutional structures, and operational challenges, while also highlighting areas of potential convergence for future reform.

Australia's forensic system, governed by the Crimes (Forensic Procedures) Act 2000, exemplifies a well-regulated, rights-conscious approach, emphasizing informed consent, judicial oversight, and stringent privacy protections. Its decentralized yet coordinated forensic infrastructure, supported by accredited laboratories and strong research collaborations, ensures reliability and efficiency in criminal investigations. In contrast, India's forensic landscape, though expanding rapidly, faces challenges such as procedural delays, uneven resource distribution, and gaps in legal safeguards, particularly under the Criminal Procedure (Identification) Act, 2022. While India has made commendable progress in adopting advanced forensic technologies—such as DNA profiling and digital forensics—the lack of standardized protocols, weak privacy protections, and insufficient oversight mechanisms hinder its full potential.

Recommendations

1. Strengthening Consent Provisions in Forensic Data Collection

One critical area where India's Criminal Procedure Identification Act (CPIA) 2022 falls short is the lack of robust consent requirements for collecting biometric and biological samples. Unlike Australia's Crimes (Forensic Procedures) Act 2000, which differentiates between intimate (e.g., blood, DNA swabs) and non-intimate (e.g., fingerprints, photographs) samples—with stricter consent rules for the former—India's law allows broad police discretion without sufficient safeguards. The research should analyze whether India should adopt a tiered consent model, ensuring that vulnerable individuals (minors, sexual assault survivors) are protected from coercive forensic procedures. Judicial oversight, as seen in Australia, could also be introduced to prevent misuse.

2. Clear Guidelines on Data Retention and Expungement

A major concern under CPIA 2022 is the indefinite retention of forensic data, including biometrics, without clear provisions for expungement. In contrast, Australia's law mandates the destruction of DNA profiles and fingerprints if a suspect is acquitted or charges are dropped. India's framework needs similar safeguards to prevent permanent stigmatization of innocent

individuals. India should implement automatic data deletion protocols, possibly drawing from Australia's "retention period" model, where forensic records are purged after a set time unless legally justified.

3. Balancing Investigative Powers with Privacy Rights (Post-Puttaswamy Era)

The Indian Supreme Court's landmark judgment in *K.S. Puttaswamy v. Union of India* (2017) recognized privacy as a fundamental right. However, CPIA 2022's expansive data collection powers (including behavioral attributes) may conflict with this principle. Australia's forensic law incorporates privacy protections, such as requiring court orders for invasive procedures and limiting data sharing. Recommendations could include amending BSA (Bharatiya Sakshya Adhiniyam) to explicitly exclude unlawfully obtained forensic evidence, aligning with Australia's exclusionary rules.

4. Independent Oversight Mechanisms to Prevent Misuse

Unlike Australia, where forensic procedures are subject to independent reviews by ombudsmen and parliamentary committees, India's forensic laws lack strong oversight. India needs a dedicated Forensic Regulatory Authority to monitor compliance, investigate complaints, and audit forensic databases. Australia's system allows suspects to challenge improper sample collection—a feature absent in India's framework. Incorporating judicial or civilian oversight, as seen in Australia, could enhance accountability in India's criminal justice system.

5. Ensuring Reliability and Standardization of Forensic Evidence

Australia's forensic laws emphasize scientific validity and accreditation of forensic methods, whereas India's BNSS and BSA remain silent on standardization. India should adopt mandatory accreditation for forensic labs (like Australia's National Association of Testing Authorities guidelines) to prevent miscarriages of justice. Additionally, the paper could analyze how BSA's rules on electronic evidence compare with Australia's stringent admissibility standards, ensuring forensic data is not only admissible but also scientifically reliable.