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FORENSIC LAW

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“Forensic evidence does not lie, it does not forget. It sits there and waits to be detected, preserved, evaluated and explained.” - Brent E. Turvey¹

I INTRODUCTION

TRUTH is the quintessence of justice, but evidence is the fulcrum to reach out the truth in order to administer justice. Opinion by a forensic expert helps the court for corroboration of the facts. In *Nellore v. Intha Ramana Reddy*,² the court observed that “Every criminal trial is a voyage of discovery in which truth is the quest. It is the duty of a presiding Judge to explore every avenue open to him in order to discover the truth and to advance the cause of justice.” Since every actor of the criminal justice system including investigator, prosecutor, forensic expert, witnesses, and the defense solemnly act to aid the court, their role is also to explore truth behind questioned facts and circumstances.

Edmond Locard opined that burden of proof in criminal matters has four primary elements, viz., providence (ordeals and combats), confession, witness testimony, and most importantly physical evidence.³ Investigating agency mainly depends on oral witness including ocular witness, but oral testimony suffers from variety of challenges.⁴ The physical evidence are mute and neutral in nature, and

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1 Brent E. Turvey, *Criminal Profiling: An Introduction to Behavioral Evidence Analysis* (Academic Press Inc., 5th edn. 2022).

2 1972 Cri LJ 1485 at para 2: ILR 1972 AP 683.

3 BallánéFüszer, Erzsébet, “Edmond Locard – Father of the Crime Lab” 16(2) *Magyar Rendeszlet* 24-25 (2016), available at :<https://folyoirat.ludovika.hu/index.php/magyrend/article/download/2574/1842> (last visited on Feb. 24, 2025).

4 G.K. Goswami and Siddhartha Goswami, “Taking Injustice Seriously: Proving Innocence of Wrongly Convicted Persons” in Dilip Ukey, Chirag Bayan and Melissa Walavalkar (eds.) *Revisiting Reforms in the Criminal Justice System in India* 34-50 (Thomson Reuters, Legal: South Asia, 2020). Also see: G.K. Goswami, “Forensic Law” LVI *ASIL* 313 (2020).

need befitting analysis and interpretation. The forensic expert opinion derived from analysis of physical artefacts, if conducted with due precautions and protocols, are very helpful for corroboration. The opinion evidence has inherent advantages such as neutrality (equally used as inculpatory evidence for proving guilt, or to establish innocence as exculpatory evidence), scientific validation and re-testability. The founding father of the Indian Evidence Act, Sir James Fitzjames Stephen has aptly described the role of an expert, "...the substance of the rules as to experts is that they are only witnesses, not judges; that their evidence, however important, is intended to be used only as materials upon which others are to form decisions".⁵

On probative value of expert opinion, the High Court of Calcutta observed, "The concept of proof in law of evidence is not of certainty but of reasonable probability which a man of ordinary prudence would believe. Like other evidence, probative value of an expert opinion is to be tested on the anvil of reasonable probability within margins of error. Development of science and fidelity to test protocols are important parameters to assess the reliability of expert opinion. The threshold of satisfaction of court is higher when opinion evidence is main bulwark of prosecution case".⁶ In the *Saiful Ali*, the high court further observed, "In *Manoj v. State of M.P.* the Supreme Court held DNA evidence, being in the nature of opinion evidence, its probative value is to be held on a case-to-case basis. It can be used to corroborate the prosecution case. In the facts of cited case it discarded the evidence as seizure of most of the samples subjected to DNA analysis was doubtful".⁷ It is pertinent to concede that an expert is not a witness to a particular fact and expert evidence is merely advisory in nature, it becomes bounden duty of an expert witness to furnish before the court, all relevant scientific criteria which is needed for testing the accuracy of forensic findings or conclusions.⁸

The admissibility of expert testimony in courtroom under the common law may be determined based on the factors: (i) that such evidence should be helpful to the court, (ii) that the expert is knowledgeable in the relevant subject, (iii) that the expert is unbiased, and (iv) that his evidence is credible.⁹ It is observed that "An expert witness, however impartial he may wish to be, is likely to be unconsciously prejudiced in favor of the side which calls him."¹⁰ In principle, an expert witness should be an advocate for the truth and not an advocate for a

5 Sir James Fitzjames Stephen, *The Indian Evidence Act (I. of 1872): With an Introduction on the Principles of Judicial Evidence* 121 (Macmillan and Co., London, 1872).

6 *State of West Bengal v. Saiful Ali* (2023) 1 High Court Cases (Cal) 525 at para 126.

7 *Id.* 6 at para 124. Also see: *Rahul v. State (NCT of Delhi)* (2023) 1 SCC 83; and *Manoj v. State of M.P.* 2022 SCC OnLine SC 677.

8 Michael Lynch and Simon Cole, "Science and Technology Studies on Trial: Dilemmas of Expertise" 35(2) *Social Studies of Science* 269-311 (2005).

9 The Crown Prosecution Service, Expert Evidence (last updated Nov. 1. 2024), available at: <https://www.cps.gov.uk/legal-guidance/expert-evidence> (last visited on Feb. 24, 2024).

10 *Umeed Ali Khan v. Sultana Ibrahim*, LEX/SCPK/0483/2006; observations from judgment of the Supreme Court of Pakistan as quoted in *Prem Sagar Manocha v. State (NCT of Delhi)*, AIR 2016 SC 290 : (2016) 4 SCC 571 at 580.

particular organization or party.¹¹ However, an expert witness represents usually his findings as a prosecution witness, so his neutrality or impartiality is always on stake. Hence, it appears prudent, if forensic expert presents his findings as deponent rather than witness. In the instant survey 2023, nearly 250 judgements of constitutional courts deliberating upon forensic related vital issues have been reviewed. Several seminal issues such as chain of custody, definition of expert, *Brady* rule, the right of an accused to cross-examine the expert, infallibility of DNA evidence, legal conundrum in determination of paternity of a child, doctrine of “judicial calm”, new criminal major enactments, data protection regime and other allied spheres have been pondered. On the basis of the review of the judgments few recommendations have also been submitted.

II PROCEDURAL RECTITUDE IN FORENSICS

Procedural probity remains vital necessity for admissibility of forensic evidence in the courtroom. There are several intertwined procedural issues and challenges observed during this survey, which have been succinctly pondered below.

Human identification: A dire need for adjudication

The prime objective of crime investigation as well as judicial proceedings is to identify correct human being related to a crime. Similarly, genuine human identification is obligatory to largely connect the right and duty binary (claims) adjudicated during civil proceedings. In criminal matters, the identity of victim as well as accused are crucial and challenged. Many a times, victim may be incapable of disclosing her identity due to various factors like age, mental status or designed malice; putrefied or disintegrated bodily remains or skeleton. For an accused, even if the first information report (FIR) mentions him by name, it is onerous duty of the investigating agency and the trial judge to determine correct identity of the perpetrator before holding him guilty. Thus, the test of justice system revolves around accurate human identity.

Forensic tools like biometrics, photography, skull superimposition, videography, handwriting and signature analysis, fingerprinting, voice spectroscopy, serology, DNA *etc.*, aid to establish human identity with greater precision.¹² DNA is indeed a powerful tool for human identification including gender determination especially when traditional methods are incapable for human identity.¹³ In infamous *Nithari*

11 LC Friedman, RA Daynard and CN Banthin, “How tobacco friendly science escapes scrutiny in the courtroom” 95(S1) *American Journal of Public Health* S16-S20 (2005).

12 *John Anthonisamy alias John v. State* (2023) 3 SCC 536; 2023 SCC OnLine SC 57.

13 *Liyakat Ali v. State (NCT of Delhi)* 2023 SCC OnLine Del 3663 : (2023) 249 AIC 638; *Razia Begum v. Commissioner Employees Compensation* 2023 SCC OnLine Del 5693 at para 27; and *Yogesh Sharma v. State (Govt. of NCT of Delhi)* 2023 SCC OnLine Del 2726 at paras 20 & 21.

case,¹⁴ the body remains were identified by connecting DNA with the parents of deceased victims.¹⁵ However, despite the fact that forensics provide powerful aid for evidence collection; and prosecution is losing the cases, it is strange that prosecution (and courts) are maintaining conspicuous silence why DNA and other forensic aids are not been fully utilized.¹⁶ In *Indrajit Das v. State of Tripura*, the apex court poignantly observed that “only a limb was recovered but no DNA testing was carried out to establish the limb was of the deceased.”¹⁷ In this case, the apex court has revisited the canons governing chain of circumstantial evidence.

Crime scene management (CSM) and chain of custody (CoC)

Crime scene management is very important in detection of crime, since it effectively secure probity of evidence. Chain of custody (CoC) of sample ensures integrity and authenticity of the samples collected from the crime scene and other sources during investigation. Proper chain of custody protects forensic samples from contamination, tampering, substitution, manipulation and destruction. Indeed, CoC upholds procedural fairness, hence it became imperative for admissibility of forensic evidence. In *Allarakha Habib Menon v. State of Gujarat*,¹⁸ the apex court held that unverified chain of custody compromises credibility of forensic reports. The court ruled that if prosecution fails to establish unbroken chain of custody of samples, the reliability of forensic evidence weakens, affecting the right of fair trial.¹⁹

In *Manoj v. State of Madhya Pradesh*,²⁰ the apex court observed that the crime scene was not secured, consequently tampering and contamination of the samples for forensic examination cannot be ruled out. The chain of custody of the sample analyzed by the expert is a crucial factor for admissibility of the expert

14 The Nithari serial killings refer to a series of horrendous offences involving kidnapping, sexual assaults and killings of several children and females in NOIDA, Uttar Pradesh. These incidents took place between 2005 and 2006 in Nithari village of district Gautam Budhanagar, Uttar Pradesh. Mohinder Singh Pandher and Surinder Koli were arrested and sentenced to death. The matters are still sub-judices in the appellate courts.

15 *Surendra Koli v. State through Central Bureau of Investigation* 2023 SCC OnLine All 2038: (2023) 6 All LJ 634.

16 *State (NCT of Delhi) v. Jaswant Singh* 2023 SCC OnLine Del 6569. In this case, a German girl was sexually assaulted on 02.08.1997, and trial court acquitted the accused on 28.11.2020. The blood samples of victim and accused were collected, but DNA report was never obtained from Germany, without citing any reason causing travesty of justice.

17 2023 SCC OnLine SC 201 at para 16: 2023 INSC 175.

18 [2024] 8 SCR 345: 2024 INSC 590.

19 Harry Browne said that “A fair trial is one in which the rules of evidence are honored, the accused has competent counsel, and the judge enforces the proper court room procedures - a trial in which every assumption can be challenged.” In *Mithu Rai v. State of Jharkhand* [2023 SCC OnLine Jhar 1557], despite matching DNA with the accused, the high court for the purpose of ensuring fair trial remanded the case for retrial and declined the death penalty reference in a sexual penetrative assault and murder of a minor.

20 (2023) 2 SCC 353 at para 126 : 2022 SCC OnLine SC 677; and *Chandan v. State of U.P.* 2022 SCC OnLine All 915 : (2023) 123 ACC (Sum 8) 4.

opinion. In several cases despite inculpatory forensic report, the admissibility was challenged based on disruption in the chain of custody causing doubt of integrity of sample and possibility of manipulation; consequently, the accused were acquitted.²¹

The court has consistently raised doubts on the manners of gathering biological samples used for DNA analysis. In *Rajesh v. State of Madhya Pradesh*,²² the deceased during scuffle with the accused, managed to pull out some of his hairs, which were later recovered from her feast by police, as recorded in the *panchnama* of dead body. The DNA test of these hairs linked crime with the accused Rajesh Yadav. The apex court found this story of prosecution bereft of logic, since the accused was much taller than the victim. “This scenario does not lend itself to credibility and seems to have been concocted so that Rajesh Yadav’s hair would be conveniently available for DNA analysis to corroborate the prosecution’s case”, the apex court observed.²³ Similar scenario was observed in the *Manoj*,²⁴ where the apex court has refused to rely on DNA report, since genuineness of biological samples was not beyond suspicion. In fact, both conviction orders in the *Rajesh* and the *Manoj* were set aside by the Supreme Court of India. Hence, there is a dire need to formulate protocols and strict adherence to maintain chain of custody.

Procedural violations in collection of forensic samples

In the *Manoj* case,²⁵ the issue of violation of procedures laid down in the Identification of the Prisoners Act, 1920 for collecting the fingerprint samples of the accused were raised. The apex court held that said provisions are not mandatory, but rather directory in nature to eliminate possibility of evidence fabrication, during collection of samples. This preposition was earlier affirmed in *Ashish Jain v. Makrand Singh*.²⁶

In *The State of Maharashtra v. Baburao Ukandu Sangerao @ Baburao Malegaonkar*²⁷ the high court has observed that if the chain of custody of the sample (here DNA) is compromised or there is an unexplained inordinate delay in submitting the sample for analysis to forensic laboratory from the investigation agency, or the requisite protocol and standard operating procedure has not been scrupulously followed, then the report is untrustworthy for admissible reliance as evidence despite the forensic technique like DNA may have high credence. Every forensic technique including DNA Profiling is evolving and none so far could

21 *Id.* at 32; *Rahul v. State of NCT Delhi* (2023) 1 SCC 83; *Mohan Lal v. State of Punjab* AIR 2018 SC 3853 : (2018) 9 SCALE 663; and *Chandan v. State of U.P.* 2022 SCC OnLine All 915 : (2023) 123 ACC (Sum 8) 4.

22 2023 SCC OnLine SC 1202.

23 *Id.* at para 44.

24 *Supra* note 20 at para 152.

25 *Id.* at para 125.

26 (2019) 3 SCC 770; (2019) 2 SCC (Cri) 256.

27 2023 SCC OnLine Bom 1945.

attain infallible status, however, these are useful and neutral aids for corroboration, observed the court.

Defining an ‘Expert’

Expert opinion based on analytical reporting represents forensic evidence. Section 45 of the Indian Evidence has not defined the term ‘expert’, and the enigma creates huge conundrum.²⁸ The Indian judiciary has attempted to clarify the position of experts. In *State of Himachal Pradesh v. Jai Lal*,²⁹ the apex court elucidated expression ‘specially skilled’ of section 45 which entails that an expert must have made a special study (education) or acquired a special experience. Thus, expert is a skilled professional having adequate knowledge of the subject. The court further clarified that an expert is not a witness of fact (neither of law), and his opinion is really of an advisory and persuasive in character provided it is intelligible, convincing and tested. The expert opinion once admitted in the court, it becomes opinion of the court. In *Titli v. Alfred Robert Jones*,³⁰ it was laid down that the real function of the expert is to put before the court, all the materials, together with reasons which would induce him/her to come to a particular conclusion.

Issue of cross examination of an expert

Due to partisan nature of trials and the ethical commitment of attorneys to their clients in adversarial justice system, it is alleged that trials are not dearly devoted to logic and truth.³¹ Although rules of evidence can mitigate the most extreme prejudice against truth in the adversarial situation, they argue that when law and science connect, science suffers³². Thus, cross examination of witness of either side is the testament for exploring and securing truth. Despite knowing forensic science is not a gospel truth, legal systems rooted mainly in British colonial regime, exempt experts from facing cross-examination. Section 30 of the Criminal Justice Act, 1988 of United Kingdom entails that the reports of experts would be admissible in courts, irrespective of whether or not the author of the report is present in court to present oral evidence with regards to the same. However, if the author of the report chooses not to give oral evidence on the contents of the report, the report can only be admitted as evidence, with the permission of the court. Similarly in India, Section 293 of the Criminal Procedure Code, 1973 entails list of certain experts whose reports can be admitted as evidence even without summoning them to depose during court proceedings.

28 G.K. Goswami and Aditi Goswami, “Navigating Forensic Evidence Under India’s New Legal Landscape” (2024) 7 SCC J-1; and G.K. Goswami, “A need to define forensic expertise” *The New Indian Express*, January 03, 2024, available at: <https://www.newindianexpress.com/opinions/2024/Jan/02/a-need-to-define-forensic-expertise-2647232.html> (last visited Feb. 24, 2024).

29 (1999) 7 SCC 280.

30 AIR 1934 All 237.

31 Michael Risinger and Michael J. Saks, “Rationality, Research, and Leviathan: Law enforcement-sponsored Research and the Criminal Processes” 4 *Michigan State DCL Law Review* 1033 (2003).

32 *Id.* at 1038.

The USA Supreme Court in *Melendez- Diaz v. Massachusetts*,³³ observed that mere laboratory report cannot replace the evidence rendered through live testimony. The court after making reference to the Confrontation Clause of the Sixth Amendment,³⁴ held that the forensic scientists performing the task of testing and analysis in the laboratories on behalf of the prosecution and submitting report must be present to face trial proceedings.

Infallibility of DNA evidence

DNA profiling provides evidence of high credence, but no forensic evidence has yet to attain the status of infallibility. In *Pattu Rajan v. State of Tamil Nadu*,³⁵ the apex court held that "... even though the accuracy of DNA evidence may be increasing with the advancement of science and technology with every passing day, thereby making it more and more reliable, we have not yet reached a juncture where it may be said to be infallible".

Impact of non-matching DNA report

The culpability of the accused in a crime is decided on case-to-case basis and negative or positive DNA report is not the sole criteria for finally holding innocent or guilty. Positive DNA indicates higher probability of guilt. In *Raj Kumar v. State (NCT of Delhi)*,³⁶ High Court of Delhi convicted the accused of rape despite DNA samples collected from the accused were not matching with the samples collected from the undergarments and other garments of victim. The high court observed that "... absence of semen which could on DNA analysis account for the alleles of the two appellants does not discredit the version of the prosecutrix that she was raped by the two appellants one after another. For an offence of rape, it is sufficient to prove that there was penetration."³⁷

The principle of "Judicial Calm"

The principle of judicial calm or judicial temperament or composure refers to an expectation of judge conduct to be observed during judicial proceedings, and is necessary for ensuring fair trial. Judicial calm is an integral part of the Code for Judges to preserve the integrity and dignity of judicial process instilling faith and confidence of people in judicial system. This doctrine insulates a judge from external factors such as media trial, emotional conflicts, provocation *etc.* Various courts have emphasized for strict compliance of this doctrine.³⁸

33 557 U.S. 305 (2009).

34 Confrontation Clause found in the Sixth Amendment to the United States Constitution provides that "in all criminal proceedings, the accused shall enjoy the right ... to be confronted with the witness against him".

35 (2019) 4 SCC 771 at para 33; (2019) (Cri) 354 : 2019 SCC OnLine 444..

36 2023 SCC OnLine Del 3666.

37 *Id.* at para 24.

38 *R v. Suussex, ex parte McCarthy* [1924] 1 KB 256 : [1923] All ER Rep 233; *In re Murchison* 349 U.S. 133 (1955); *Johnson v. Johnson* [2000] HCA 48 – 201 CLR 488 : 74 ALJR 1380 ; and *State of Maharashtra v. Shashikant S. Patil* 2000; and *Naveen alia Ajay v. State of Madhya Pradesh* 2023 SCC OnLine SC 1365 at para 18.

In *Naveen* case,³⁹ a chargesheet was filed in seven days from the incident of kidnapping and rape with murder of a three-month old girl child, and DNA report was submitted later during the trial. In 15 days, trial was concluded awarding death penalty to the indigent accused. Thus, trial was hurriedly concluded without providing adequate opportunity to legal-aid defense counsel for preparing effectively. In appeal, the apex court observed that collection of DNA sample was doubtful, the forensic evidence was neither scientifically nor legally proved. Neither the high court nor the trial court have examined the underlying basis of the findings for DNA reports nor they examined the fact whether the techniques were reliably applied by the expert. Opportunity to cross-examine the forensic expert was not provided under immunity provisions of section 193 of CrPC. The trial was hurriedly concluded by conducting day-to-day hearings. The apex court set aside the conviction order and matter was remitted for the trial court for *de novo* trial.

IV FORENSICS IN CRIMINAL ADJUDICATION

In criminal matter prosecution has to establish guilt beyond reasonable doubt, however, innocence may be proved merely on the basis of preponderance of probability. DNA and other forensic aids have corroborative value in criminal adjudication. It must be realized that forensics is not a panacea, and even “DNA evidence alone is not the magic bullet, and it must be interpreted in the context of the case.”⁴⁰ In various cases screened during this survey, DNA reports have been used both as inculpatory evidence to prove guilt,⁴¹ and as exculpatory evidence to examine innocence claims.⁴² DNA evidence also play crucial role in deciding bail petitions.⁴³ In the extant survey of 2023 judgments, several vital issues in criminal matters have been observed as illustrated below.

39 *Naveen alia Ajay v. State of Madhya Pradesh* 2023 SCC OnLine SC 1365.

40 Peter Gill, *Misleading DNA Evidence: Reasons for Miscarriage of Justice* (Academic Press Inc., 2014)

41 *State of Maharashtra v. Raju* 2023 SCC OnLine Bom 2648; *Sameer Shashikant Jadhav v. State of Maharashtra* 2023 SCC OnLine Bom 84 at para 47; *Pradeep v. State of Chhattisgarh* 2023 SCC OnLineChh 5305; *Aman v. State (NCT of Delhi)* 2023 SCC OnLine Del 3662 : 2023 Cri LJ 3554 : (2023) 302 DLT 612 (DB); *Jagdish v. State (NCT of Delhi)* 2023 SCC OnLine Del 3659; *Navi v. State (NCT of Delhi)* 2023 SCC OnLine Del 3672 at para 22 : (2023) (2023) 249 AIC 646; *Rahul v. State (NCT of Delhi)* 2023 SCC OnLine Del 2197 : (2023) 300 DLT 701; *Raju Yadav v. State (Govt. of NCT of Delhi)* 2023 SCC OnLine Del 2782 at para 38; *Siddhartha v. State (Govt. of NCT of Delhi)* 2023 SCC OnLine Del 1672 at para 47; *Sunder Singh v. State (Govt. of NCT of Delhi)* 2023 SCC OnLine Del 2023 at para 61; and *Session Judge, North Tripura Judicial District v. State of Tripura* 2023 SCC OnLine Tri 384 at para 43.

42 *State (NCT of Delhi) v. Dabloo Kumar* 2023 SCC OnLine Del 7005; *State (NCT of Delhi) v. Sandeep* 2023 SCC OnLine Del 4637 at para 35; and *Sandeep v. State (Govt. of NCT of Delhi)* 2023 SCC OnLine Del 3657 at para 35.

43 *Rajkumar Gupta v. State (Govt. of NCT of Delhi)* 2023 SCC OnLine Del 4032 at paras 21 and 22; *Meena Ram v. State of Himachal Pradesh* 2022 SCC OnLine HP 6087 at para 13; *Ramesh Kumar v. State of Himachal Pradesh* 2023 SCC OnLine HP 8.; *Mandeep Singh v. State of Punjab* 2023 SCC OnLine P&H 5850; and *Sonuv. State of Haryana* 2023 SCC OnLine P&H 6358.

Role and Responsibility of an Investigator

The apex court in *Maghavendra Pratap Singh @ Pankaj Singh v. State of Chhattisgarh*⁴⁴ has emphasized the role and responsibilities of the investigating agencies. Paul B. Weston and Renneth M. Wells in their seminal treatise on “Criminal Investigation: Basic Perspectives” have explained criminal investigation as under:⁴⁵

Criminal investigation is a lawful search for people and things useful in reconstructing the circumstances of an illegal act or omission and the mental state accompanying it. It is probing from the known to the unknown, backward in time, and its goal is to determine truth as far as it can be discovered in any post-factum inquiry.

Successful investigations are based on fidelity, accuracy and sincerity in lawfully searching for the true facts of an event under investigation and on an equal faithfulness, exactness, and probity in reporting the results of an investigation. Modern investigators are persons who stick to the truth and are absolutely clear about the time and place of an event and the measurable aspects of evidence. They work throughout their investigation fully recognising that even a minor contradiction or error may destroy confidence in their investigation.

The joining of science with traditional criminal investigation techniques offers new horizons of efficiency in criminal investigation. New perspectives in investigation bypass reliance upon informers and custodial interrogation and concentrate upon a skilled scanning of the crime scene for physical evidence and a search for as many witnesses as possible. Mute evidence tells its own story in court, either by its own demonstrativeness or through the testimony of an expert witness involved in its scientific testing. Such evidence may serve in lieu of, or as corroboration of, testimonial evidence of witnesses found and interviewed by police in an extension of their responsibility to seek out the truth of all the circumstances of crime happening. An increasing certainty in solving crimes is possible and will contribute to the major deterrent of crime—the certainty that a criminal will be discovered, arrested and convicted.

The investigating officer “is not merely to bolster up a prosecution case with such evidence as may enable the court to record a conviction but to bring out the real unvarnished truth” referred by the Supreme Court in *Mohd. Imran Khan v. State (Govt. of NCT of Delhi)*.⁴⁶

44 2023 SCC OnLine SC 486.

45 Paul B. Weston and Renneth, M. Wells, *Criminal Investigation: Basic Perspectives* (Prentice Hall : 2005). Also see: *Pooja Pal v. State of U.P.* (2016) 3 SCC 135 at para 96. Commenting upon the content to be mentioned in the case diaries of investigation, the apex court in *Bhagwant Singh v. Commissioner of Police* [(1983) 3 SCC 344] observed that the entries into the police diary shall be with: (a) promptness; (b) in sufficient detail; (c) containing all significant facts; (d) in chronological order; and (e) with complete objectivity.

46 (2011) 10 SCC 192 at para 31. Also see: *Jamuna Chaudhary v. State of Bihar* (1974) 3 SCC 774 at 780 : AIR 1974 SC 1822.

Integrity of samples

Integrity of samples related to crime is baseline for admissibility of the opinion of the forensic expert. On the basis of challenged integrity of samples, in *Rahul v. State of Delhi, Ministry of Home Affairs*, the apex court has turned around the death penalty of the accused after observing:⁴⁷

If the DNA evidence is not properly documented, collected, packaged and preserved, it will not meet the legal and scientific requirements for admissibility in a court of law. It is because extremely small samples of DNA can be used as evidence, greater attention to contamination issues is necessary while locating, collecting, and preserving DNA evidence can be contaminated when DNA from another source gets mixed with DNA relevant to the case. This can happen when someone sneezes or coughs over the evidence or touches his/her mouth, nose, or other part of the face and then touches area that may contain the DNA to be tested. The exhibit shaving biological specimen, which can establish link among victim(s), suspect(s), scene of crime for solving the case should be identified, preserved, packed and sent for DNA profiling.

The Supreme Court concluded, “Thus, DNA may be more useful for purposes of investigation but not for raising any presumption of identity in a court of law.”⁴⁸ On the similar ground like the *Rahul*, the High Court of Bombay raised doubt on the sanctity of the DNA sample, and set aside the conviction order of the trial court in a POCSO case, where 17-year-old victim was impregnated by alleged sexual abuse by the accused and DNA of aborted foetus matched with the accused.⁴⁹ The accused was also acquitted in an appeal against conviction order in a POCSO case by the High Court of Uttarakhand, despite DNA matched with the biological samples collected from the prosecutrix and the accused on the ground that “there is no evidence on record as to when the sample for D.N.A. test was taken by the prosecution from the victim as well as from the appellant and when the same was sent to the F.S.L. It is also not available on record that under which kind of safety, the sample was preserved in-between with the Police/ Investigating Agency. In this view of the matter, no reliance can be made on the F.S.L. Report.”⁵⁰ In this appeal, the *Rahul*⁵¹ was referred for reversal of the conviction.

It is paramount to note that integrity of forensic sample is pertinent for admissibility of forensic opinion as credible evidence in the courtroom. The High Court of Bombay observed that “in criminal cases, especially based on circumstantial evidence, forensic science plays a pivotal role, which may assist in establishing the element of crime, identifying the suspect, ascertaining the guilt or

47 (2023) 1 SCC 83 at para 37.

48 *Id.* at para 37.

49 *Mahesh Bhimraj Jadhav v. State of Maharashtra* 2023 SCC OnLine Bom 1675 : (2023) 4 Bom CR (Cri) 278 : (2023) 3 AIR Bom CR (Cri) 699.

50 *Id.* at para 40.

51 *Supra* note 47.

innocence of the accused. Therefore, the investigating officer has to deal with the scene of crime in a scientific manner and guard against potential contamination of physical evidence which can be found during the process of collection, packing and forwarding of sample etc. Subject to the fulfilment of these contentions, evidence of DNA profile is of great weight.”⁵²

In *Manoj*, the Supreme Court also “...highlighted the need to ensure quality in the testing and eliminate the possibility of contamination of evidence; it is also held that being an opinion, the probative value of such evidence has to vary from case to case”.⁵³ In *Sudhir Sahni* case,⁵⁴ the High Court of Delhi found that despite the semen sample of the accused was collected but did not send to forensic laboratory for testing. The court further observed that the possibility of the semen having been planted on the clothes of the prosecutrix cannot be ruled out as contended by the accused appellant, and thus set aside the conviction in a POCSO case. Thus, shoddy investigation led to improper chain of custody of sample, which resulted in acquittals despite matching DNA.

Shoddy investigative procedure for processing forensic evidence

Improper collection and careless handling of forensic samples remain major challenge in India. The High Court of Calcutta has observed that matching DNA report was not admissible since there is no documentary evidence that the accused was taken to government hospital for collecting biological samples, and prosecution could not establish authenticity of FTA card using for DNA sampling.⁵⁵ In a POCSO case the DNA was establishing paternity of the accused with foetus of rape-induced pregnancy, but trial court ignored DNA test report since prosecution failed to establish plausible evidence concerning the collection of blood samples of the subjects and its dispatch to the forensic center for forensic analysis to get expert opinion.⁵⁶

Medico-legal examination and necessity of consent

The medico-legal examination by a medical expert and his opinion is used since long as potent evidence for adjudicating bodily offences. In sexual assault cases, virginity test (two-finger test) was prevalent across globe to determine veracity of allegation, hence the victim was subjected to medical examination. In the wake of human rights discourse, such tests to examine virginity of a female, irrespective of her status as victim, detainee or accused, has been declared unconstitutional and violation of right to dignity enshrined under Article 21 of the Indian Constitution. Having detailed deliberation on virginity jurisprudence, the

52 *Nima Tamang v. State of Goa* (2023) 1 High Court Cases (Bom) 617 at para 59. Also see: *Dharam Deo Yadav v. State of U.P.* (2014) 5 SCC 509 : (2014) 2 SCC (Cri) 626 : *Snehal Dias v. State of Goa* 2019 SCC OnLine Bom 1535; and *Jitendra v. State of Maharashtra* 2017 SCC OnLine Bom 8600.

53 *Supra* note 21 at 158. Also see: *Supra* note 35.

54 *Sudhir Sahni v. State (Govt. of NCT of Delhi)* 2023 SCC OnLine Del 722 at para 18 : (2023) 244 AIC 609 : 2023 Cri LJ (NOC 327) 106 (2023) 303 DLT 58.

55 *Animesh Majumder v. State of West Bengal* 2023 SCC OnLine Cal 4970 at para 16.

56 *Kishore Gurung v. State of Sikkim* 2023 SCC OnLineSikk 28 at para 3 (iii).

High Court of Delhi has issued five directions for declaring virginity test conducting on a female detainee, accused under investigation or custody unconstitutional.⁵⁷ Further, virginity test finds no mention in the “Explanation” to Section 53 of Cr PC and cannot be covered under the phrase “other such tests” on the rule of ejusdem generis.⁵⁸ This test is sexist, gender biased and stereotype; and it is neither modern nor scientific, rather archaic and irrational. Medical science and modern law globally disapprove to conduct virginity test since it is a form of inhumane treatment.

Medical examination of the accused of rape is required to be conducted under section 53-A of Cr PC, where his biological samples such as buccal swab or blood may be collected for serological or DNA analysis. However, an accused may also be examined by a medical practitioner for various other reasons such as health issues or injuries during the period of police or judicial custody. Failure to conduct medical examination may be fatal to prosecution case.⁵⁹ The medical examination of a rape victim (prosecutrix) is conducted under section 164-A Cr PC and biological samples such as vaginal swab etc. are collected for forensic analysis including DNA testing.

Consent of adult female for sexual liaison is crucial to ascertain culpability in a case of alleged sexual abuse. However, consent of minor in sexual liaison remains immaterial and constitutes statutory rape, which is dealt in India under the POCSO Act, 2012. Since the prosecutrix was adult, the High Court of Tripura, acquitted the accused, despite DNA linked the prosecutrix and the rape accused as the biological parents of the child born to her as a consequence of sexual liaison on the pretext of marriage.⁶⁰ The consent is also necessary for conducting medical examination of the prosecutrix, but in case of the accused of rape, his consent is not a legal necessity. The biological sample of foetus or in alleged poisoning case must be collected during medical exam.

Serology and DNA in administration of justice

Prior to DNA profiling, serological analysis remained a potent tool especially for identifying human blood, semen, saliva, and other distinctive features aiding for human identification in the administration of justice. Serology markers includes blood typing for ABO blood groups, antigens, Rh factor, proteins and enzymes analysis. Serological analysis still holds relevance in crime detection,⁶¹ since it is cost effective and helps for screening and sample selection for DNA analysis. Serology is useful when DNA samples are degraded, contaminated or in low

57 *Sr. Sephyv. CBI* (2023) 1 High Court Cases (Del) 646 at para 99 : 2023 SCC OnLine Del 717.

58 *Selvi v. State of Karnataka* (2010) 7 SCC 263 : (2010) 3 SCC (Cri) 1; *Sr. Sephy v. CBI*(2023) 1 High Court Cases (Del) 646 at para 66 : 2023 SCC OnLine Del 717.

59 *Chotkau v. State of Uttar Pradesh* 2022 SCC OnLine SC 1313at para 81, and 82; and *Munna Panadey v. State of Bihar* 2023 SCC OnLine SC 1103.

60 *Md. Hachib Ali v. State of Tripura* 2023 SCC OnLine Tri 382.

61 *Rajesh Kumar Anant v. State of Chhattisgarh* 2023 SCC OnLine Chh 4652.

quantities. However, DNA is more powerful and widely used method for human identification.

In *R v. Dohoney and Adams*,⁶² UK Court of Appeal laid down following guidelines concerning the procedure for introducing DNA evidence in trials: “(1) the scientist should adduce the evidence of the DNA comparisons together with his calculations of the random occurrence ratio; (2) whenever such evidence is to be adduced, the Crown (prosecution) should serve upon the defense details as to how the calculations have been carried out, which are sufficient for the defense to scrutinize the basis of the calculations; (3) the Forensic Science Service should make available to a defense expert, if requested, the databases upon which the calculations have been based”. A research article⁶³ on the issue of degradation of DNA due to washing of clothes was referred in *Ram Pal v. State of H.P.*⁶⁴ The research concluded that DNA degrades by laundering the clothes at higher temperature.

The High Court of Telangana dismissed the criminal petition against the prosecution of the offence of cheating and other offences where DNA established the inferior quality of seeds of ‘Arunim’ variety of chilli crop was sold to farmers and they suffered from heavy financial loss due poor crop yield.⁶⁵ The farmers were made to believe through their authorized dealers that the seeds are of genuine quality and farmers would be benefitted.

Probative value of DNA and conviction based on standalone DNA

DNA being a potent tool for human identification with founded caveat of observing procedural probity, it is generally asked whether DNA evidence as sole inculpatory evidence may be the basis of conviction? In *Prakash Nishad alias Kewat Zinak Nishad v. State of Maharashtra*,⁶⁶ the apex court has categorically addressed this issue. In this case of rape with murder of a six-year-old minor girl and causing disappearance and destruction of evidence by throwing her dead body into a drain (*nala*), the trial court awarded death penalty, which was also ratified by the high court. During the appeal, the apex court has observed that baffling delay in sending the samples for forensic analysis causing scope for manipulation and contamination in alleged samples. The court observed that “without any delay” and “chain of custody” aspects are indispensable criterion for admissibility of the forensic evidence, which have not been observed in this

62 [1997] 1 Cr.App.R. 369. The case involved two separate appeals (Doheny and Adams), which were heard together because they both raised legal issues about the admissibility of DNA evidence.

63 Ivan Stojanovic, Aleksandra Stefanovic and Goran Ilic, “DNA Degradation of Bloodstains on Cotton Fabric Caused by Different Washing Procedures” *Herald Scholarly Open Access* (2022). DOI:10.24966/FLIS-733X/100068

64 2023 SCC OnLine HP 645.

65 *Vuda Nagesh v. State of Telangana* 2023 SCC OnLine TS 599.

66 2023 SCC OnLine SC 666.

case.⁶⁷ On the probative value of DNA evidence, the apex court referred *Pattu Rajan v. State of Tamil Nadu*, where it was observed:⁶⁸

Like all other opinion evidence, the probative value accorded to DNA evidence also varies from case to case, depending on the facts and circumstances and the weight accorded to other evidence on record, whether contrary or corroborative. This is all the more important to remember, given that even though the accuracy of DNA evidence may be increasing with the advancement of science and technology with every passing day, thereby making it more and more reliable, we have not yet reached a juncture where it may be said to be infallible. Thus, it cannot be said that the absence of DNA evidence would lead to an adverse inference against a party, especially in the presence of other cogent and reliable evidence on record in favour of such party.

The apex court recorded that "... perusal of these documents reveals that samples of the blood and semen of the Appellant were sent for forensic analysis. Importantly though, there is nothing on record to establish as to who took such samples, on what date, on how many occasions and why were they not sent all at once, we notice that none of the police officials have testified to the formalities of keeping the samples safe and secure being complied with."⁶⁹ Thus, despite inculpatory DNA report, the appeal was allowed and conviction was set aside. Indeed, DNA is not infallible, since DNA report is dependent on procedural probity and integrity of samples.

In *Parvej Khan*, the Bombay High Court reversed the conviction for remainder of natural life of the accused in a POCSO case. The court observed that in absence of independent incriminating evidence or circumstance, "solely on the basis of DNA evidence, guilt cannot be fastened."⁷⁰ The court further observed, "Moral conviction has no legal sanctity and what law requires is legally acceptable evidence ruling out innocence of the accused."⁷¹ Bombay High Court in *Suresh v. State of Maharashtra*⁷² has set aside the conviction in a rape considering that conviction cannot be based solely on DNA Report. The Bombay High referred *Premjibhai Bachubhai Khasiya v. State of Gujarat*,⁷³ where the High Court of Gujarat had observed:

67 *Id.* at para 62. The Apex court in *Prakash Nishad* said that a chain of custody document in other words is a document, "which should include name or initials of the individual collecting the evidence, each person or entity subsequently having custody of it, dated the items were collected or transferred, agency and case number, victim's or suspect's name and the brief description of the item".

68 *Supra* note 35 at para 52.

69 *Supra* note 66 at para 54.

70 *Parvej Khan v. State of Maharashtra* 2023 SCC OnLine Bom 2705 at para 76.

71 *Id.* at para 85.

72 2023 SCC OnLine Bom 641: (2023) 2 Bom CR (Cri) 247: (2023) 2 AIR Bom R (Cri) 340.

73 2009 Cri LJ 2888.

Positive DNA report can be of great significance, where there is supporting evidence, depending of course on the strength and quality of that evidence, even if it is positive, it cannot conclusively fix the identity of the miscreant, but, if the report is negative, it would conclusively exonerate the accused from the involvement of charge. The science of DNA is at a developing stage and when the Random Occurrence Ratio is not available for Indian Society, it would be risky to act solely on a positive DNA report, because only if the DNA profile of the accused matches with the foetus, it cannot be considered as a conclusive proof of paternity. Contrarily, if it is solitary piece of evidence with negative result, it would conclusively exclude the possibility of involvement of the accused in the offence. The positive DNA report cannot be therefore accepted by the trial Court in isolation, i.e. as sole piece of evidence to record the conviction of accused under Sections 376, 366 of Penal Code, 1860.

In *Reference v. Anokhilal*,⁷⁴ the Jabalpur Bench of High Court of Madhya Pradesh has dealt with the Reference of death penalty in a penetrative sexual assault with murder case of a 9-year-old girl. This case was remanded earlier by the apex court for retrial,⁷⁵ where second time death penalty was awarded by the Special Judge, POCSO Act, Khandwa, Madhya Pradesh. The MP high court held that “the credibility of expert evidence in case of a DNA report depends upon the data, material, or the basis on which conclusions were drawn in DNA report.”⁷⁶ The high court set aside the death penalty and direct the trial court for third trial for examining the DNA experts and issues the digestion that “The Trial court, thereafter consider the new evidence and material and by considering the other evidence already on record, pronounce its judgment.”⁷⁷

In fact, negative or inconclusive DNA report is not the certificate of innocence and conviction may be upheld, since there may be various reasons for negative DNA report.⁷⁸ This legal preposition has also been endorsed in *Pattu Rajan v. State of Tamil Nadu*.⁷⁹

Consequences, if DNA not conducted

In plethora of criminal cases, the investigators do not resort to forensic sample collection for forensic analysis. Sometimes, the accused take advantage of prosecution failure to produce forensic evidence.⁸⁰ The Criminal (Amendment) Act, 2005, has substituted the Explanation in section 53 of CrPC, for explaining

74 I.L.R. 2023 M.P. 1891 (DB).

75 2019 SCC OnLine 1637.

76 *Supra* note 74 at para 13 (d).

77 *Id.* at para 22(iii).

78 *Sak Tshering Lepcha v. State of Sikkim* 2023 SCC OnLine Sikk 30 : 2023 Cri LJ 2569 : (2023) 246 AIC 775.

79 *Supra* note 3 at para 52.

80 *Ajay v. State of Madhya Pradesh* 2023 SCC OnLine MP 1936.

“examination” and “registered medical practitioner.”⁸¹ The plain reading of the amendment reveals that it is mandatory to conduct “examination” of blood and other bodily material mentioned therein. The conundrum related to essentiality of bodily examination and collection of biological samples has been resolved in *Rajendra Pralhadrao Wasnik v. State of Maharashtra*⁸² by observing, “... where DNA profiling has not been done or it is held back from the trial court, an adverse consequence would follow for the prosecution.” The apex court held that if DNA test is not conducted without any plausible reasons, adverse consequences would fall on prosecution case.⁸³

For the prosecution to decline to produce DNA evidence would be a little unfortunate particularly when the facility of DNA profiling is available in the country. The prosecution would be well advised to take advantage of this, particularly in view of the provisions of Section 53-A and Section 164-A CrPC. We are not going to the extent of suggesting that if there is no DNA profiling, the prosecution case cannot be proved but we are certainly of the view that where DNA profiling has not been done or it is held back from the trial court, an adverse consequence would follow for the prosecution.

However, in *Dinesh Yadav v. State of M.P.*,⁸⁴ the High Court of Madhya Pradesh, Jabalpur Bench has observed that section 53-A and Section 164-A have been introduced to make DNA test as mandatory. Non-conduction of DNA test causes dent on prosecution story as observed in *Krishan Kumar Malik v. State of Haryana*,⁸⁵ but court cannot draw adverse presumption. In catena of judgments during the extant Survey 2023, the constitutional courts held that in absence of DNA test, an adverse inference cannot be drawn against the prosecution case, but an adverse consequence could follow for the prosecution.⁸⁶ However, the courts

81 Section 8 of the Criminal (Amendment) Act, 2005: Amendment of section 53. In section 53 of the principal Act, for the Explanation, the following Explanation shall be substituted, namely:

‘Explanation’- In this section and in sections 53A and 54:

(a) “examination” shall include the examination of blood, blood stains, semen, swabs in case of sexual offences, sputum and sweat, hair samples and finger nail clippings by the use of modern and scientific techniques including DNA profiling and such other tests which the registered medical practitioner thinks necessary in a particular case;

(b) “registered medical practitioner” means a medical practitioner who possesses any medical qualification as defined in clause (h) of section 2 of the Indian Medical Council Act, 1956 (102 of 1956) and whose name has been entered in a State Medical Register.

82 (2019) 12 SCC 460.

83 *Id.* at para 54. *Prakash Nishad @ Kewat v. State of Maharashtra* 2023 SCC OnLine SC 666 at para 57, 58, 59; and *Chotkau v. State of Uttar Pradesh* 2022 SCC OnLine SC 1313 at para 80.

84 I.L.R. 2023 M.P. 1841 (DB) at para 26.

85 (2011) 12 SCC 130.

86 *Supranote* 58 at para 80. *Dinesh Yadav v. State of M.P.* I.L.R. 2023 M.P. 1841 (DB); and *Ramswaroop v. State of M.P.* I.L.R. 2023 M.P. 2258 (DB)

have categorically mentioned that not conducting the DNA test for credible human identification is failure of prosecution for establishing crime.⁸⁷

In *Chotkau v. State of Uttar Pradesh*⁸⁸ the Supreme Court observed that section 53-A and 164-A of CrPC are said to be mirror image of each other, but there are three distinguishing features:

- 81.1. Section 164-A requires the prior consent of the woman who is the victim of rape. Alternatively, the consent of a person competent to give such consent on her behalf should have been obtained before subjecting the victim to medical examination. Section 53-A does not speak about any such consent.
- 81.2. Section 164-A requires the report of the medical practitioner to contain among other things, the general mental condition of the woman. This is absent in Section 53-A.
- 81.3. Under Section 164-A(1), the medical examination by a registered medical practitioner is mandatory when, “it is proposed to get the person of the woman examined by a medical expert” during the course of investigation. This is borne out by the use of the words, “such examination shall be conducted”. In contrast, Section 53-A(1) merely makes it lawful for a registered medical practitioner to make an examination of the arrested person if “there are reasonable grounds for believing that an examination of his person will afford evidence as to the commission of such offence.”

In *State of Bihar v. Munna Pandey*,⁸⁹ the high court, referring to *Chotkau*, has observed that “Prior to its insertion in the Code also, DNA test and matching of semen was being resorted to but without the specific provision in place, non-observance of the same would not have otherwise led to an inference of weak prosecution”. The Patna High Court further observed that “Though in *Rajendra Prahladrao Wasnik v. State of Maharashtra* (2019) 12 SCC 460, it was held that the compliance of Section 53-A is not mandatory but non-compliance definitely weakens the prosecution case.”⁹⁰

In *Pattu Rajan v. State of Tamil Nadu*, the apex court held that the DNA is not infallible, “Thus, it cannot be said that the absence of DNA evidence would lead to an adverse inference against a party, especially in the presence of other cogent and reliable evidence on record in favour of such party.”⁹¹ In another case of rape, the High Court of Patna draw an adverse inference against the prosecution because, for the reason best known to the prosecution, despite DNA report was prepared but it was not produced before trial court.⁹² In *Srikanta Dhara v. State of*

87 *Munna v. State of U.P.* 2023 SCC OnLine All 32 at para 23.

88 *Supra* note 59 at para 81.

89 2023 SCC OnLine Pat 7619 at para 140. Also see: *Raushan Singh v. State of Bihar* 2023 SCC OnLine Pat 4183 at para 17.

90 *Supra* note 87 at para 141.

91 *Supra* note 35 at para 52.

92 *Ranjeet Thakur v. State of Bihar* 2023 SCC OnLine Pat 4354 at para 39.

West Bengal, if prosecution has emphatically brought enough incriminating evidence home against the accused, conviction may be awarded independent of DNA profiling.⁹³

Judicial response to non-sharing of exculpatory evidence with the accused

In *Manoj* case,⁹⁴ several critical legal issues have been addressed by the Supreme Court including non-sharing inculpatory evidence with the accused by the prosecution. Issue of disclosing exculpatory evidence is crucial because it is an integral part of the right to fair trial derived from Article 21 of the Indian Constitution, and is necessary for accused for establishing innocence.⁹⁵ The apex court has underpinned that a public prosecutor has wider duties than to merely ensuring that the accused is punished. He must ensure fair play in the proceedings by placing all relevant facts before the court in order to determine truth and justice for all parties including victim. The apex court has also interpreted liberal meaning of sections 173 and 207 of CrPC for providing free of cost copies of the documents to the defense by the prosecution in order to achieve its legislative object. The court held that documents and information not relied upon by the investigating officer or prosecutor must also be disclosed to the accused. The court further braced the right of accused to have access to the diaries of proceedings in investigation in order to ensure fairness in trial. The court observed that the purpose of investigation is meaningless, if police fail to maintain the police diaries accurately.

The similar observations were made by the apex court in *Ponnusamy v. State of Tamil Nadu*⁹⁶ to share all documents and information with the accused by the prosecution. In United States the *Brady* Rules⁹⁷ ensure that all facts including exculpatory evidence must be disclosed in the court and shared with the defense otherwise any violation of these rules amount to prosecutorial misconduct. Thus, Indian judiciary is also adopting the *Brady* rule for ensuring equitable justice and fair play, necessary for fair trial.

Rape related pregnancy (RRP) and DNA based parentage determination

The issue of RRP remains a consistent challenge in every society, since rape is highly stigmatized social construct and causing consistent trauma to the prosecutrix by defiling her social status including her family. The concealment of the incident many a times results delay in disclosure of RRP. The pregnant

93 2023 SCC OnLine Cal 805 at para 69.

94 *Supra* note 21.

95 *Id.* at paras 199 to 209. The apex court at para 209 directed that: "In view of the above discussion, this Court holds that the prosecution, in the interests of fairness, should as a matter of rule, in all criminal trials, comply with the above rule, and furnish the list of statements, documents, material objects and exhibits which are not relied upon by the investigating officer. The presiding officers of courts in criminal trials shall ensure compliance with such rules."

96 2022 SCC OnLine SC 1543.

97 The *Brady* Rules are the derivatives of the *Brady v. Maryland* [373 U.S. 83], which was decided by the US Supreme Court on 13 May 1963.

prosecutrix may approach the constitutional court for termination of her fetus, if the pregnancy is over 24 weeks.⁹⁸ Nuances of such incidents of grave concern have been reported in detail by the author in earlier annual surveys.⁹⁹ Justice D Y Chandrachud in *X v. The Principal Secretary, Health and Family Welfare Department, Government of NCT of Delhi*,¹⁰⁰ has observed that woman's right to reproductive choice is an inseparable ingredient of her personal liberty under Article 21 of the Indian Constitution. The apex court in *XYZ v. State of Gujarat*,¹⁰¹ has set aside the high court order, and after seeking the latest medical report of pregnant prosecutrix, permitted termination of her 27-week fetus. The court further order to secure DNA sample of the aborted fetus for DNA testing and handed over to investigating agency dealing with rape investigation.¹⁰²

Delayed forensic reporting and other challenges

Delayed forensic reporting is a poignant reality in Indian scenario due to lack of resources, missing accountability, and lackadaisical approach. In a POCSO case the trial court acquitted the accused of POCSO case since the DNA report of the foetus was awaited since long. Later, the DNA report was obtained which connected the foetus with the accused. Consequently, in the appeal by the State, the high court directed the trial court for *de novo* trial.¹⁰³

98 “Explanation 2. For the purposes of clauses (a) and (b), where any pregnancy is alleged by the pregnant woman to have been caused by rape, the anguish caused by the pregnancy shall be presumed to constitute a grave injury to the mental health of the pregnant woman”, of the section 3 of the Medical Termination of Pregnancy Act, 1971 read with the Medical Termination of Pregnancy (Amendment) Act, 2021 (No. 8 of 2021).

Section 3(2) of MTP Act states: Subject to the provisions of sub-section (4), a pregnancy may be terminated by a registered medical practitioner, (a) where the length of the pregnancy does not exceed twelve weeks, if such medical practitioner is, or (b) where the length of the pregnancy exceeds twelve weeks but does not exceed twenty-four weeks in case of such category of woman as may be prescribed by rules under this Act, if not less than two registered medical practitioners are of opinion, formed in good faith, that, (i) the continuance of the pregnancy would involve a risk to the life of the pregnant woman or of grave injury physical or mental health; or (ii) there is a substantial risk that if the child were born, it would suffer from such physical or mental abnormalities as to be seriously handicapped.

Section 3(4): (a) No pregnancy of a woman, who has not attained the age of eighteen years, or, who, having attained the age of eighteen years, is a lunatic, shall be terminated except with the consent in writing of her guardian.

(b) Save as otherwise provided in C1. (a). no pregnancy shall be terminated except with the consent of the pregnant woman. (For detail, please see the MTP Act, 1971 and 2021, available at: <https://nhm.hp.gov.in/storage/app/media/uploaded-files/mtp-amendment-act2021.pdf> (last visited on Feb. 24, 2024).

99 G. K. Goswami, Forensic Law, LVII *ASIL* 291 (2021).

100 AIR 2022 SC 4917. Also see: *Suchitra Srivastava v. Chandigarh Administration* (2009) 9 SCC 1; AIR 2010 SC 235.

101 2023 SCC OnLine SC 1573.

102 *X v. State of U.P.* 2023 SCC OnLine All 396 at para 7.

103 *State of Himachal Pradesh v. Madan Lal* 2023 SCC OnLine HP 279 at paras 28 and 29 : 2023 Cri LJ 2207.

Ballistic report

Ballistic expert opinion plays a dominant role to connect fire weapon with crime.¹⁰⁴ In absence of ballistic report it is difficult to establish that the bullets/pellets found on the body of the victim have been shot or fired from the seized fire weapon.¹⁰⁵ In *Pritinder Singh v. State of Punjab*,¹⁰⁶ the accused were acquitted, since the prosecution failed to examine the ballistic expert to establish that the wad and pellets were fired from the empty cartridges. In this case, the Apex Court cited *Sukhwant Singh v. State of Punjab*,¹⁰⁷ wherein the court had observed, "... It hardly needs to be emphasised that in cases where injuries are caused by firearms, the opinion of the ballistic expert is of a considerable importance where both the firearm and the crime cartridge are recovered during the investigation to connect an accused with the crime. Failure to produce the expert opinion before the trial court in such cases affects the creditworthiness of the prosecution case to a great extent".

Indeed, the forensic opinion aids for corroboration of prosecution story, and not sending the seized firearms and recovered empties for forensic opinion is not necessarily fatal, if there are other cogent evidence to prove guilt.¹⁰⁸ In catena of cases, the courts have observed that it is not possible to reject the credible and reliable deposition of the prosecution witness merely because the ballistic report shows that the bullet recovered during investigation does not match with the weapon recovered.¹⁰⁹ Non-recovery of the weapon or lack of ballistic expert opinion does not materially affect the case of prosecution, if other evidence cogently connect with guilt.¹¹⁰

Deception detection techniques (DDTs)

Deception is the biggest challenge for exploring truth in order to administer justice. Investigating agencies are blamed for torturing the suspect to extort truth

104 *Arvind Kumar v. State (NCT of Delhi)* (2023) 8 SCC 208 : 2023 SC OnLine SC 845; *Central Bureau of Investigation v. Shyam Bihari* (2023) 8 SCC 197 : 2023 SCC OnLine SC 844; *Aarif v. State (NCT of Delhi)* 2023 SCC OnLine Del 1807 : 2023 Cri LJ 2378; *Anil v. State (NCT of Delhi)* 2023 SCC OnLine Del 1599; *Anwar Mian v. State of Bihar* 2023 SCC OnLineJhar 222 : (2023) 243 AIC 389 : (2023) 1 JBCJ 741 (HC); *Ariz Khan v. State (NCT of Delhi)* 2023 SCC OnLine Del 6403 at para 88; *Lalit Lajras v. State of M.P.* I.L.R. 2024 M.P 518; and *Sanaul v. State of Jharkhand* 2023 SCC OnLine Jhar 686.

105 *Amar Nath v. State of Uttar Pradesh* 2023 SCC OnLine SC 1322 at para 13.

106 (2023) 7 SCC 727: 2023 SCC OnLine SC 811.

107 (1995) 3 SCC 367 at p. 377, para 21: 1995 SCC (Cri) 524].

108 *State of Punjab v. Hakam Singh* (2005) 7 SCC 408 at para 13; *Amar Singh v. Balwinder Singh* (2003) 2 SCC 518 at para 15; *Mahadeo Ram v. State of Jharkhand* 2023 SCC OnLine Jhar 2315; *Michael Dungdung v. State of Bihar* 2023 SCC OnLine Jhar 54 : (2023) 1 JBCJ 825 (HC); and *Suresh Sahu v. State of Jharkhand* 2023 SCC OnLineJhar 64 : (2023) 1 JLJR 587 : 2023 Cri LJ 1624.

109 *Rakesh v. State of U.P.* (2021) 7 SCC 188 at para 12;

110 *Nankaunoov. State of U.P.* (2016) 3 SCC 317 at para 9; *Aarif v. State (NCT of Delhi)* 2023 SCC OnLine Del 1807, *Baiju v. State of Bihar* 2023 SCC OnLine Jhar 223 at para 69; *Birju Mandal v. State of Jharkhand* 203 SCC OnLineJhar 1667; and *Lakhiram Hembram v. State of Bihar* 2023 SCC OnLine Jhar 50 : 2023 Cri LJ 1289.

and to secure confession. Consequently, physical torture is legally proscribed, and the right against self-incrimination has been recognized as a vital legal protection across jurisdictions. Article 20(3) of the Indian Constitution provides an individual choice between speaking or remaining silent during interrogation. This legal construct is further aimed to proscribe the forcible ‘conveyance of personal knowledge’ for enabling tight against self-incrimination as a fundamental right.¹¹¹

The results of various psychological assessment tests or DDTs such as narco-analysis, polygraph, brain mapping, Brain Electric Activation Profile (BEAP) etc. do not have evidentiary value *per se*,¹¹² but they have detective potential to provide leads to the investigating agency for evidence gathering especially in blind criminal cases. DDTs are the tools to aid police investigation, and strictly speaking, not to assist the court. However, the results of these techniques at the best may be used for corroboration depending upon the circumstances at the time of trial proceedings.¹¹³ In *Lindsey v. United State*,¹¹⁴ the Ninth Circuit Court of Appeal on the admissibility of the psychological tests had observed that “Scientific tests reveal that people thus prompted to speak freely do not always tell the truth.”¹¹⁵

In *Captain Manjit Singh Viridi v. Hussain Mohammed Shattaf*,¹¹⁶ the Supreme Court observed that “Though psychological evaluation test report only may not be sufficient to convict an accused but certainly a material piece of evidence. Despite this material on record, the high court could not have opined that the case was not made out even for framing of charge, for which only prima facie case is to be seen”. The High Court of Delhi held that even if a person give consent to undergo any DDTs or psychological analysis test, the result cannot be admitted as evidence because “subject” does not exercise control over responses during process of such test, and these results only serve an aid to investigation.

In *Vijay v. State of Madhya Pradesh*,¹¹⁷ three accused consented in *Sahmati Panchnama* to undergo narco, polygraph and brain mapping tests. However, they later retracted from their consent. The trial judge ordered to conduct these tests. In appeal, the High of Madhya Pradesh decided that a suspect can be subjected to DDTs only after taking his consent before the judicial Magistrate. The Central Bureau of India also conducted various DDTs, found no involvement of a few suspects, and arrested others based on deception.¹¹⁸ In 2023, the High Court of

111 *Supra* note 58 at para 262.

112 *Id.*, para 264.

113 *Sagar v. State of GNCT of Delhi* 2023 SCC OnLine Del para 12.

114 237 F 2d 893. Also see: *Selvi v. State of Karnataka* (2020) 7 SCC 263.

115 Andre A. Moenssens, “Narcoanalysis in Law Enforcement” 52(4) *The Journal of Criminal Law, Criminology and Police Science* 455-456 (November-December 1961).

116 (2023) 7 SCC 633 : 2023 SCC OnLine SC653 at p. 640, para 19.

117 2023 SCC OnLine MP 3877.

118 *B.W. Juothikumar v. Central Bureau of Investigation* 2023 SCC OnLine Ker 6766 at para 22.

Allahabad acquitted the accused of diabolic *Nithari* case.¹¹⁹ The high court has deliberated upon the legality of the DDTs, since the accused were subjected to various psychological tests including polygraph and narco-analysis.¹²⁰ The court observed that statement made during DDT procedure is equivalent to oral statement made during investigation, and tantamount to compulsory extraction of information resulting in self-inculpation violating Article 20(3). The high court observed that the compulsory administration of the narco-analysis technique amounts to “testimonial compulsion” and thereby triggers the protection of Article 20(3).

The inculpatory statement made by the accused during narco-analysis test, thus can be equated to a confession made by the accused during custody and would attract the wrath of section 26 of the Indian Evidence Act, 1872. The mere fact that an accused was in the scientific laboratory and the test was conducted by the expert would not lessen the impact of section 26 of the Evidence Act. Indeed, for conducting DDT, the accused was brought to laboratory under police custody. The importance of custody is required to be understood that the accused was in laboratory for the test would not cease his police custody.¹²¹ In an appeal against life imprisonment, the High Court of Bombay acquitted the accused since investigating officer failed to conduct narco, polygraph and brain mapping tests despite the court granted permission twice with the consent of accused of robbery and murder.¹²²

In order to address the challenge of fake complaints, a public interest litigation under Article 226 of the Indian Constitution was filed for “a direction to the Police to subject a complainant to undergo scientific tests like Narco-analysis, Polygraphy and Brain mapping during the investigation to prove the allegation and only then record his/her statement in order to control fake cases to secure right to life, liberty, dignity and speedy justice”.¹²³ The High Court of Delhi had pondered upon various allied issues and observed that a writ of mandamus cannot be issued by the courts to the authorities for conducting such tests in order to ascertain the veracity of the complainants.¹²⁴ These techniques globally suffer from inherent limitations, since some persons have ability to deceive even in hypnotic state and there is no uniform criteria for evaluating the efficacy of the DDTs. In 227th Report, the Law Commission of India has also not recommended to undergo complainant any scientific test before registering the alleged crime. “In case of a false complaint there are other remedies which are available in law”, said the high court.¹²⁵

¹¹⁹ *Supra* note 15.

¹²⁰ *Supra* note 16.

¹²¹ *Id.*, paras 326 and 327.

¹²² *Ajikh Khan Mohd. Khan Pathan v. State of Maharashtra* 2023 SCC OnLine Bom 2035 at para 9 : 2023 Cri LJ 4180.

¹²³ *In Matter of Ashwini Kumar Upadhyay v. Union of India* 2023 SCC OnLine Del 3816.

¹²⁴ *Id.* at para 5. Also see: *S. v. State (NCT of Delhi)* (2023) 6 High Court Cases (Del) 341: 2023 SCC OnLine Del 6476; *Sangitaben Shaileshbhai Datanta v. State of Gujarat* (2019) 14 SCC 522; (2020) 1 SCC (Cri) 395.

¹²⁵ *Id.*, para 8.

Signature and handwriting

Both signature and handwriting are crucial piece of evidence for human identification, and may be relevant for resolving civil disputes or adjudicating criminal matters. There are challenges for admissibility of disputed handwriting and signature, and sections 67 to 73 of the Indian Evidence Act, 1872 provide legal landscape related to documents, handwriting and signatures. Section 68 deals with proof of execution of document required by law to be attested; and section 69 provides proof where no attesting witness is found. In case attesting witness denies the execution, then section 71 comes to rescue. Comparison of signature, writing or seal with others is admitted or proved under section 73 of the Indian Evidence Act, 1972. Thus, in the event where attesting witnesses may have died, or cannot be found, the propounder is not helpless, as Section 69 of the Evidence Act, 1872 may be applicable.¹²⁶ Section 311-A of the Criminal Procedure Code, introduced by Act No. 2005, w.e.f. 23.06.2006, empowers the Magistrate to order a person to give specimen signature or handwriting, and these provisions would apply prospectively.¹²⁷

In *State of Maharashtra v. Sukhdev Singh*,¹²⁸ the Supreme Court observed: “It is well settled that evidence regarding the identity of the author of any document can be tendered (i) by examining the person who is conversant and familiar with the handwriting of such person or (ii) through the testimony of an expert who is qualified and competent to make a comparison of the disputed writing and the admitted writing on a scientific basis and (iii) by the court comparing the dispute with admitted one...”. On the nature of comparison of writing the court in *Sukhdev Singh*, the court observed, “But since the science of identification of handwriting by comparison is not an infallible one, prudence demands that before acting on such opinion the court should be fully satisfied about the authorship of the admitted writings which is made the sole basis for comparison and the court should also be fully satisfied about the competence and credibility of the handwriting expert.”¹²⁹ In this case the Supreme Court kept on observing:¹³⁰

It is, therefore, necessary to exercise extra care and caution in evaluating their opinion before accepting the same. So, courts have as a rule of prudence refused to place implicit faith on the opinion evidence of a handwriting expert. Normally courts have considered it dangerous to base a conviction solely on the testimony of a handwriting expert because such evidence is not regarded as conclusive. Since such opinion evidence cannot take the place of substantive evidence, courts have, as a rule of prudence, looked for

126 *Ashutosh Samanta v. SM. Rajan Bala Dai*, 2023 SCC OnLine SC 255 at para 19. Also see: *Babu Singh v. Ram Sahai alias Ram Singh* (2008) 14 SCC 754 : AIR 2008 SC 2485.

127 *Sukh Ram v. State of Himachal Pradesh* (2016) 14 SCC 183.

128 (1992) 3 SCC 700 at para 29 : 1992 SCC (Cri) 705.

129 *Ibid.*

130 *Ibid.*

corroboration before acting on such evidence. True it is, there is no rule of law that the evidence of a handwriting expert cannot be acted upon unless substantially corroborated but courts have been slow in placing implicit reliance on such opinion evidence, without more, because of the imperfect nature of the science of identification of handwriting and its accepted fallibility.

The defendants frequently contest in the courts that obtaining specimen signature of an accused or suspect without his consent by the investigating agency amount to violation of the right against self-incrimination. In *Santosh @ Bhure v. State (GNCT of Delhi)*,¹³¹ the High Court of Delhi held that “A conspectus of the decisions above would indicate that since specimen signatures and handwriting samples are not incriminating by themselves as they are to be used for the purpose of identification of the handwriting on a material with which the investigators are already acquainted with, compulsorily obtaining such specimens would not infringe the rule against self-incrimination enshrined in Article 20(3) of the Constitution of India.” If the defense does not question the genuineness of the signature and does not file an application to summon the expert for cross-examination, admissibility of expert opinion cannot be challenge merely on ground that the specimens of signatures and handwriting were obtained by compulsion.¹³²

CCTV footage and the last seen theory

In modern era CCTV are widely deployed and video footage provides crucial evidence for detection of crime. In *Chandan v. State of U.P.*,¹³³ the minor victim of penetrative sexual assault was seen live last on the shoulder of the accused in CCTV footage, which was presented vital inculpatory evidence by the prosecution. CCTV footage are also crucial to support the prosecution plea of the accused last seen together with the victim.

III CIVIL DISPUTE RESOLUTION

Paternity determination

Several cases of matrimonial disputes originate or culminate in raising doubt by the husband on paternity of the child born to his wife. Sometimes, females also contest for claiming matrimonial rights alleging the respondent being the biological father of her child. In fact, section 112 of the Indian Evidence Act, 1872 solely address the issue of legitimacy of a child. Legitimacy and paternity of a child are two distinct doctrines. Paternity is a biological concept, while legitimacy is a legal construct. Legitimacy determines whether child is born to a legally wedded (legitimate) couple and determine legal father (pater), while paternity ascertains the biological father (genitor) of a child. Thus, paternity biologically helps to decide the legitimacy of a child. Presumption under section 112 entails that pater and genitor must be the same, however, in real life legally married wife may be

131 2023 SCC OnLine SC 538 at para 63.

132 *Id.* at para 65.

133 2022 SCC OnLine All 915 : (2023) 123 ACC (Sum 8) 4.

conceived by a man other than husband through natural intercourse or through artificial insemination (*in vitro* fertilisation, IVF). Therefore, DNA test assists to know paternity (biological father), while section 112 decides legitimacy (legal father), consequently creates legal conundrum as discussed below.

DNA in last over three decades have used as potent tool to determine disputed paternity of a person, which may be useful for deciding civil as well as criminal matters. In the extant survey for 2023 plethora of paternity disputes in the courts have been resolved by using DNA profiling under the strict legal regime.¹³⁴ DNA further assisted to decide disputes on custody of a child.¹³⁵

The Supreme Court, in *Aparna Ajinkya Firodia v. Ajinkya Firodia*,¹³⁶ has addressed the legal question "... as to how a Court can prevent the law's tidy assumptions linking paternity with matrimony, from collapsing, particularly when parties are routinely attempting to dislodge such presumptions by employing modern genetic profiling techniques."¹³⁷ For existing legal framework in India on conclusive presumption of paternity of a child for the parentage determination, the apex court has succinctly reviewed and conspectus as under:¹³⁸

Indian Law has proceeded on the assumption that parents are persons who beget a child or who assume the legal obligations of parenthood through formal adoption of child. Under the Indian legal spectrum, a husband is strongly presumed to be the father of a child born to his wife. Thus, there is a strong presumption regarding the paternity of a child. This presumption can be overcome only by evidence precluding any procreative role of the husband, such as by showing that the husband and wife had no access to each other at the relevant time of possible conception. In the absence of proof of non-access, the law considers the husband's paternity to be conclusively established if they cohabited when the child was likely to have been conceived. By allowing rebuttal with proof, that the husband could not have been the biological father, the marital presumption was implicitly premised, in part, on a policy linking parenthood with biological reproduction and on an assumption about the probability of the husband's genetic contribution. The presumption protects social parentage over biological parentage.

134 *Shaji v. Potty* PR 2023 SCC OnLine Ker 1731.

135 *Prabha Rani v. State of Tripura* 2023 SCC OnLine Tri 301 at paras 5 and 14.

136 (2024) 7 SCC 773 : 2023 SCC OnLine SC 161. The apex court in this case had reversed the order of High Court of Bombay in *Aparna Ajinkya Arun Firdosiav. Ajinkya Arun Firdosia* 2021 SCC OnLine Bom 11774. Also see: *Madanaiah Durgam Chinna Kande v. Kande Omkar Kande Madanaiah* 2023 SCC OnLine Bom 614 : (2023) 2 AIR Bom R (Cri) 329; *Gagandeep Singh v. Bhumiika* 2024 SCC OnLine Del 611; and *Mobin v. Dy. Director of Consolidation* 2023 SCC OnLine All 2404; and *Nikhat Parveen v. Rafiqui* 2023 OnLine Del 6751.

137 *Id.*, para 2.

138 *Ibid.*

Establishing prima facie case by the petitioner is *sine qua non* for directing DNA Profiling by the court to determine disputed paternity of a child. There are various conflicting issues like the privacy right of child, consent of the parties to provide DNA samples etc. associated with DNA based parentage determination. The apex court, regarding DNA based paternity, has culled out following principles for conducting DNA test of a minor child:¹³⁹

- 43.1. That a DNA test of a minor child is not to be ordered routinely, in matrimonial disputes. Proof by way of DNA profiling is to be directed in matrimonial disputes involving allegations of infidelity, only in matters where there is no other mode of proving such assertions.
- 43.2. DNA tests of children born during the subsistence of a valid marriage may be directed, only when there is sufficient prima facie material to dislodge the presumption under Section 112 of the Evidence Act. Further, if no plea has been raised as to non-access, in order to rebut the presumption under Section 112 of the Evidence Act, a DNA test may not be directed.
- 43.3. A court would not be justified in mechanically directing a DNA test of a child, in a case where the paternity of a child is not directly in issue, but is merely collateral to the proceeding.
- 43.4. Merely because either of the parties have disputed a factum of paternity, it does not mean that the court should direct DNA test or such other test to resolve the controversy. The parties should be directed to lead evidence to prove or disprove the factum of paternity and only if the court finds it impossible to draw an inference based on such evidence, or the controversy in issue cannot be resolved without DNA test, it may direct DNA test and not otherwise. In other words, only in exceptional and deserving cases, where such a test becomes indispensable to resolve the controversy the court can direct such test.
- 43.5. While directing DNA tests as a means to prove adultery, the court is to be mindful of the consequences thereof on the children born out of adultery, including inheritance-related consequences, social stigma, etc.

In other words, if a party to a marriage establishes that there was no access to the party to marriage, then the shield of conclusive proof becomes unavailable.¹⁴⁰ DNA test of a child for determination of alleged paternity cannot be ordered routinely, but only in extra-ordinary circumstances where there is no other legal basis to determine parentage.¹⁴¹ The defendant to oppose DNA testing for paternity determination takes plea for breach of the right of privacy guaranteed under Article 21 of the Constitution of India. However, the privacy rights are always subjected to reasonable restrictions. The apex court in *Sharda v. Dharmpal*,¹⁴² held that a

¹³⁹ *Id.*, para 43.

¹⁴⁰ *Anil Kapoor v. Dipika Chauhan* 2023 SCC OnLine HP 283 at para 15: AIR 2023 HP 103: (2023) 2 DMC 255 : (2023) 246 AIC 353 : (2023) 2 HLR 58.

¹⁴¹ *Mobin v. Dy. Director of Consolidation* 2023 SCC OnLine All 2404 at para 11.

¹⁴² (2003) 4 SCC 493.

matrimonial court has the power to direct a person to undergo medical tests and such a direction would not amount to violation of personal liberty guaranteed under Article 21 of the Constitution of India. In case of denial by the party to undergo DNA test ordered by the court for paternity determination, the court may not force the party, but may draw an adverse presumption¹⁴³ contemplated under illustration (h) of section 114-A of the Indian Evidence Act. The interplay between section 112 and 114-A of the Evidence Act have been discussed in *Dipawita Roy v. Ronobroto Roy*.¹⁴⁴

Section 112 of the Indian Evidence Act, 1872 embodied the rule of law that the birth of a child during the subsistence of lawful wedlock or within 280 days after dissolution of marriage shall be “conclusive proof” that the child is legitimate unless proved by the evidence that husband and wife has no ‘access’ to each other when the child could have conceived. The apex court observed, “... “access” or “non-access” does not mean actual co-habitation but means the “existence” or “non-existence” of opportunities for sexual relationship. Section 112 refers to point of time of birth as the crucial aspect and not to the time of conception.”¹⁴⁵ The apex court further observed that “A conjoint reading of Section 112 of the Evidence Act, with the definition of “conclusive proof” under Section 4 thereof, makes it amply clear that a child proved to be born during a valid marriage should be deemed to be a legitimate child except where it is shown that the parties to the marriage had no access to each other at any time when the child could have been begotten or within 280 days after the dissolution of the marriage and the mother remains unmarried, that fact is the conclusive proof that the child is the legitimate son of the man. Operation of the conclusive presumption can be avoided by proving non-access at the relevant time.”¹⁴⁶ Unless the absence of access to wife is established or impotency is proved, the presumption of legitimacy cannot be displaced. The fact that a woman is living in adultery would not by itself be sufficient to repel the conclusive presumption in favour of the legitimacy of a child.

The principle underlying section 112 is to prevent an unwarranted and robbing enquiry for paternity of a child and this legal surmise braces the presumption of public morality and public policy.¹⁴⁷ In *Aparna Ajinkya Firodia*,¹⁴⁸ the apex court held that DNA test only prove the adultery of the wife but cannot be used to rebut

143 As per Black’s Law Dictionary, 9th edn., Inference means “a conclusion reached by considering other facts and deducing a logical conclusion”. “Adverse Inference” may be explained as a detrimental conclusion drawn by the fact-finder from a party’s failure to produce evidence that is within the party’s control. Some courts allow the inference only if the party’s failure is attributable to bad faith.

144 (20015) 1 SCC 365.

145 *Supra* note 136, para 19.

146 *Id.* at para 20.

147 *Sham Lal v. Sanjeev Kumar* (2009) 12 SCC 454.

148 *Supra* note 136, para 22.

the conclusive proof of paternity section 112, if a child is born between legally wedded couple or within 280 days of divorce between the parents.

The apex court for safeguarding the best interest of the children has observed, “Further, children have the right not to have their legitimacy questioned frivolously before a Court of Law. This is an essential attribute of the right to privacy. Courts are therefore required to acknowledge that children are not to be regarded like material objects, and be subjected to forensic/DNA testing, particularly when they are not parties to the divorce proceeding. It is imperative that children do not become the focal point of the battle between spouses.”¹⁴⁹ The court has also contemplated various provisions of the UN Convention of Child Rights, 1989 for protecting child’s right to privacy and the best interest of a child.¹⁵⁰ The court sensitively observed:¹⁵¹

It is undeniable that a finding as to illegitimacy, if revealed in a DNA test, would, at the very least adversely affect the child psychologically. It can cause not only confusion in the mind of the child but a quest to find out who the real father is and a mixed feeling towards a person who may have nurtured the child but is not the biological father. Not knowing who one’s father is creates a mental trauma in a child. One can imagine, if, after coming to know the identity of the biological father what greater trauma and stress would impact on a young mind. Proceedings which are in rem have a real impact on not only the child but also on the relationship between the mother and the child itself which is otherwise sublime. It has been said that parents of a child may have an illegitimate relationship but a child born out of such a relationship cannot carry the stamp of illegitimacy on its forehead, as, such a child has no role to play in its birth. An innocent child cannot be traumatised and subjected to extreme stress and tension in order to discover its paternity. That is why Section 112 of the Evidence Act speaks about a conclusive presumption regarding the paternity of a child, subject to a rebuttal, as provided in the second part of the section.

The dignity of a child is an integral part of the dignity of character of her mother, and DNA testing may potentially abridge her reputation. A child should not be lost in its search of one’s paternity and his identity and suffering from mistrust to her mother. The plight of a child, whose paternity and thus his legitimacy is questioned, would sink into a vortex of conundrum, which can be confounded if judiciary is not vigilant and responsible enough to exercise discretion in the most cautious and judicious manner. “Therefore, the wholesome object of Section 112 of the Evidence Act which confers legitimacy on children born during the subsistence of a valid marriage, subject to the same being rebutted by cogent and

¹⁴⁹ *Id.*, para 48.

¹⁵⁰ *Id.*, paras 49 to 52.

¹⁵¹ *Id.* at 56.

strong evidence, is to be preserved” observed the apex court.¹⁵² For proving allegations of adultery and infidelity, demand for a DNA test of a child, not only competes with the presumption under section 112, but also jostles with the imperative of bodily autonomy.

DNA test cannot be used as short cut by a husband for proving infidelity of his wife to contest divorce petition, since DNA curtails multiple fundamental rights of a child. Such allegations may be proved by other evidence. The apex court directed that “The Courts must hence be inclined towards upholding the legitimacy of the child unless the facts are so compulsive and clinching as to necessarily warrant a finding that the child could not at all have been begotten to the father and as such a legitimization of the child would result in rank injustice to the father, vide *Dukhtar Jahan v. Mohammed Farooq* (1987) 1 SCC 624”.¹⁵³ In *Shivani Garg Gujral v. State (Govt. of NCT of Delhi)*,¹⁵⁴ the petitioner prayer for declaring right to identity as an integral part of right to life under Article 21 of the Indian Constitution. The High Court of Delhi observed that the court may order for DNA test for paternity determination, only if there is a strong prima facie case is made out.

Maintenance and child custody disputes

Maintenance and custody of child pose challenges for judiciary to decide disputed paternity of a child, and DNA plays decisive role in resolving such socio-bio-legal riddles. Under the Indian legal system, section 112 read with section 4 of the Indian Evidence respond to the issue of conclusive proof of legitimacy of the birth of a child. However, if a party to a marriage establishes that there was no access to the other party to the marriage, then the shield of conclusive proof becomes unavailable.¹⁵⁵ The apex court in case of *Aparna Ajinkya Firodia*,¹⁵⁶ has culled out five guidelines to conduct DNA test of the child for determining her legitimacy, and the same principles also applied for maintenance related petitions.¹⁵⁷ Referring to *Pattu Rajan v. State of Tamil Nadu*,¹⁵⁸ the High Court of Kerala has observed, “... merely because parties have disputed about paternity, it does not mean that the court should direct DNA or such other test to resolve the controversy. In such circumstances, the parties should be directed to lead evidence to prove the dispute of factum of paternity and only when the court finds it impossible to draw an inference based on such as evidence or the controversy in issue cannot be resolved without DNA Test, it may direct the DNA test and not otherwise.”¹⁵⁹

152 *Id.* at para 60.

153 *Id.* at para 65.

154 2023 SCC OnLine Del 3316.

155 *Madanaiah Durgam Chinna Kande v. Kande Omkar Kande Madanaiah* 2023 SCC OnLine Bom 614 : (2023) 2 Air Bom R (Cri) 329 at para 17.

156 *Supra* note 136, para 60.

157 *Supra* note 155, para 26.

158 *Supra* note 35.

159 *Sujith Kumar S. v. Vinaya V.S.* 2023 SCC OnLine Ker 8343 at para 11 : (2023) 4 KLJ 270 : (2023) 5 KLT 499.

The Telangana High Court directed the parties to conduct DNA test after due cautions of balancing the interest of both parties, and directed the court below for deducing adverse presumption against the husband, if he refuse to submit himself to medical examination.¹⁶⁰ In *Prabha Rani Das v. State of Tripura*,¹⁶¹ the high court decided the custody of child on the basis of DNA report of the child related to her parentage.

V LEGISLATIVE DEVELOPMENTS

New Major Criminal Laws, 2023

Year 2023 may be marked in history, since Indian Parliament has repealed three archaic criminal laws rooted in the British colonial framework of repression.¹⁶² These new laws, enacted with emphasis on Indian cultural ethos, have shifted the focus from punitive measures to ensuring justice. These federal laws mark a transformative shift in criminal jurisprudence. In the past, forensic sample collection and analysis in India remained discretionary for investigating agency. However, on the strength of annual surveys conducted during previous years, the author of this survey has consistently advocated for amendments in the Indian procedural laws to ensure compulsory collection of forensic samples. Interestingly, under the new laws, section 176(3) of the *Bharatiya Nagarik Suraksha Sanhita* (BNSS), 2023, mandates that a forensic expert shall visit the crime scene in the offences where prescribed punishment is seven years or more to collect forensic evidence and document the process through videography. This provision will open floodgate of forensic samples forwarded to forensic laboratories, which are already struggling with huge pendency. The legal compulsion under section 176 (3) has raised dire need for forensic capacity building and ignited hopes for snowballing employment opportunities to budding professionals.

However, the provisions under 176 (3) underscores the role of forensic science in ensuring scientific temper in evidence collection. There are limited changes made in the new procedural laws with regard to conventional forensic sampling, analysis, and adjudication. However, electronic procedures have been adopted at various stages of criminal process. These laws have been implemented from July 1, 2024, and shall be dealt in the annual survey of 2024.

Digital Personal Data Protection Act, 2023

Data is the most precious identity in the modern era. British Economist Ronald Coase had rightly observed that “Torture the data, it will confess to anything.” This adage on data manipulation expresses the dire need for data protection. Indian legislature has enacted the Digital Personal Data Protection Act, 2023

160 *Mohamad Munawar v. State of Telangana* 2023 SCC OnLine TS 31.

161 2023 SCC OnLine Tri 301.

162 New set of major criminal laws of India include the *Bharatiya Nyaya Sanhita* (BNS), 2023 (No. 45 of 2023); the *Bharatiya Nagarik Suraksha Sanhita* (BNSS), 2023 (No. 46 of 2023); and the *Bharatiya Sakshya Adhinyam* (BSA), 2023 (No. 47 of 2023) have replaced the Indian Penal Code, 1860; the Code of Criminal Procedure, 1973; and the Indian Evidence Act, 1872 respectively.

(hereafter the DPDP Act, 2023) and issued DPDP Rules in 2024. This piece of law is applicable on both digital personal data collected online and offline, and to all entities in India and abroad processing data of an identifiable individual in India. The DPDP Act mainly aimed to protect individual's privacy since the privacy right has been declared as the fundamental right under Article 21 of the Indian Constitution by the Supreme Court in 2017.¹⁶³ The Act, 2023 defines several terms like "data"¹⁶⁴ "data fiduciary",¹⁶⁵ "data principal",¹⁶⁶ "personal data";¹⁶⁷ and also elaborated upon lawful and fair use, purpose limitation and data minimization. Data processing requires explicit, free, informed, and revocable consent from an individual.

The DPDP Act empowers data principal with several rights, and imposes liabilities and obligations on data fiduciary. The Act also provides the Data Protection Board (DPB) as the regulatory body empowered to investigate violations, enforces compliances and imposes penalties up to the tune of Rs. 2500 million. Section 17 of the DPDP Act balances individual privacy with national security, and provides several exemptions allowing certain entities and scenarios to be excluded from compliances. The exemptions help streamlining operations, but they raise vital concerns about government surveillance and potential misuse. The DPDP Act is relevant for cyber forensics at large, since several breaches may require digital footprints for civil and criminal dispute resolution.

VI CONCLUSION

Forensic science plays a crucial role in scientific appreciation of evidence, which is essential for fair adjudication. Expert opinion must be grounded in sound scientific technique, adhering to fair procedural protocols and ensuring impartial interpretation.¹⁶⁸ It is always prudent to use multiple forensic technologies in a case to corroborate findings, either to establish guilt beyond reasonable doubt or to support innocence based on a preponderance of probability.¹⁶⁹ Globally, forensic jurisprudence has undergone intense scrutiny, addressing issues such as procedural probity in sample management, chain of custody, laboratory experiments, statistical analysis, legal interpretation and contextualization of expert

163 *Justice K.S. Puttaswamy (retd.) v. Union of India* (2017) 10 SCC 1; and *Justice K.S. Puttaswamy (retd.) v. Union of India* (2019) 1 SCC 1 : AIR 2018 SC (Supp) 1841.

164 DPDP Act, s. 2(h) : "Data" means a representation of information, facts, concepts, opinions or instructions in a manner suitable for communication, interpretation or processing by human beings or by automated means.

165 DPDP Act, s. 2(i) : "Data Fiduciary" means any person who alone or in conjunction with other persons determines the purpose and means of processing of personal data.

166 DPDP Act, s. 2(f) : (j) "Data Principal" means the individual to whom the personal data relates and where such individual is - (i) a child, includes the parents or lawful guardian of such a child; (ii) a person with disability, includes her lawful guardian, acting on her behalf.

167 DPDP Act, 2(t): "Personal Data" means any data about an individual who is identifiable by or in relation to such data.

168 William Gossman, Kenneth J. Robinson, et.al., *Expert Witness* (StatPearls Publishing, Treasure Island, FL, 2020).

169 *Mohd. Sabir v. State (NCT of Delhi)* 2023 SCC OnLine Del 49 : (2023) 297 DLT 585.

opinion. Experts must remain vigilant against biases and exaggerations, which have been frequently observed in expert testimony across jurisdictions. They should not behave like as “hired gun”,¹⁷⁰ offering opinions tailored to serve specific interest. The United States has construed specific rules to mitigate such risks.¹⁷¹ During cross-examination of an expert, defense lawyers may pose leading questions to challenge the credibility and accuracy of the expert opinions.¹⁷²

Despite substantial legislative progressions in 2023, forensic procedures continue to face inherent challenges.¹⁷³ A critical gap is the absence of a candid definition of the term ‘Expert’ under section 39 of the *Bharatiya Shakshya Adhiniyam* (BSA), 2023.¹⁷⁴ Further, the new legal framework lacks provisions ensuring the disclosure of exculpatory evidence to the accused, and the right of accused to cross-examine forensic expert, both are fundamental to a fair trial. Other pressing challenges include the qualification standards of forensic experts, infrastructure and manpower shortage and accreditation of forensic laboratories.¹⁷⁵ The attention of legislators is desired to address these ambiguities for strengthening forensic justice. The Indian judiciary is reassuring for reforms in forensic procedural jurisprudence including disclosure of inculpatory evidence to the accused, aligning with the principle of *Brady* violations¹⁷⁶ of the United States.

Modern era marks a transformative shift from punitive approach to justice-driven framework, necessitating the cultivation of a forensic mindset. India has potential to emerge as a global leader in innovation through initiatives such as Forensic-as-a-service (f-a-a-s), a framework designed to enhance forensic capabilities with the service sector. Considering India’s vibrant pool of technocrats,

170 Eversheds Sutherland, “10 things you need to know about expert evidence”, available at: <https://www.lexology.com/library/detail.aspx?g=ece9a3dd-d2ce-4632-aa8a-4ba1609c226f> (last visited on Feb. 24, 2025).

171 Federal Rule of Civil Procedure 26(a)(2)(B)(i)-(vi); Federal Criminal Rule of Procedure 16(a)(1)(G), (b)(1)(C) and Individual State Statutes of US.

172 Indian Evidence Act, s. 141, deals with leading question which means “Any question suggesting the answer which the person putting it wishes or expert to receive, is called a leading question”. Section 143 of the Indian Evidence Act says when such question may be asked? Leading question may be asked in cross-examination.

173 G.K. Goswami and Aditi Goswami, “Spreading Wings of Forensic Science” (2023) 9 SCC J-18.

174 G.K. Goswami, “A need to define forensic expertise” *The New Indian Express*, January 03, 2024, available at: <https://www.newindianexpress.com/opinions/2024/Jan/02/a-need-to-define-forensic-expertise-2647232.html> (last visited on Feb. 24, 2024).

175 P. Ambily and D. Ashna, “Faulty Foundations: A Socio-Legal Critique of The Regulation of Forensic Science Laboratories in India” 7(2) *NLUJ Law Review* 191 (2021). Also see: *Davie v. Magistrates of Edinburgh* 1953 S.S. 34 (the Court of Session, Scotland). Lord President Cooper has famously stated in *Davie* case (at 40) that it is the duty of experts to, “furnish the judge or jury with the necessary scientific criteria for testing the accuracy of their conclusions, so as to enable the judge or jury to form their own independent judgment by the application of these criteria to the facts proved in evidence”. *Davie* in Australia refers to disappearance and murder of Linda Suzanae Davie, a young woman, who was vanished in 1980.

176 *Supra* note 97.

the author has introduced a noble concept “Law with Labs” integrating science and technology into legal system. Legal education must incorporate a critical understanding of forensic science and technology, while technocrats should be equipped with the fundamental legal precepts. The fusion of law and technology will ensure robust legal compliances, particularly as data protection and cyber security present persistent interdisciplinary challenges on global landscape. Cyber threats are evolving reality everywhere, necessitating proactive mitigating strategies. Emerging trends such as digital insurance and cybersecurity auditing are reshaping global market, offering vast opportunities for professionals in these uncharted dynamic fields. Data analytics is another key area of forensic growth, if properly harnessed, data has potential to reveal truth, provided one is willing to listen.

