

## **RSRR ~ Project 39A Lecture Series on “Decoding Forensics: Interplay of Law & Science”**

---

**Theme: Decoding Forensics: The Interplay of Law and Science**

**Date: 21<sup>st</sup> October, 2023**

### **Speakers:**

1. Ms. Shreya Rastogi - Director (Forensics & Death Penalty Litigation)
2. Ms. Maria Divya Sahayaselvan - Associate (Research) Forensics
3. Ms. Saloni Ambastha - Associate (Research) Forensics.

### **INTRODUCTION:**

The lecture on the theme, “*Decoding Forensics: The Interplay of Law and Science*”, began with Ms. Megha Bhartiya from RSRR introducing the attendees to the Guest Speakers. The Guest Speakers for the session were Ms. Shreya Rastogi - Director (Forensics & Death Penalty Litigation), Ms. Maria Divya Sahayaselvan - Associate (Research) Forensics and Ms. Saloni Ambastha - Associate (Research) Forensics. The event offered attendees an opportunity to gain deeper insights into the world of forensic science and its intricate legal standards. As the event progressed, participants were invited to critically analyse media portrayals of forensic science, challenging common myths and unravelling the realities of this fascinating field.

The honourable Vice Chancellor of RGNUL, Professor Dr. Anand Pawar welcomed the Speakers on behalf of the university. He further, apprised the august gathering of the pioneering initiatives being undertaken by the university in a bid to foster the domain of forensic science. A vote of appreciation was extended by the Vice Chancellor to Project 39A for their trailblazing endeavours in a slew of legal domains including forensic science. Post the introductory session, the first session of the lecture on “Discussion on the science of forensic science” by Ms. Shreya Rastogi commenced.

### **SESSION 1:**

#### **DISCUSSION ON THE SCIENCE OF FORENSIC SCIENCE**

The first part of the lecture delved into the discussion on the scientific aspect of Forensic Science. The first Speaker, Ms. Shreya Rastogi briefed about the scope of deliberation in the first session. The Speaker included the realm of forensic science and the element of “science in forensic science”, further unravelling the role of forensic evidence in the legal system. After briefly shedding light on the fundamental idea of forensic science, she delved into an intriguing sphere of debunking some commonly held perceptions about forensic science.

### **FORENSIC SCIENCES AND DEBUNKING MYTHS**

The speaker set forth the session by explaining how forensic science is the application of scientific methods to the legal system, which is essential for criminal investigations. As explained by Ms. Rastogi, it is a general phrase that encompasses a variety of scientific fields, each with its distinct methodology, such as biology, odontology, toxicology, DNA analysis, etc. Whilst these techniques originated developing in laboratories, the criminal justice system eventually incorporated them. She emphasized how important case elements like who, what, where, and how are indirectly revealed by forensic evidence.

Ms. Rastogi delved into demystifying some interesting myths regarding ballistics and fingerprint analysis. Generally, all human fingerprints are said to be unique, however, there is no empirical or statistical backing to prove the exclusiveness of fingerprints. Another aspect of forensic analysis is "bite marks". The fact that skin will accurately hold the impression of bite marks can be refuted by the fact that skin is elastic. In common understanding, bullets retrieved from the crime scene can be traced to their source gun, however, the Speaker elucidated that there is a lack of scientific data to support the claim of exact tracing of the bullet to its origin. Further, another discipline of “forensic DNA” sampling was brought to the discourse. Ms. Rastogi explained that, even if the DNA of the accused is found on a particular surface, there is no certainty that the same has not been tampered with. Corroborating with an example, she said that DNA material found on an object retrieved from the crime scene might get contaminated with other fresh DNA deposits or might have another individual’s DNA sample who is not related to the crime. Thus, it can be inferred that DNA samples on an object can be due to both direct or indirect means, implying that the domain of forensic DNA profiling is not absolute and is subject to several contingencies. The Speaker explained that only after debunking these commonly held misconceptions can one deal with and fathom the nuances of

a niche field of forensic science and its effective applicability in criminal examination and investigation processes.

### **WHAT ARE THE TENETS OF SCIENCE?**

Ms. Rastogi also dealt with the moot question that when can a discipline be called a “science”. In the broadest sense, the general tenets considered for evaluating the scientific nature of a discipline or a method, are its measurability, its ability to be tested empirically and the verifiability of the conclusion derived. The Speaker further added that forensic evidence is said to be scientific, based on three predominant factors namely, Accuracy, Repeatability; and Reproducibility. The scientific methods used to arrive at the forensic evidence must follow these parameters making certain of their foundational validity. To explain the term “accurate,” the Speaker posed a question about the size of an apple, wherein one of the options for the answer was “red”. Through this, she highlighted that though the option was correct in itself, however, not in the context of the question. To be accurate, a scientific method thus, must be in the context of satisfying the demands of that particular investigation. The term “precision or precise” was also deliberated upon. Taking into consideration an example, wherein the weight of the requisite apples was given, one of the options was highly unrelated to the required weight. Therefore, concluding that a precise result is the one which is devoid of high variances. The term “repeatability” entails an investigation relating to a certain matrix, with the ability to be replicated by different individuals under the same conditions. In a corollary to this “reproducibility” forms an essential marker of a “science”. this refers to the ability of the results of the experiment to be replicated under varied conditions and achieve the same results. Thus, upholding the veracity and scientific nature of the experiment. The Speaker concluded by averring that forensic evidence has to be an amalgamation of both accuracy and precision. Neither of the tenets can be jeopardised at the altar of the other.

### **ERROR RATES IN FORENSIC EVIDENCE**

Taking a leap into the essence of forensic results, the Speaker, expounded on the concept of “false positive” and “false negative” results. The term false positive entails a false alarm, wherein the result shows something to be present even if it is not. For instance, a metal detector releases a false positive result by misconstruing a toy gun to be that of a real metal gun. On the other hand, the term, “false negative” result entails the absence of something despite it being

present. For example, a metal detector not being able to detect a real gun at the airports. The possibility of such false results poses a serious impediment to the criminal justice system and thus, forensic scientists and experts shall always look out for such possibilities before conclusively admitting any evidence as “absolute scientific evidence”.

Ms. Rastogi, throughout the deliberation, elucidated several authentic international reports in the field of forensic science to highlight the potential loopholes in the collection of forensic evidence and their implications on the criminal justice system.

#### **A. FINGERPRINT ANALYSIS**

As per the [AAAS Report of 2017](#), the conclusions drawn from fingerprint examinations are not conclusive and absolute in nature. Therefore, no scientific implication can be drawn pertaining to the indefensible nature of this forensic evidence or narrowing down its source to be of one single individual. The Speaker explained how human fingerprint examinations are insufficient scientific data, to constitute a unique identifier. There is a plausible scope for many other people showing similar features. Another survey of 2021 shows the presence of 28.1% of false positives in forensic results thereby negating the contention of exclusivity of fingerprints. The Speaker brought into the discourse, the famous case of [Brandon Mayfield](#), wherein the FBI falsely arrested an individual based on an erroneous fingerprint identification.

#### **B. BITE MARK ANALYSIS**

Ms. Rastogi discussed the scope of “bite mark analysis” and its significance to not only the case of the victim but also of the accused. However, the scientific veracity of this forensic evidence cannot be proved. As per various reports, it cannot be determined as to whether the bite marks belong to an animal or a human being. The Speaker underscored the idea that the claim of human dental marks to be unique has no scientific basis. The Speaker vehemently put to fore the idea of how this inconclusive piece of evidence can be used to incarcerate innocent individuals. One example of [Steven Chaney’s](#) conviction for more than 30 years, who was subsequently exonerated, highlights the indefensible piece of forensic evidence used to falsely implicate an individual.

#### **C. BALLISTICS**

As the discussion progressed, Ms. Rastogi delved into other disciplines of forensic science. Studies carried out to ascertain whether the fired cartridges recovered from the crime scene can

be retraced to its source, submit the presence of false positive rates in the evidence. Therefore, even firearm experts cannot ascertain any conclusive evidence based on ballistics.

#### **D. MICROSCOPIC HAIR ANALYSIS**

In the case of microscopic analysis of human hair, the results were proven to be inconclusive and misleading. As per reports, 1 of every 9 cases turns out to be false positive. The Speaker further highlighted this lacuna through the case of [Santae Tribble](#), who was wrongfully convicted in 1978 and was finally exonerated in 2012. This false implication was based on the microscopic hair analysis, which further on advanced DNA tests proved to be dog hair.

The Speaker concluded the first segment of the first session by emphasising the need to acknowledge these existing lacunae in the field of forensic evidence and to avoid completely relying on forensic evidence.

#### **FORENSIC SCIENCE AND SUBJECTIVITY**

The second segment of the first lecture was dealt with by Ms. Sahayaselvan, who elucidated another area of concern as far as forensic evidence is concerned. Ms. Sahayaselvan explained the implicit role of subjectivity and bias of the forensic expert while preparing an objective and reliable forensic report. One of the potential spheres of bias can be due to the presence of “specific knowledge”. If in any case, any ancillary information is furnished to the forensic expert, the probability is that he/she will look out for points of similarity rather than dissimilarity. Thus, jeopardising the veracity of forensic evidence. The Speaker further elaborated on the role of the past requisite knowledge in influencing the forensic examination process. Apart from this, an individual attitude or behaviour towards a particular situation also plays a consequential role in impacting the examination carried out by the forensic expert.

The Speaker then explained the dynamics of these biases through an empirical study. In two situations, a child was declared dead, one of them was white while the other was of black race. In the process of knowing the potential cause of death, the majority of respondents said that the white child might be killed due to an accident by the child’s grandmother, on the other hand, the majority also said that the death of a black child might be a homicide by his mother’s boyfriend. The result of this study highlights the entrenched nature of biases in society, especially in the case of the child’s race. Ms. Sahayaselvan called for a conscious understanding

and acknowledgement of these cognitive biases and their sphere of influence on forensic evidence.

The Speaker emphasised the presence of both a requisite expert and the correct method for forensic evidence to establish its foundational validity. An expert with the necessary qualifications and experience and the application of correct methods are the two prerequisites for a reliable forensic examination. Thus, it is incumbent upon the court to check not only the presence of an expert and correct technique/method but also the subsequent forensic report and its relevance in the present case.

*The Speakers then opened the question-answer round for the first session.*

- 1. In most cases, it is observed that the crime scene is prone to severe contamination, which in future courses of examination is detrimental to the requisite inquiry. What should be the general course of action to avoid such instances?**

Ms. Rastogi answered the question by averring that the physical area should be isolated and cordoned off from public access. In the case of digital evidence, the focus should also be given to avoid any digital contamination of electronic evidence. Electronic devices are susceptible to tampering and contamination, thus, securing the device's activities and data ought to be a top priority.

- 2. What is the scope of improvement in forensic examination and its impact on the criminal justice system with specific reference to India?**

Ms. Rastogi dealt with the question by underscoring the need to comprehensively invest in the Research & Development (R&D) of forensic science in India along with the need for more studies and research in this arena. Not only the physical infrastructure in the form of forensic labs with cutting-edge technology and necessary equipment but the discipline of forensic science in general ought to be more streamlined. This is essential to avoid any form of grave injustice and to ensure, that justice is seen to be delivered.

- 3. In India, a rampant lack of awareness in terms of forensic evidence is seen, who essentially has the onus to augmentation of reach and correct application of forensic evidence?**

Ms. Rastogi elucidated that in the interplay of forensic science and the criminal justice system, there are various stakeholders and a collective course of action is potentially

the only way to expand awareness and correct application. One of the main reasons for the lack of correct use of methods/techniques is the absence of law on the same. The Speaker shared one of the most problematic observations on the lack of forensic knowledge to judges. This makes them rely completely on forensic evidence that in itself is not completely reliable and is subject to contingencies. The Speaker concluded by remarking that collective action from all stakeholders can increase the reliability of forensic science and its applicability.

**4. What should essentially be one's perspective towards the role of forensic science in the realm of the criminal justice system?**

One of the grey areas in the contemporary discourse regarding the forensic science domain is the embedded perspective. Ms. Rastogi explained how in India there is a need for transformation of discourse from being methodology and technique-oriented to being attitude-based. There are forensic disciplines that do not justify exclusivity and uniqueness and thereby cannot be absolute/solely relied upon in cases of conviction or acquittal. A visible shift in the real cultural norms pertaining to forensic evidence is essential along with fostering a research-based environment in the domain of forensics. The Speaker highlighted the existing law with an example wherein a chemical engineer was convicted for the act of bombing, solely on the basis of technical knowledge and no contextual information.

**5. What is the present Indian jurisprudence with regards to forensic reports and their admissibility in a court of law?**

Ms. Rastogi expounded on the fact that in the common law system, evidence that is admissible in the court of law is fact-based and not based on mere opinions. As per Section 45 of the Indian Evidence Act, a forensic expert's opinion can be used to corroborate other pieces of evidence since an expert's opinion is based on specialised knowledge and is thereby admissible in the court of law. However, it has no binding effect and is advisory in nature. The simple rationale behind this is that the forensic expert is not a witness to the facts.

To conclude the first session of the Lecture Series, the Speaker called for a more comprehensive involvement of various sectors of society to foster the sphere of forensic science, for example, IITs and scientific experts. It was highlighted that along with

requisite procedures, step-by-step mechanisms must be implemented to ensure that forensic reports and evidence presented before the courts have required veracity.

The Speakers thanked the audience for the fruitful discussion during the course of the first session and initiated the second session of the lecture.

## **SESSION 2:**

### **DISCUSSION ON EXPERT EVIDENCE ADMISSIBILITY IN COURT**

One of the key issues discussed in this session was the ambiguity in the definition of "especially skilled" and "science itself" in the context of expert testimony. The Speaker, Ms. Sahayaselvan, highlighted that clear definitions are essential to ensure that expert witnesses are indeed qualified to provide their opinions. She stressed that the court now requires experts to provide scientific criteria for testing the accuracy of their conclusions. Expert credibility was seen as contingent on offering correct steps and data to support their opinions. This led to a discourse on the admissibility of expert evidence, with a focus on qualifications, reliability, and the relevance of the field. A notable case was presented where the court found a DNA report in a death sentence case to be inadmissible due to issues with the chain of custody and a lack of a valid basis for the findings. This case highlighted the importance of rigorous adherence to legal standards. The event attendees were introduced to the landmark Supreme Court case of *Daubert v. Merrell Dow Pharmaceuticals*<sup>1</sup>. It was revealed that this case reshaped the admissibility standards for expert evidence in the United States, emphasizing the need for empirical studies, testing, and peer review. The Speaker emphasized that scientific evidence should be grounded in empirical studies and subjected to rigorous testing. It cannot be applied subjectively or without peer review. The courts, it was argued, must reassess expert testimony to determine its reliability and consider the principles of scientific validity. The event featured intriguing case examples from different countries. In fingerprint analysis, an Indian court found that an expert's testimony on uniqueness was unreliable, while a U.S. court in North Carolina found the same expert's testimony reliable. In ballistics, a Supreme Court of Maryland case raised questions about the reliability of firearms identification methodology in connecting crime scene bullets to a specific firearm.

---

<sup>1</sup> *Daubert v. Merrell Dow Pharmaceuticals, Inc.*, 509 U.S. 579, 589 (1993).

Ms. Sahayaselvan concluded with a discussion on the legal standards for expert evidence in India, as outlined in Section 293 of the Code of Criminal Procedure (CRPC). She highlighted that expert evidence in India must meet a substantive legal standard to be admissible in court.

## **SECOND SEGMENT OF SESSION 2**

The second segment of session 2 was dealt by Ms. Saloni Ambastha who began with a detailed discussion of the substantive legal standard required for forensic evidence to be considered admissible in court. The speaker emphasized the importance of adhering to specific legal criteria and the need to attach high standards to forensic evidence.

## **DISCUSSION ON SECTION 293 OF CRPC AND HOW IT INFLUENCES THE ADMISSIBILITY OF FORENSIC EVIDENCE**

The highlight of the discussion revolved around Section 293 of the Code of Criminal Procedure (CRPC), which plays a pivotal role in shaping the practice of how forensic evidence is introduced in court and the court's ability to evaluate it. Unlike documentary evidence, where a witness typically has to orally prove the document's authenticity, Section 293 changes the requirements for the admissibility of forensic reports. Under Section 293, certain government forensic experts, particularly those in senior positions, are exempted from the need to appear in court to prove their reports. The provision assumes that the report produced by these experts is sufficient, effectively doing away with the traditional requirement of oral evidence to accompany the production of the document. However, this exemption presents a gap in the scrutiny of forensic evidence. The court must ask critical questions about the foundational validity of the technique used, its correct application in the case, whether it is disqualified, and other pertinent inquiries. Section 293 potentially impedes this scrutiny, as forensic reports often lack comprehensive answers to these questions, resulting in an inadequate examination of forensic evidence.

## **INSTANCES ILLUSTRATING SECTION 293 AND ITS CONSEQUENCES**

The speakers provided concrete case examples to illustrate the impact of Section 293 on the admissibility and evaluation of forensic evidence. *Baburao Ukandu Sangerao v. State of*

*Maharashtra*<sup>2</sup> was a particular case that was examined; in this case, the accused was sentenced to the death penalty for the rape and murder of a young girl. The DNA report was a crucial piece of evidence, but the court's reliance on Section 293 led to inadequate scrutiny. However, upon closer examination and expert cross-examination, significant errors and contamination issues in the DNA report came to light, resulting in the commutation of the accused's death penalty to life imprisonment. Another case, *Anokhilal v. State of Madhya Pradesh*<sup>3</sup>, followed a similar pattern. The Supreme Court ordered a retrial, recognizing the need for a thorough examination of the DNA report. However, Section 293 continued to hinder the process, prompting further court intervention to ensure the examination of the DNA expert.

### **CHAIN OF CUSTODY**

In addition to the issues related to Section 293, the event touched on the concept of the chain of custody of evidence. This concept is essential to ensure the integrity of forensic samples from the crime scene to the laboratory. Proper documentation of the collection, preservation, packaging, transportation, and storage of samples is critical to maintaining the identity and integrity of the evidence. The event continued with an in-depth exploration of the chain of custody in forensic evidence. The chain of custody can be likened to a flowing river, where the integrity of evidence is maintained as it passes through various stages from the crime scene to the laboratory. The chain of custody consists of multiple components, including collection, preservation, packaging, transportation, and storage of evidence. Proper documentation is essential to track and verify the integrity of the evidence at each stage. The importance of maintaining the chain of custody was emphasized, as it serves two crucial purposes:

**Preservation of Identity:** To ensure that the evidence presented in court is indeed the same evidence collected from the crime scene, preserving its identity and preventing tampering.

**Maintaining the Quality of Evidence:** To ensure that the characteristics of the evidence remain unaltered after collection, preventing contamination or deterioration.

The event featured discussions on the practical implications of maintaining the chain of custody, using real-world cases to highlight its significance. The speakers stressed that

---

<sup>2</sup> Baburao Ukandu Sangerao v. State of Maharashtra, 2022 SCC OnLine Bom 11809.

<sup>3</sup> Anokhilal v. State of M.P., (2019) 20 SCC 196.

improper handling, delay, or deviation from established guidelines in maintaining the chain of custody can potentially compromise the reliability of the evidence.

A recent case from the state of Maharashtra was presented as an example. In this case, the accused's blood samples were collected twice, with no clear explanation for the duplication. The samples experienced an unexplained delay in being sent to the laboratory. The Supreme Court, in its ruling, highlighted the importance of maintaining the chain of custody to prevent possible contamination of the samples, emphasizing that this delay can adversely affect the value of the evidence. Additionally, the Court noted that guidelines issued by relevant authorities were not followed in this case, underlining the necessity of strict adherence to procedural standards in maintaining the chain of custody.

### **DEBUNKING FORENSIC MYTHS THROUGH MEDIA CLIPS**

The program concluded with a captivating activity that drew attendees in by presenting clips from popular media that featured forensic investigations. This lively lecture was designed to get participants thinking critically about these clips in order to apply the new knowledge they had gained. Its main objective was to debunk widespread misunderstandings that are supported by the media, a phenomenon known as the “CSI effect.” Participants in this exercise were urged to identify and draw attention to any inconsistencies, mistakes, or misinformation presented in the media snippets. They were also asked to list practical forensic concepts that, in an ideal world, would inform a more accurate portrayal of forensic science. In this way, the exercise provided participants with an interactive setting in which to use their newly acquired knowledge and hone their critical thinking abilities.

The attendees' reaction as the event came to an end was overwhelmingly positive. Numerous people conveyed their excitement and desire to learn more concerning the field of criminalistics. The presenters were successful in arousing audiences' curiosity by illuminating the complexities of forensic science and encouraging further investigation of the field. In addition to giving participants a fun and engaging opportunity to put their knowledge to use, this exercise developed a greater comprehension and appreciation of the subtleties and complexity found in the discipline of criminalistics.