

Origin and Development of Forensic Science and Branches of Forensic Science

Kasturi Warbhe*

Abstract

Forensic science is like the Sherlock Holmes of the real world, blending scientific expertise, legal acumen, and investigative prowess to crack cases and bring justice to the forefront. It's essentially the art of using scientific methods to untangle the mysteries of crimes and legal disputes. Picture this: a team of experts delving into the minutiae of evidence – from DNA samples to fingerprints, from chemical analyses to digital footprints – all to reconstruct events and uncover the truth behind criminal acts. This multidisciplinary field draws from various branches of science – biology, chemistry, anthropology, psychology, and digital forensics – each playing a crucial role in deciphering clues and piecing together the puzzle. But it's not just about solving crimes; forensic science ensures fairness, objectivity, and transparency within the justice system. Expert testimony from forensic scientists often serves as the linchpin in legal proceedings, helping to establish guilt or innocence and secure convictions or exonerations. In essence, forensic science is the backbone of modern criminal investigation, safeguarding against wrongful convictions and ensuring that justice is served. As technology advances and forensic techniques evolve, the role of forensic science in upholding the rule of law will only continue to expand, ensuring that the truth prevails and justice prevails in society.

Keywords: Forensic science, DNA profiling, toxicology, fingerprints, DNA samples

INTRODUCTION

Forensic science is like the Sherlock Holmes of the real world, blending scientific expertise, legal acumen, and investigative prowess to crack cases and bring justice to the forefront. It is essentially the art of using scientific methods to untangle the mysteries of crimes and legal disputes. Picture this: a team of experts delving into the minutiae of evidence – from DNA samples to fingerprints, from chemical analyses to digital footprints – all to reconstruct events and uncover the truth behind criminal acts. This multidisciplinary field draws from various branches of science – biology, chemistry, anthropology, psychology, and digital forensics – each playing a crucial role in deciphering clues and piecing together the puzzle. But it is not just about solving crimes; forensic science ensures fairness, objectivity, and transparency within the justice system. Expert testimony from forensic scientists often serves as the linchpin in legal proceedings, helping to establish guilt or innocence and secure convictions or exonerations. In essence, forensic science is the backbone of modern criminal investigation, safeguarding against wrongful convictions and ensuring that justice is served. As

*Author for Correspondence

Kasturi Warbhe
E-mail: kasturiwarbhe@nlunagpur.ac.in

Student, Department of Law, National Law University,
Nagpur, Maharashtra, India

Received Date: December 23, 2024
Accepted Date: January 27, 2025
Published Date: January 31, 2025

Citation: Kasturi Warbhe. Origin and Development of Forensic Science and Branches of Forensic Science. Omni Science: A Multi-disciplinary Journal. 2025; 15(1): 19–27p.

technology advances and forensic techniques evolve, the role of forensic science in upholding the rule of law will only continue to expand, ensuring that the truth prevails, and justice prevails in society.

RESEARCH DESIGN

Research Questions

1. How has the interdisciplinary nature of forensic science evolved over time, and what are the key contributions of integrating different

-
- forensic disciplines in solving complex criminal cases?
2. How has forensic science evolved historically and what milestones have shaped its development?
 3. What are the primary challenges facing modern forensic science disciplines, and how do they impact criminal investigations?

RESEARCH AIMS AND OBJECTIVE

Research Objective

The objective of this research is to investigate the current state, challenges, and advancements in various branches of forensic science, with a focus on their applications in criminal investigations and legal proceedings. The research aims to provide a comprehensive understanding of the role of forensic science in modern society and its significance in upholding justice and accountability.

Research Aims

1. To examine the evolution of forensic science and its historical origins, tracing its development from ancient civilizations to the present day.
2. To identify and analyze key milestones, contributions, and landmark cases that have shaped the field of forensic science, highlighting their impact on criminal investigations and legal practices.
3. To explore the interdisciplinary nature of forensic science, investigating the integration of different forensic disciplines and their collaborative approaches in solving complex criminal cases.

RESEARCH METHODOLOGY

The research methodology employed in this study involves a comprehensive literature review of academic journals, books, and relevant publications to gather data on the historical evolution, current state, challenges, and advancements in various branches of forensic science. Additionally, qualitative analysis and synthesis of the collected information will be conducted to derive insights into the interdisciplinary nature of forensic science and its applications in criminal investigations and legal proceedings.

HISTORICAL ORIGINS AND EVOLUTION OF FORENSIC SCIENCE

Forensic science traces its roots back to ancient civilizations, where early contributions laid the groundwork for its evolution. The Babylonians, Egyptians, and Chinese all made significant strides in the application of scientific methods to legal investigations, such as documenting evidence in written records and using rudimentary techniques to identify suspects. During the Medieval and Renaissance periods, forensic science saw further development with the emergence of early forensic techniques like autopsies and fingerprinting. Scholars like Leonardo da Vinci delved into anatomical studies, laying the foundation for modern forensic pathology, while the Chinese developed the first known use of fingerprints for identification purposes [1]. However, it was not until the modern era that forensic science truly flourished as a distinct discipline. Pioneering contributions from figures, like Sir Arthur Conan Doyle, who popularized forensic science through his fictional detective Sherlock Holmes, sparked public interest and propelled advancements in the field. In the late 19th and early 20th centuries, significant milestones, such as the establishment of the first forensic science laboratory in France by Edmond Locard and the introduction of DNA profiling by Alec Jeffreys in the 1980s revolutionized forensic investigation. These developments solidified forensic science as an indispensable tool in criminal investigation and established its critical role in the pursuit of justice.

KEY MILESTONES AND CONTRIBUTIONS IN FORENSIC SCIENCE

Forensic science has witnessed remarkable milestones and contributions that have revolutionized the field and reshaped the course of criminal investigation. One of the most significant advancements is the development of forensic techniques and methodologies, such as DNA profiling and toxicology analysis. DNA profiling, pioneered by Sir Alec Jeffreys in the 1980s, has become a cornerstone in forensic identification, enabling investigators to match biological evidence to individuals with unprecedented accuracy. Similarly, toxicology analysis, which involves identifying and quantifying drugs and poisons

in biological samples, has played a crucial role in determining cause of death and establishing links between substances and criminal activities [2]. Furthermore, landmark cases have left an indelible mark on forensic science, shaping its trajectory and influencing legal practices. The O.J. Simpson trial in 1995 showcased the power of forensic evidence, particularly DNA analysis, in high-profile cases, while the Innocence Project has spearheaded efforts to exonerate wrongfully convicted individuals through DNA testing, shedding light on flaws in the criminal justice system and prompting reforms. These milestones underscore the transformative impact of forensic science on criminal investigation and the pursuit of justice, serving as a testament to its invaluable role in unraveling mysteries and ensuring accountability Figure 1.

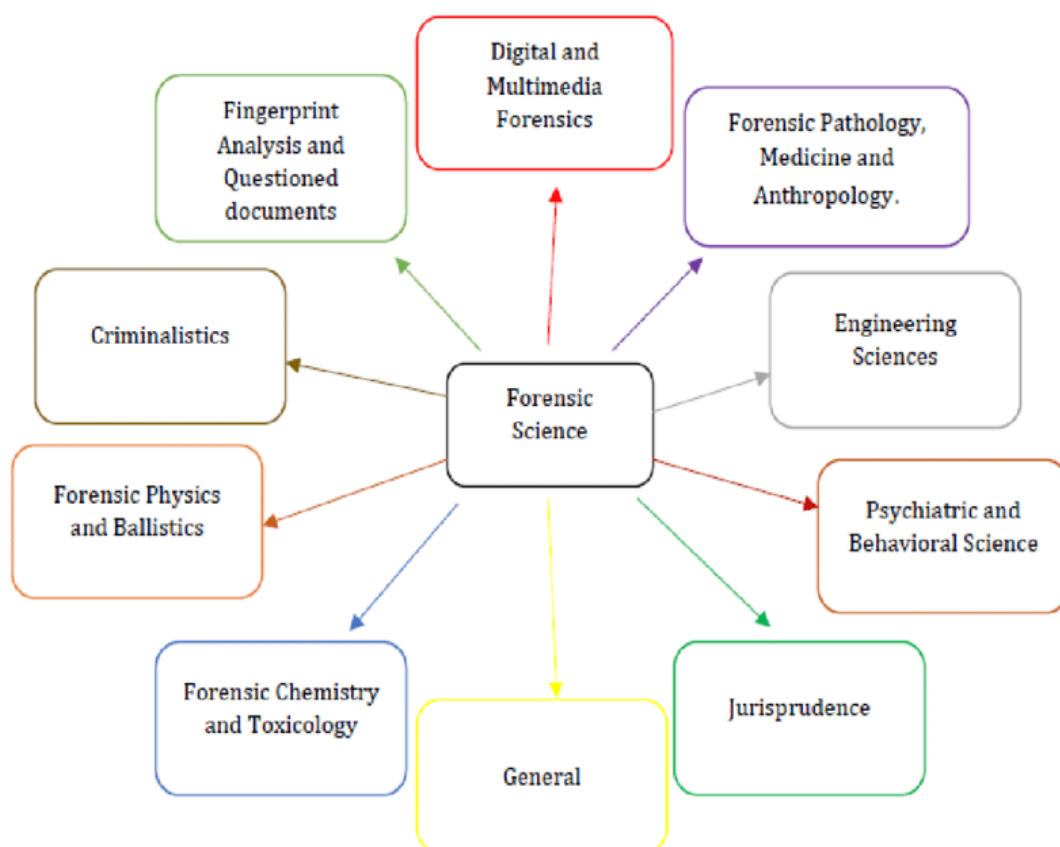


Figure 1. Branch of forensic science.

Forensic Biology

Forensic biology, a pivotal branch of forensic science, delves into the intricate world of biological evidence, utilizing cutting-edge techniques and advancements to uncover crucial clues in criminal investigations. At the forefront of forensic biology is DNA analysis, a ground-breaking method that revolutionized forensic investigation by enabling the identification of individuals with unparalleled accuracy. From analyzing trace amounts of DNA left at crime scenes to comparing genetic profiles for matching suspects, DNA analysis has become a cornerstone in solving cases and linking perpetrators to their crimes. Alongside DNA analysis, forensic biology encompasses serology, which involves the examination of bodily fluids like blood and semen. Bloodstain pattern analysis, a key aspect of serology, provides insights into the dynamics of crime scenes, while semen detection aids in identifying perpetrators in cases of sexual assault. Moreover, forensic biology extends its reach into the natural world through disciplines like forensic botany and entomology. By studying plant and insect evidence found at crime scenes, forensic botanists and entomologists can provide valuable information regarding

time of death, location, and environmental factors, further aiding investigators in piecing together the sequence of events [3]. Together, these components of forensic biology contribute immensely to the investigative process, shedding light on the complexities of criminal cases and facilitating the pursuit of justice (Figure 2).

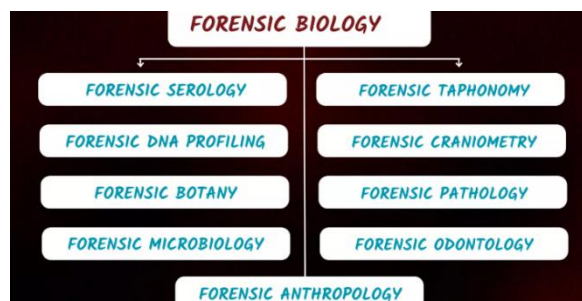


Figure 2. Forensic biology.

Forensic Anthropology

Forensic anthropology, a branch of forensic science, involves the examination of human skeletal remains to establish the identity, age, sex, ancestry, and other characteristics of the deceased individual. While forensic anthropology has gained prominence internationally, its application within the Indian legal system is also noteworthy, with several cases highlighting its significance. One such case is the infamous Nithari serial killings, which occurred in Noida, Uttar Pradesh, between 2005 and 2006. The skeletal remains of several missing children and women were discovered in a drain near a businessman's house. Forensic anthropologists played a crucial role in identifying the victims and providing evidence for the prosecution [4]. Through careful analysis of the skeletal remains, they were able to determine the age, sex, and possible causes of death, aiding in the investigation and eventual conviction of the perpetrator.

Another significant case involving forensic anthropology is the investigation into the Bilkis Bano gang rape and massacre that took place during the 2002 Gujarat riots. Forensic anthropologists were involved in the examination of skeletal remains recovered from a mass grave, helping to establish the identities of the victims and the brutality of the crime [5, 6]. Their findings provided crucial evidence for the prosecution, leading to the conviction of several perpetrators involved in the heinous crime. The case of the exhumation of the mortal remains of Netaji Subhas Chandra Bose, forensic anthropological techniques were employed to determine the identity and cause of death of the freedom fighter. Although the results of the investigation remain disputed, forensic anthropology played a significant role in the attempt to unravel the mystery surrounding Netaji's death.

Forensic Serology

Forensic serology is a branch of forensic science focused on the identification and analysis of bodily fluids, such as blood, semen, saliva, and other biological materials encountered at crime scenes. Its primary objective is to provide valuable evidence in criminal investigations by examining these fluids to determine their origin, composition, and potential DNA content. Forensic serologists utilize a range of techniques including microscopy, immunological assays, and DNA analysis to identify and characterize biological fluids collected from crime scenes, victims, and suspects. Bloodstains, for example, can reveal information about the type of injury sustained, the mechanism of injury, and the movement of individuals within a crime scene. Similarly, semen and saliva can provide DNA evidence linking suspects to a crime or victim.

In *Rajesh Kumar v. State of Haryana* case, the accused was charged with rape and murder. The prosecution presented serological evidence in the form of blood and semen samples collected from the crime scene and the victim's body. Forensic serology analysis conclusively linked the accused to the

crime through DNA profiling, establishing his guilt beyond a reasonable doubt. The case highlighted the crucial role of serological evidence in securing convictions in cases of sexual assault and homicide.

In *State of Maharashtra v. Dr. Praful B. Desai* [7] high-profile case, a renowned doctor was accused of poisoning his wife to death with insulin injections. Forensic serology played a pivotal role in establishing the cause of death by analyzing blood samples collected from the victim's body.

The presence of insulin in the victim's bloodstream, detected through serological analysis, provided crucial evidence linking the accused to the crime. The case demonstrated how serological evidence can uncover hidden aspects of a crime and contribute to the prosecution's case in complex criminal trials. Forensic serology plays a crucial role in cases involving sexual assault, homicides, and violent crimes, where the presence of bodily fluids can establish links between individuals and crime scenes, corroborate or refute alibis, and contribute to the reconstruction of events leading to a crime.

Forensic Pathology

Forensic pathology, a critical branch of forensic science, focuses on uncovering the mysteries surrounding death. It involves conducting postmortem examinations to determine both the cause and manner of death, shedding light on how and why someone has died. This meticulous process often involves autopsies, where forensic pathologists meticulously examine the deceased's body, looking for clues, such as injuries, diseases, or other abnormalities. Additionally, forensic toxicology plays a vital role in this investigation by analyzing biological samples like blood, urine, or tissue for the presence of drugs or poisons. By identifying these substances and their concentrations, forensic toxicologists can provide crucial insights into whether substances contributed to or caused the individual's death. Together, these disciplines play a pivotal role in uncovering the truth behind deaths, assisting law enforcement, and ensuring justice is served in cases involving suspicious or unexplained deaths. In this high-profile case, forensic pathologists provided critical evidence regarding the cause of death of Aarushi Talwar and Hemraj Banjade, whose bodies were found in a residential complex in Noida in 2008 [8].

Forensic Odontology

Forensic odontology, also known as forensic dentistry, is a specialized field within forensic science that utilizes dental evidence to aid in criminal investigations and legal proceedings. This branch of forensic science plays a crucial role in identifying individuals, establishing the circumstances of a crime, and providing valuable evidence in both civil and criminal cases. In India, forensic odontology has been employed in numerous high-profile cases to identify victims of mass disasters, natural calamities, and criminal activities [9]. One such notable case is the Indian Ocean tsunami of 2004, where dental records were instrumental in identifying victims, whose bodies were badly decomposed or disfigured, helping families find closure amidst the tragedy.

Forensic odontologists use a variety of techniques to analyze dental evidence, including dental records, bite marks, and dental morphology. Dental records, such as dental charts, X-rays, and photographs of dental features, are compared with post-mortem dental findings to establish positive identifications. Bite marks found on victims or suspects can also be analyzed to determine their unique characteristics, potentially linking individuals to a crime scene or victim. In criminal cases, forensic odontology provides valuable evidence through bite mark analysis. Indian courts have recognized the significance of bite mark evidence in convicting perpetrators, as demonstrated in cases, such as *State of Maharashtra v. Dr. Praful B. Desai* [10], where bite mark evidence was crucial in establishing the guilt of the accused.

Forensic Chemistry

Forensic chemistry is the sleuth behind the scenes, using scientific methods to uncover crucial evidence in criminal investigations. One of its key roles is in drug analysis, where forensic chemists

identify and quantify controlled substances, helping law enforcement track down drug traffickers and dealers. But it does not stop there; forensic chemistry also delves into trace evidence analysis, examining fibers, paints, glass fragments, and even explosive residues left behind at crime scenes. By meticulously analyzing these tiny traces, forensic chemists can link suspects to the scene or even reconstruct the sequence of events [11]. And when it comes to arson investigations, forensic chemistry plays a vital role in analyzing accelerants like gasoline or kerosene, as well as examining fire debris to determine the cause and origin of the blaze. Through their expertise and attention to detail, forensic chemists shine a light on the hidden clues that help solve crimes and bring perpetrators to justice, ensuring that the truth prevails in the courtroom.

Forensic Toxicology

Forensic toxicology is a critical field within forensic science that deals with the identification and quantification of drugs and other toxic substances in biological specimens, such as blood, urine, and tissue samples, collected from individuals involved in legal investigations. It plays a pivotal role in determining the cause of death or impairment in cases ranging from drug overdoses to poisoning. In India, forensic toxicology has been instrumental in numerous legal cases, providing crucial evidence for both prosecution and defense. One such landmark case is the *State of Maharashtra v. Suresh Pandurang Darshane* [12], where forensic toxicology played a pivotal role in determining the cause of death. In this case, the accused was charged with murder by poisoning. Forensic toxicology analysis of the victim's bodily fluids revealed the presence of a lethal dose of a poisonous substance, which was key evidence in establishing the guilt of the accused. The case of *Union of India v. M/s Brij Lal* [13] highlighted the importance of forensic toxicology in cases involving product liability and public health concerns. In this instance, the forensic toxicology report served as critical evidence in proving that a particular pharmaceutical product was contaminated with toxic substances, leading to adverse health effects among consumers. This case underscored the role of forensic toxicology in ensuring public safety and holding accountable those responsible for manufacturing or distributing harmful products.

Forensic Psychology

Forensic psychology, a captivating branch of forensic science, delves into the complexities of the human mind within the realm of crime and justice. One of its prominent facets is criminal profiling, a technique that involves analyzing behavioral patterns to create profiles of potential offenders. This involves scrutinizing crime scenes, victimology, and psychological characteristics to develop insights into the perpetrator's mindset, motivations, and potential traits. By understanding the behavioral nuances of criminals, forensic psychologists aid law enforcement in narrowing down suspects and formulating investigative strategies. Moreover, forensic psychology sheds light on the intricacies of eyewitness testimony, recognizing the multitude of factors that can influence its accuracy and reliability. From stress and trauma to suggestibility and memory distortion, forensic psychologists scrutinize the reliability of eyewitness accounts, offering insights into the reliability of their testimonies in legal proceedings [14].

Forensic psychologists were involved in evaluating Kasab's mental state and assessing factors, such as his culpability, capacity to understand the consequences of his actions, and potential mitigating circumstances. Their expert testimony helped the court understand Kasab's psychological state and informed the sentencing decision, ultimately leading to his conviction and subsequent execution [15]. Another notable case is the *State of Maharashtra v. Ankur Panwar* [16] which involved the murder of Sheena Bora. Forensic psychologists played a crucial role in assessing the mental competency of the accused, Indrani Mukerjea, who was Sheena Bora's mother. Mukerjea's mental health and psychological state were evaluated to determine her ability to stand trial and assist in her own defense. The expert testimony provided by forensic psychologists helped the court understand the complexities of the case and make informed decisions regarding Mukerjea's legal status and treatment.

Digital Forensics

Digital forensics is like the high-tech detective work of the digital age, focusing on two main areas: computer and mobile device forensics, and cybercrime investigation. In computer and mobile device

forensics, experts dive deep into the digital world, recovering data and meticulously analyzing electronic evidence to uncover crucial information about a case. Whether it is examining deleted files or tracing the origins of incriminating documents, these forensic wizards use their technical savvy to piece together the puzzle. For instance, in the case of *State of Maharashtra v. Dr. Praful B. Desai* [17], the Bombay High Court acknowledged the admissibility of electronic evidence obtained through digital forensic methods, emphasizing the importance of maintaining the integrity of digital evidence and following proper procedures during its collection and analysis. This case set a precedent for the acceptance of digital evidence in Indian courts, highlighting the crucial role of digital forensics in combating cybercrime and upholding the rule of law. On the other hand, cybercrime investigation involves tracking down digital footprints left behind by cybercriminals, whether it is hacking attempts, online fraud, or malicious attacks. By tracing IP addresses, monitoring network activity, and dissecting malware, digital sleuths can identify perpetrators and thwart their nefarious schemes. In essence, digital forensics is the frontline defence against digital wrongdoing, leveraging cutting-edge technology to bring cybercriminals to justice and safeguard digital landscapes.

Forensic Fingerprint

Forensic fingerprint analysis is a cornerstone of criminal investigations worldwide, including India, where it has been pivotal in solving numerous cases. Fingerprint identification relies on the unique patterns of ridges and valleys on the skin's surface, which remain unchanged throughout a person's life. In India, the use of fingerprints as evidence dates to the late 19th century, with the establishment of the Fingerprint Bureau at Kolkata Police in 1897 by Sir Edward Henry. Since then, fingerprint evidence has been extensively utilized in Indian courts to link suspects to crime scenes, establish identities, and aid in the pursuit of justice.

One significant Indian case highlighting the importance of forensic fingerprint analysis is the *State of Maharashtra v. Sukhdeo Shinde* [18]. In this case, the accused was charged with murder, and crucial evidence linking him to the crime scene was a fingerprint found on a bottle at the scene. The prosecution relied heavily on the expert testimony of fingerprint analysts, who conclusively matched the fingerprint to the accused. This case underscored the reliability and admissibility of fingerprint evidence in Indian courts, setting a precedent for its use in subsequent criminal proceedings.

In contemporary India, advancements in technology have enhanced the efficiency and accuracy of fingerprint analysis, with automated fingerprint identification systems (AFIS) aiding law enforcement agencies in matching and identifying prints more swiftly. Additionally, the National Crime Records Bureau (NCRB) maintains a centralized fingerprint database, facilitating nationwide coordination in criminal investigations [19]. Despite technological advancements, the fundamental principles of forensic fingerprint analysis remain unchanged, continuing to serve as a crucial tool in the pursuit of justice in India's criminal justice system.

Forensic Ballistics

Forensic ballistics is a specialized field within forensic science that deals with the examination of firearms, ammunition, and related evidence in criminal investigations and legal proceedings. It encompasses the analysis of ballistic markings, such as bullet trajectories, firearm identifications, and gunshot residue patterns, to provide crucial insights into shooting incidents. One pivotal aspect of forensic ballistics is the matching of bullets or cartridge cases found at a crime scene to a specific firearm, which can link suspects to the crime and establish crucial elements of a case. Case law often highlights the significance of forensic ballistics in resolving criminal cases. One notable example is the case of the *State of Maharashtra v. Dr. Praful B. Desai*, where forensic ballistics played a key role in convicting the accused of murder.

The expert testimony of forensic ballistics analysts provided critical evidence linking the recovered firearm to the bullets recovered from the victim's body, establishing a direct connection between the accused and the crime scene. Similarly, in the case of *State of Rajasthan v. Prem Singh and Ors*, forensic

ballistics analysis was instrumental in corroborating witness testimonies and establishing the sequence of events leading to the fatal shooting, leading to the conviction of the perpetrators. Forensic ballistics not only aids in identifying firearms and ammunition used in crimes but also provides valuable insights into the dynamics of shooting incidents, contributing to the reconstruction of events and the pursuit of justice. Through meticulous examination and analysis, forensic ballistics serves as a vital tool in the investigation and prosecution of firearm-related offenses, ensuring the integrity and reliability of evidence presented in court.

INTERDISCIPLINARY APPROACHES AND EMERGING TRENDS

In the dynamic landscape of forensic science, interdisciplinary approaches are revolutionizing criminal investigation by integrating various forensic disciplines. Imagine a seamless collaboration between biologists, chemists, anthropologists, psychologists, and digital forensic experts, each contributing their unique insights and techniques to unravel complex cases. This synergy allows investigators to comprehensively analyze evidence, from biological samples to digital data, leading to more robust conclusions and enhancing the likelihood of justice being served. Moreover, emerging technologies, such as nanotechnology and artificial intelligence are propelling forensic science into the future. Nanotechnology enables the manipulation and analysis of materials at the nanoscale, revolutionizing techniques like DNA sequencing and trace evidence analysis. Similarly, artificial intelligence algorithms can sift through vast amounts of data, identifying patterns and anomalies that might escape human detection, thus accelerating the investigative process and enhancing accuracy. As interdisciplinary collaboration and technological advancements continue to evolve, forensic science will remain at the forefront of criminal investigation, ensuring that the pursuit of truth and justice remain steadfast in an ever-changing world.

Way Forward

Looking ahead, the field of forensic science faces a plethora of challenges and exciting opportunities for advancement. Ethical considerations and legal implications loom large, demanding careful navigation to uphold the integrity of investigations and legal proceedings. As technology progresses, it is crucial to address limitations and enhance forensic capabilities through robust research and innovation. This involves staying abreast of emerging technologies and methodologies, such as advancements in DNA analysis or digital forensics, while also ensuring adherence to ethical guidelines and legal standards. Additionally, collaboration between academia, industry, and law enforcement agencies will be key in driving progress and overcoming obstacles in the field. By proactively addressing these challenges and embracing future-oriented approaches, forensic science can continue to evolve as a powerful tool in the pursuit of truth and justice, ensuring its relevance and effectiveness in the years to come.

CONCLUSIONS

In conclusion, forensic science stands as a beacon of truth and justice in our modern society, weaving together the threads of science, law, and investigation to unravel the complexities of crime and legal disputes. Throughout this exploration, we have witnessed the remarkable contributions of forensic science, from its foundational principles to its application in solving some of the most intricate criminal cases. Its enduring significance lies in its ability to provide impartial analysis, objective evidence, and expert testimony that underpin the integrity of the justice system. Whether it is identifying perpetrators through DNA analysis or scrutinizing digital footprints to uncover cybercrimes, forensic science continues to play an indispensable role in upholding the rule of law and safeguarding against injustices. As we move forward, advancements in technology and methodologies will only enhance the capabilities of forensic science, ensuring that it remains a cornerstone of justice and accountability in our society. Through ongoing research, innovation, and collaboration, forensic science will continue to evolve, adapt, and uphold its crucial role in shaping a fair and just legal landscape for generations to come.

REFERENCES

1. Hemanth K, Tharmavaram M, Pandey G. History of forensic science. In: Technology in Forensic Science: Sampling, Analysis, Data, and Regulations.
2. Firth JB. Forensic science. *J R Soc Arts*. 1945;93(4689):228–44.
3. Toom V. Bodies of science and law: Forensic DNA profiling, biological bodies, and biopower. *J Law Soc*. 2012;39(1):150–66.
4. Jankauskas R. Forensic anthropology and mortuary archaeology in Lithuania. *Anthropol Anz*. 2009;67(4):391–405.
5. Snow CC. Forensic anthropology. *Annu Rev Anthropol*. 1982;11:97–131.
6. AIR 2003 SC 2053.
7. AIR 1984 SC 627.
8. Nabar BS. Forensic science in crime investigation. 3rd ed. 2021. p. 205–10.
9. AIR 2003 SC 2053.
10. Firth JB. Forensic science. *J R Soc Arts*. 1945;93(4689):228–44.
11. AIR 1997 SC 2101.
12. AIR 1997 SC 2101.
13. Corrington JD. Forensic science. *Bios*. 1962;33(1):12–22.
14. AIR 2012 SC 3565.
15. AIR ONLINE 2019 BOM 417.
16. AIR 2003 SC 2053.
17. AIR 1992 SC 2100.
18. Nabar BS. Forensic science in crime investigation. 3rd ed. 2021. p. 46–72.
19. Nabar BS. Forensic science in crime investigation. 3rd ed. 2021. p. 174–93.