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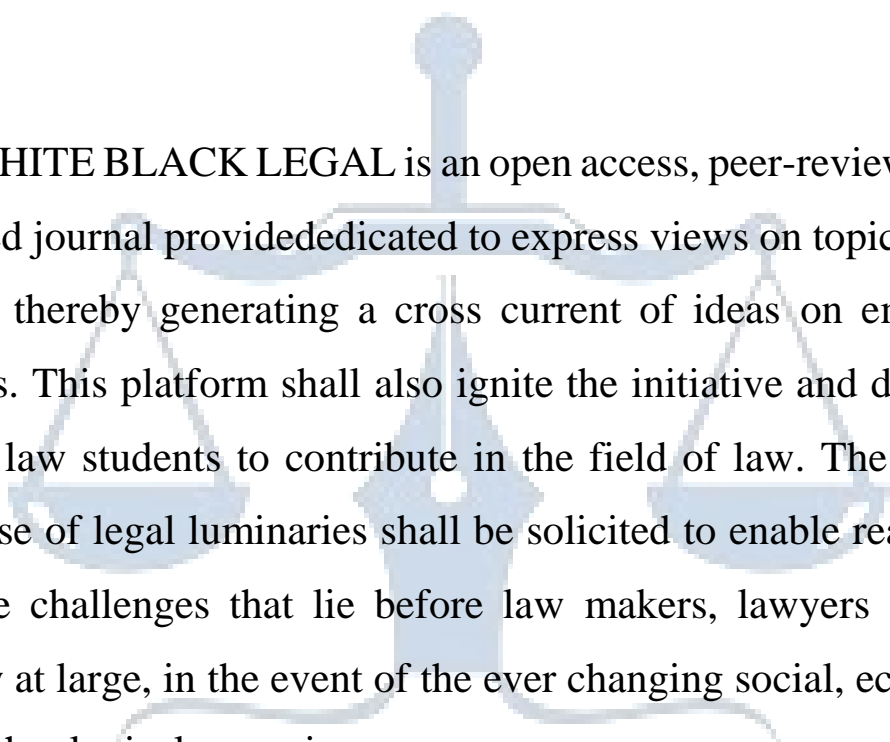


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ABOUT US



WHITE BLACK LEGAL is an open access, peer-reviewed and refereed journal provided dedicated to express views on topical legal issues, thereby generating a cross current of ideas on emerging matters. This platform shall also ignite the initiative and desire of young law students to contribute in the field of law. The erudite response of legal luminaries shall be solicited to enable readers to explore challenges that lie before law makers, lawyers and the society at large, in the event of the ever changing social, economic and technological scenario.

With this thought, we hereby present to you



FORENSIC SCIENCE IN THE INVESTIGATION OF CRIME BY DR. S SUBRAMANIAN

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1. INTRODUCTION

Forensic science has long been at the forefront of criminal investigations, providing the scientific foundation necessary for uncovering the truth and ensuring justice is served. As crime becomes increasingly sophisticated, the methods used to investigate these crimes must evolve to keep pace. Dr. S Subramanian's *Forensic Science in the Investigation of Crime* is a timely and authoritative text that delves into the complex interplay between science and law enforcement. With his extensive experience and deep understanding of forensic methodologies, Dr. S Subramanian offers readers a comprehensive guide that bridges the gap between theory and practice.¹ Modern day criminal uses Science and Technology to his advantage in committing crimes. Consequently, Investigating Officers are required to possess scientific knowledge and skills to investigate and unearth these crimes. Forensic Science comes to their rescue. Forensic Science is a complex amalgam of various scientific disciplines and it is not possible for an Investigator to master all of them. Specialised Forensic Science Laboratories and Field Units have been established to utilise Forensic Science in the detection of crime.

“Forensic Science in the Investigation of Crime” by Dr. S. Subramanian is a comprehensive exploration of the pivotal role that forensic science plays in modern criminal investigations. This book provides readers with a deep understanding of how forensic techniques, methodologies, and technologies are employed to solve crimes, highlighting the intricate relationship between science and law enforcement. Dr. Subramanian, a seasoned expert in the field, presents a detailed account of the various branches of forensic science and their application in solving complex criminal cases.

¹ *Subramanian* RADARIS available at <https://radaris.in/p/Padmashri/Subramanian/> last seen on 05/09/2024

The book begins by offering a historical overview of forensic science, tracing its origins from early criminal investigations to the highly sophisticated methods used today. Dr. Subramanian emphasizes the importance of scientific objectivity in criminal investigations and how it has revolutionized law enforcement practices. He explores the evolution of forensic science in India and globally, shedding light on its growing significance in the criminal justice system.² One of the key strengths of this book is its systematic approach to explaining different forensic disciplines, including **DNA analysis, fingerprinting, ballistics, toxicology, and forensic pathology**. Dr. Subramanian delves into the technical aspects of these fields, breaking down complex scientific processes into accessible and understandable terms for readers, whether they come from a legal, scientific, or general background. The use of case studies, both real and hypothetical, provides a practical context, demonstrating how forensic science contributes to identifying perpetrators, exonerating the innocent, and bringing justice to victims.

Dr. Subramanian also addresses the challenges that forensic science faces in the criminal justice system. These include issues of **evidence tampering, chain of custody**, and the potential for **human error** in forensic analyses. The book discusses the ethical and legal implications of forensic science, particularly the need for maintaining accuracy and impartiality when handling evidence that can significantly influence court outcomes. He also underscores the importance of training for forensic experts and the need for ongoing advancements in forensic technologies to keep up with evolving criminal tactics.³

1.1 RATIONALE AND SIGNIFICANCE

Rationale

Measurable science plays a fundamental part in advanced criminal examinations, giving logical strategies and procedures that are vital within the recognizable proof, collection, and examination of prove. Dr. S Subramanian's book, *Legal Science within the Examination of Wrongdoing*, may be a noteworthy commitment to this field, advertising a comprehensive investigation of legal hones and their application in fathoming violations. The book stands out by tending to modern challenges in measurable science, coordination both traditional methods and rising innovations, making it a basic asset for both understudies and experts within the field.

² DR S SUBRAMANIAN, *FORENSIC SCIENCE IN INVESTIGATION OF CRIME*, (S. GOGIA AND COMPANY 2007)

³ *Ibid*

Significance

The significance of this book lies in its detailed examination of case studies, which demonstrate the practical implications of forensic techniques in the judicial system. These case studies provide readers with a concrete understanding of how forensic evidence is collected, analysed, and presented in court, ultimately influencing the outcomes of criminal cases. Moreover, the book's focus on the latest advancements in forensic technology and its potential impact on future investigations makes it a timely and valuable resource.

1.2 AIMS & OBJECTIVES OF STUDY

- To critically evaluate the content, structure, and overall contribution of Dr. S Subramanian's *Forensic Science in the Investigation of Crime* to the field of forensic science.
- Analyse the Content and examine the key themes and topics covered in the book, including the range of forensic techniques discussed.
- Identify examples where the book's content can be directly applied to real-world forensic investigations and legal proceedings. Aim is achieved in chapter computer crime and cyber forensics in books content.
- Compare the book with other notable works in the field to understand its unique contributions and relevance. This aim is achieved by comparing the book in chapter critical analysis.

1.3 HYPOTHESIS OF RESEARCH:

The effective integration of advanced forensic techniques and methodologies significantly enhance the accuracy and reliability of criminal investigations, leading to higher rates of case resolution and conviction.

Hypothesis is proved in the chapter 3 contents of the book as all the content mentioned in the book speaks about effectivity of forensic techniques in enhancing the accuracy of criminal investigations as well as resolving day to day issues.

1.4 RESEARCH METHODOLOGY

Researcher will use following Research Methods and Research Models:

Literature Review:

Literature Review is a survey of the existing related works in order to find out as to what has already been discussed on the particular aspect; it will also give an understanding as to what has not been discussed.

Researcher will conduct a preliminary literature review to understand the existing body of knowledge on forensic science and its role in criminal investigations. This helps in contextualizing Dr. Subramanian's contributions within the broader scope of forensic science literature. ⁴

Content Analysis:

The next task after collection of data is its analysis. The raw data has to be putted to analysis so as to reflect the direction and trend. Analysis happens before interpretation. There is no clearcut demarcation between the two as analysis is not complete without interpretation and interpretation cannot precede analysis

Researcher will perform a detailed content analysis of the book, focusing on its structure, key themes, and topics covered. Pay particular attention to the following areas:

- The role of forensic science in crime investigation.
- Key forensic techniques discussed (e.g., DNA analysis, fingerprinting, toxicology, digital forensics).

Critical Evaluation:

Critically evaluate the strengths and weaknesses of the book. Consider aspects such as the author's expertise, the comprehensiveness of the content, the clarity of explanations, and the practical applicability of the material.

Comparative Analysis Model:

This involves a comparison of legal doctrines, legislations vis-a vis foreign laws. It highlights the cultural and social character of law and how does it acts in different settings. So, it is useful in developing and amending, and modifying the law. But a cautious approach has to be taken in blindly accepting the law of another social setting as an ideal because it might not act in the same manner in a different setting.

⁴ *Research Methodology* INFLIBNET available at:
https://epgp.inflibnet.ac.in/epgpdata/uploads/epgp_content/law/09._research_methodology/02._legal_research/et/8149_et_et.pdf last seen on 05/09/2024

Compare the book's content with existing literature on forensic science to evaluate its originality and contribution to the field. This involves reviewing other seminal works and recent publications to see how Dr. S Subramanian's book aligns with or diverges from established theories and practices.

Theoretical Framework Model:

This model will assess the theoretical foundations that underpin forensic science as presented by Dr. Subramanian. It looks at how the book applies scientific theories to the practical world of criminal investigations.⁵

2. DEMOGRAPHICAL INFORMATION ABOUT THE AUTHOR AND THE BOOK

2.1 Author as an Academician

Dr. S. Subramanian, a former officer of the Indian Police Service (IPS), is known for his contributions to law enforcement and his expertise in forensic science, crime investigation, and security-related issues. Throughout his career, Dr. Subramanian held various senior positions within the police force, contributing to national security, criminal justice reform, and law enforcement practices in India.

Dr. S Subramanian is a distinguished academic and expert in the field of forensic science, with a career that spans several decades. After his service in the IPS, Dr. Subramanian became an academic and author writing extensively on topics related to **forensic science, criminal investigation, and industrial espionage**. He has made significant contributions to the study and practice of forensic science, particularly in its application to criminal investigations. His work is highly respected in both academic and professional circles, and he is known for his ability to bridge the gap between scientific theory and practical application.

Throughout his career, Dr. S Subramanian has received numerous awards and honours for his contributions to forensic science Padmashri being one of it. These accolades highlight his dedication to the field and his ongoing efforts to push the boundaries of what is possible in criminal investigations through scientific innovation.⁶

⁵ *ibid*

⁶ *Subramanian* CRPF, <https://crpf.gov.in/writereaddata/537062020.pdf> last seen on 05/09/2024

2.2 Demographical information of the Book

- Title: Forensic Science in the Investigation of Crime
- Author: Dr. S Subramanian
- Publisher: S. Gogia & Company
- Publication Year: 2007
- Edition: First Edition
- Pages:336
- Language: English
- Format: Hardcover
- Price: 295⁷

2.3 Other Literature of the same Author

1. Industrial espionage causes and cure

In “Industrial Espionage: Causes and Cure,” Dr. S. Subramanian provides a comprehensive analysis of one of the most pressing threats to businesses and economies worldwide. Industrial espionage, also known as corporate spying or economic espionage, involves the illegal acquisition of trade secrets, intellectual property, or other proprietary information for competitive advantage. In today’s increasingly globalized and technologically advanced business environment, the risk of industrial espionage has grown significantly, with far-reaching consequences for companies and nations. The book explains various types of industrial espionage, including cyber espionage (hacking into company systems), physical theft of documents, and social engineering tactics used to extract information from employees.

Dr. Subramanian’s introduction delves into the root causes of industrial espionage, tracing its rise to a combination of factors such as global competition, rapid technological advancements, and the increasing value placed on intellectual property. He explains how businesses, driven by the need to outperform rivals, often engage in unethical practices to obtain critical information, leading to legal and ethical dilemmas. Moreover, he explores how state-sponsored espionage is a growing concern, with governments often targeting industries in foreign nations to gain economic or strategic advantages the book serves as a vital guide for companies

⁷ Dr S Subramanian, Forensic Science In Investigation Of Crime, (S. Gogia and company 2007)

looking to safeguard their intellectual assets and ensure competitive integrity in a globalized economy.⁸

3. BOOK AS A WHOLE

3.1 First Look of the Book

The cover of *Forensic Science in the Investigation of Crime* by Dr. S Subramanian has design of crime scene tape, fingerprints, or laboratory equipment, skeleton, DNA design, fingerprint and the table showing forensic tools. The title is prominently displayed, often in bold lettering, making it clear that this is a specialized text meant for those interested in the field of criminal investigations.

3.2 Summary of the Book

“*Forensic Science in the Investigation of Crime*” by Dr. S Subramanian is a comprehensive exploration of the role, methodologies, and advancements of forensic science in modern criminal investigations. The book serves as an essential resource for students, professionals, and anyone interested in understanding how scientific principles are applied to solve crimes and administer justice. The book covers the different types of forensic evidence, including fingerprints, DNA, bloodstain pattern analysis, ballistic evidence, and toxicology. It explains how these forms of evidence are collected, preserved, and analysed in the context of criminal investigations.

Dr. Subramanian also discusses the challenges faced in forensic investigations, such as contamination of evidence, limited resources, and the evolving nature of crime. He stresses the need for continuous advancements in forensic technology and techniques to stay ahead of sophisticated criminal activities.

3.3 Central Idea of the Book

The book highlights the importance of interdisciplinary collaboration, ethical practices, and continuous innovation in the field to address the growing complexity of crimes in the modern world. Through detailed explanations and case studies, Dr. S Subramanian illustrates how forensic science not only aids in solving crimes but also upholds the integrity of the legal process, ultimately contributing to a more just society. Dr.

⁸ Dr S Subramanian, *Industrial Espionage: Causes and Cure* (Ed 1 1988)

Subramanian emphasizes the integration of forensic science into law enforcement practices to improve the accuracy of investigations and reduce wrongful convictions. Through detailed explanations of forensic techniques such as fingerprint analysis, DNA profiling, ballistics, and toxicology, the book underscores the importance of these scientific tools in identifying perpetrators, reconstructing crime scenes, and corroborating witness testimonies. Dr. Subramanian also discusses the challenges that forensic experts face, including issues related to evidence handling, legal admissibility, and the need for proper training and infrastructure.

The book serves as a guide for law enforcement officers, legal professionals, and forensic scientists, advocating for a more systematic and scientific approach to crime investigation to strengthen the criminal justice system.

3.4 Contents of the Book

The book contains many chapters main being:

i. Science in Aid of Law

Criminal Justice System. The Criminal Justice System consists of four wings: -

- (1) The Law makers. Who enact the Laws, which define the deviant behaviour and prescribe the punishment for the same.
- (2) The Law enforcers. - Including the Police, who seek to prevent Crime and if committed detect the same. They collect evidence against those committing the Crime and place the same before the Judiciary.
- (3) Judiciary. The Courts of Law, evaluate the evidence produced by the law enforcers, and if satisfied, find the citizen guilty of the crime and hand down such punishment that is appropriate to reform the citizen.
- (4) Correctional Administration. - Includes Jails, Reform Homes, and others, where the citizen undergoes the punishment awarded by the Judiciary. The purpose of punishment is to reform the citizen and make him once again a useful member of the society.

Definition:

Forensic Science is the application of principles of Science and Technology to assist in the administration of Civil and Criminal Justice Systems. The basic principle of Forensic Science is the "Law of Exchange". Propounded by Edmond Locard. This principle states that "whenever entities come in contact, there is an exchange of traces mutually". Thus, while committing the crime, the criminal will leave some of

his traces at the scene of crime and will also carry with him some traces from the scene of crime.

Proof beyond reasonable doubt. - To ensure that there is no miscarriage of justice and innocent citizens are not punished, the courts insist that the evidence produced by the Law enforcers should prove the guilt of the citizen beyond reasonable doubt. The benefit of doubt, if any, should go to the citizen accused of the crime. The philosophy is not to punish even by mistake an innocent citizen even if many guilty persons escape punishment.

Evidence. Evidence consists of facts and exhibits which link the citizen with the crime. There are two kinds of evidence, the direct evidence and indirect evidence. Direct evidence establishes a particular point under consideration without reliance on presumptions and inferences. It can be in the form of accounts of eye witnesses who actually witnessed the Crime being committed; Confessions made voluntarily by the accused persons accepting the guilt; and the statements of an approver-that is one of the accused persons, who had actively participated in the crime and willing to assist the court by fully accepting his guilt and giving evidence about the role of others. Direct evidence can become subjective due to errors in observation and infirmities in vision, hearing etc, perception problems, memory lapses, social prejudices, and inability to express without exaggeration, embellishment and value judgements.

ii. Historical review and Development of forensic science in India.

The book begins by acknowledging the history middle of the Nineteenth Century, there was a spurt in the development of sciences. Courts of Law, which were weary of the unreliability of traditional forms of evidence, started looking towards scientists to give them definitive opinion on matters referred to them. In the initial stages, Forensic Science was dominated by Pathologists and Toxicologists, who were mostly from medical profession. As a result of this, Forensic Medicine also developed rapidly along with Forensic Science and their inter relationship became well established. Among the pioneers of Forensic Science, we give below some who laid the foundations for different branches of Forensic Science.

ANTHROPOMETRY

Alphonse Bertillon (1853-1914.- Bertillon developed the first scientific system of personal identification, known as Anthropometry. In 1879, Alphonse Bertillon, began to develop the science of Anthropometry, a systematic procedure of taking a

series of body measurements as a means of identification of uniqueness of individuals.

FINGERPRINTS

Francis Galton (1822-1911). Francis Galton undertook the first scientific study of Fingerprints and developed a methodology of classifying them for filing. In 1892, he published the book "Finger Prints" which contained the first authentic statistical proof supporting the uniqueness of Finger Prints and their utility

BALLISTICS

Calvin Goddard (1891-1955). Col. Calvin Goddard, used comparison Microscope for the first time to determine whether a particular bullet was fired from the suspect's gun, by comparing the same with a test bullet fired from the same weapon. His success in establishing the fact conclusively had made comparison microscope an essential tool for Fire Arms Examiners.

DOCUMENT EXAMINATION

Albert S. Osborne (1858-1946). - Osborne developed fundamental principles of document examination, which was responsible for acceptance of documents as scientific evidence by the courts. In 1910, he wrote the book, "Questioned Documents" which till date is the standard reference book on the subject.

iii. Development of forensic science in India.

Here the author acknowledges use of basic forensic methods in ancient India. Traditional practices like the study of fingerprints were recognized as early as 300 BCE, with references in texts like the Vishnu Purana, where markings on the human body were used to establish identity. One of the major milestones in the development of forensic science in India was the formal adoption of fingerprinting as a method of identification. The Finger Print Bureau was established in 1897 in Kolkata, making India a pioneer in the use of fingerprints for criminal investigation. Dr. Subramanian highlights the work of Sir William Herschel and Azizul Haque, who developed fingerprint classification systems, which were critical in solving crimes and reducing impersonation in legal matters.

iv. Photographing the scene of crime.

Dr. Subramanian explains that photography is an essential tool for visually recording the crime scene. Photographs serve as permanent records that investigators, lawyers,

and forensic experts can refer to during the investigation and trial phases. The chapter discusses the types of photographs required at the scene, including overall shots, mid-range photos, and close-up images of important evidence such as footprints, bloodstains, weapons, and other crucial forensic details. The importance of lighting, angles, and consistency in taking photographs is highlighted, as these factors can impact the clarity and interpretation of the evidence. It also touches upon specialized photography techniques like macro photography for detailed close-ups, low-light photography for capturing scenes in dim environments, and infrared or ultraviolet photography for detecting hidden evidence.

v. Sketching the scene of crime.

After the photographing of the scene of crime is completed, the investigating officer should prepare the sketch of the scene. Sketches supplement the photographs. The author discusses different types of sketches, including rough sketches drawn at the crime scene and finished sketches prepared later, often with the help of computer software. The author also mentions three methods of sketching them being:

1. Baseline or Co-ordinate method
2. Triangulation Method
3. Cross Projection Method

He also explains the legal challenges, such as ensuring the admissibility of sketches in court, particularly in terms of their accuracy and relevance to the case.

vi. Investigating of Deaths.

In the chapter author delves into the critical role forensic science plays in determining the cause and manner of death in criminal investigations.

The chapter begins by categorizing different types of deaths, such as natural, accidental, suicidal, and homicidal. Understanding these classifications is essential for investigators to approach each case appropriately. Dr. Subramanian emphasizes the importance of forensic pathology in investigating deaths. He explains the role of forensic pathologists in performing autopsies to ascertain the cause of death, examining bodily injuries, and collecting evidence. Dr. Subramanian elaborates on the types of evidence relevant to death investigations, including biological samples (blood, tissue), toxicological analysis, and trace evidence (fibres, hair).

Author also mentions need to follow the prescribed legal and departmental

procedures:

As Murder cases are contested in courts by the best of legal brains and the investigation comes under close scrutiny. Scientific and oral evidence will be ruthlessly dissected to point out inconsistencies. To ensure success of prosecution, the investigating officer should always keep in mind the legal and procedural requirements of collection and forwarding of evidence to the laboratory, obtaining required certificates from the scientists and surgeons and forwarding the same to the courts without loss of time, maintaining integrity of documentation, proof of custody etc. These may appear very simple routine matters but failure to follow them may result in the failure of case in the court.

vii. Photography as Forensic Tool.

In the chapter titled “Photography as a Forensic Tool” from “Forensic Science in the Investigation of Crime” by Dr. S. Subramanian, the author emphasizes the critical role that photography plays in documenting crime scenes and collecting evidence. Below is a summary of key points that are typically covered in such a chapter: Dr. Subramanian underscores photography as an indispensable tool in forensic science, essential for accurately documenting crime scenes. It serves as a permanent record of the scene, helping to preserve visual evidence for investigations, court presentations, and historical records. Dr. Subramanian likely addresses how forensic photography can be used in courtroom settings. Photographs can provide visual context for juries, supporting the testimony of forensic experts and investigators.

Author also mentions about Latest Techniques:

Digital Imaging Analysis and Enhancement Techniques are now used to analyse photographs to detect clues that may be contained in them. These techniques are highly complicated technologies and they are not discussed here. It is sufficient to know that using these techniques, lot of clues can be extracted from ordinary photographs to help investigation

Use of Photography in Forensic Science Laboratory

Photography is used in the Forensic Science Laboratory to: (1) to record the original condition of physical evidence received in the Laboratory, (2) to record the condition of evidence after subjecting it to scientific examination, (3) to demonstrate points of evidence in court, and (4) to highlight evidence invisible to human eye. In the

Laboratory, X-Ray, Ultra Violet Rays and Infra-Red Rays are used in photography. Photomicrography is a useful tool in the Laboratory.

Submission of Photographic Evidence in Court

Photographs are admissible in evidence after their authenticity and relevancy are proved. It is therefore necessary to take all precautions to ensure that the authenticity of the photographs is not questioned in Court.

viii. Computer crime and cyber forensics.

Author starts by defining Computer Crime as:

Where a crime is committed with computers as the target of the crime, or the means adopted to commit a crime, it is classified as Computer Crime.

The author delves into the growing significance of digital technology in criminal activities and the essential role of cyber forensics in investigating such crimes. Here's a summary of the key themes and insights typically covered in this chapter: Dr. Subramanian defines computer crime and its various forms, such as hacking, identity theft, online fraud, cyberbullying, and the distribution of illegal content (e.g., child exploitation materials). The chapter categorizes different types of cybercrimes, including: Hacking as unauthorized intrusion into computer systems. Phishing as deceptive attempts to obtain sensitive information. Malware as Malicious software designed to damage or exploit devices. Dr. Subramanian explains the concept of cyber forensics as a branch of forensic science focused on the identification, preservation, analysis, and presentation of digital evidence. He outlines the importance of following proper protocols to ensure the integrity and admissibility of digital evidence in court. He emphasizes the need for cyber forensics experts to adhere to ethical standards to protect privacy rights while conducting investigations

Dr. Subramanian discusses the role of law enforcement agencies in combating cybercrime and the importance of collaboration between different agencies and organizations to tackle cyber threats effectively.

Author then speaks about how Computer Crime is investigated in the States of India?

- In most of the States, the cases are registered in the Police Stations and investigated by regular Police officers, who seek locally the assistance of College professors, LT. Professionals and Systems Administrators.

- In some States, Cyber Crime Cells have been established in the Criminal Investigation Department (CID) under an S.P., who is assisted by regular police officers well versed with I.T. These cells receive cases on transfer from the police stations.
- In few States, Computer Crime Investigation Cells or Cyber Crime Police Stations have been established with original jurisdiction to register cases from all over the State. These stations are manned by specialist police officers and civilian I.T. Experts. These cells also maintain a website providing a facility for on line reporting of cases. These cells also educate the users about computer crimes and the preventive and investigative aspects.
- Central Bureau of Investigation (CBI) has a Cyber Crime Investigation Cell under a S.P., which takes up important cases for investigation at the request of the States. It is also the notified nodal contact point for international cooperation, and keeps close touch with INTERPOL.

Author has also mentioned Computer Forensic Laboratories in India:

There are four Central Forensic Science Laboratories three of them under GEsQD at Hyderabad, Kolkata and Chandigarh and one under CFSL of the CBI at Delhi.

ix. Forensic aspects of Investigation of cases of fire.

In this author focuses on the role of forensic science in determining the causes and origins of fires, as well as understanding the dynamics of fire-related incidents. The chapter delves into various investigative and scientific techniques that are applied when analyzing fire cases. The chapter likely starts with an overview of how fires behave in different environments, the chemistry of combustion, and the factors that influence fire spread, such as fuel sources, oxygen availability, and ignition points. Dr. Subramanian emphasizes the importance of preserving the crime scene in fire cases. Since fire scenes can be chaotic and damaged, forensic investigators must be meticulous in collecting evidence before it is further compromised.

The chapter underscores the role of forensic experts in interpreting fire-related evidence. Specialists in fire dynamics, chemical analysis, and material sciences collaborate to provide a scientific basis for determining how the fire started. The chapter also explores how multiple potential causes of a fire (electrical failure,

human negligence, or intentional acts) must be considered, making fire investigations particularly complex.

x. Preparing portraits of Individuals from descriptions.

The author states that in Crime Investigation, it becomes necessary to construct the picture of a criminal or a suspect from the descriptions given by the victim or eyewitnesses. It is not possible for an ordinary citizen to use precise technical words to describe another person and often confusion results. In the process of retention of images in the brain, often the unusual features get lodged in memory. If it is possible to assist the memory to recall these unusual features, with the help of drawings, the recall becomes total.

Police officers, when searching for Missing Persons or wanted criminals, are required to develop their powers of observation and when a suspect is seen, quickly mentally compare his features with those known to them and apprehend them.

This science of using anthropometrical features for identification of individuals is known as Portrait Parle.

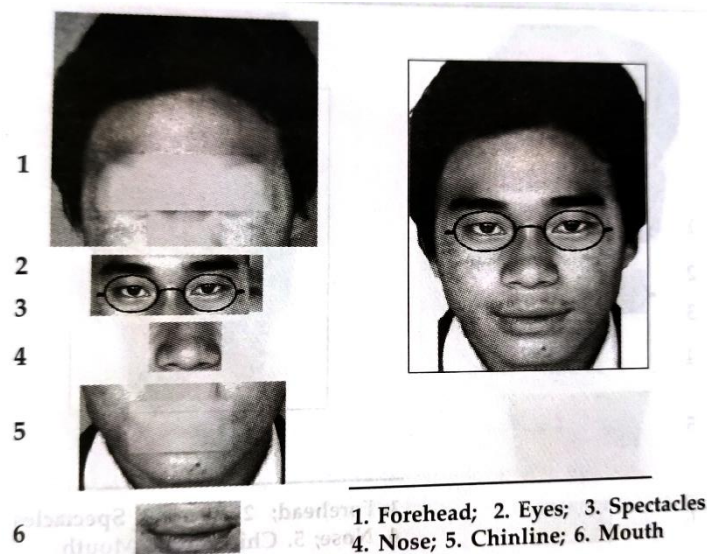
Alphonse Bertillon was the first to evolve a system to describe different parts of the body. He divided them into four parts as below: -

1. Determination of Colour (left eye, hair, beard and skin)
2. Morphological determinations (shape, direction and size of different parts of head)
3. General determination (Fat, Thin, voice, language, dress, deportment, social status etc.)
4. Description of permanent marks (Tattoos, Scars, cuts etc)

Computerised Portrait Building System for India

To meet the needs of the Indian conditions, the National Crime Records Bureau has developed a computerized portrait building system. This consists of 100 photographs, split into strips representing various anthropological features such as hairline, forehead, eyes, nose, mouth, chin line, etc. Additional features like beard, moustache, spectacles, headgear etc can be incorporated to the portrait. The features on the strips are scanned, digitized and stored on a microprocessor-based database. Based on the description given it is possible to generate over 150 crores of different portraits. This system has given excellent results in solving cases.

Following is the pictorial representation show by author depicting how the face is reconstructed:



3.5 Research Methodology used by Author:

The research methodology employed by Dr. S Subramanian in Forensic Science in the Investigation of Crime is a comprehensive, multidisciplinary approach that combines scientific rigor with practical insights. The methodology includes the following key components:

i. Scientific Method Model:

The book utilizes the scientific method to explain how forensic experts form hypotheses based on available evidence, test these hypotheses using scientific tools, and draw conclusions that can be presented in a court of law. It explains how forensic data is systematically collected from crime scenes, ensuring the integrity of physical evidence (fingerprints, DNA, blood samples, etc.).

ii. Case Study Model:

Dr. Subramanian employs real-life case studies to demonstrate how forensic science aids in solving criminal cases. Each case study highlights different forensic techniques, including Ballistics i.e. Determining the type of firearm used in a crime. Toxicology that is identifying poisons or drugs involved in a death and DNA Profiling which is Matching biological evidence to suspects or victims.

iii. Comparative Analysis Model:

This model is used to compare different forensic methods and their effectiveness in

solving various types of crimes. Dr. Subramanian compares Old vs. modern techniques: Such as the evolution from manual fingerprinting to automated fingerprint identification systems (AFIS).⁹¹⁰

4. CRITICAL ANALYSIS

4.1 Key issues raised in the Book

In *Forensic Science in the Investigation of Crime* by Dr. S Subramanian, several key issues are raised that critically examine the application of forensic science in criminal investigations. These issues highlight the intersection of science, law, and justice, as well as the practical problems encountered in the field. The rapid pace of technological advancements in forensic science, such as digital forensic. Here are the primary issues discussed in the book:

Challenges in Evidence Collection:

One of the major issues raised is the proper collection and preservation of evidence. The book emphasizes that any mishandling of evidence, contamination, or improper storage can compromise the integrity of forensic findings. Dr. Subramanian stresses the importance of trained professionals at crime scenes and the use of proper protocols in evidence handling to ensure reliable results.

Admissibility of Forensic Evidence in Court:

Dr. Subramanian discusses the legal challenges regarding the admissibility of forensic evidence in courtrooms. There are instances where forensic techniques may not be fully understood by legal professionals, leading to misinterpretation or exclusion of crucial evidence. The book highlights the need for forensic scientists to clearly communicate scientific findings and methodologies to judges and juries.

Technological Gaps and Advancements:

Dr. Subramanian highlights the rapid advancements in forensic technology, but also points out the disparities in access to these technologies, especially in developing countries. The book raises the issue of technological gaps between well-equipped forensic labs and those lacking modern tools, which can affect the quality and speed of investigations.

⁹ *Research Methodology* INFLIBNET available at: https://epgp.inflibnet.ac.in/epgpdata/uploads/epgp_content/law/09._research_methodology/02._legal_research/et/8149_et_et.pdf last seen on 05/09/2024

¹⁰ DR S SUBRAMANIAN, *FORENSIC SCIENCE IN INVESTIGATION OF CRIME*, (S. GOGIA AND COMPANY 2007)

Training and Expertise of Forensic Personnel:

The book stresses the importance of adequate training for forensic experts, law enforcement officers, and crime scene investigators. Dr. Subramanian identifies the lack of specialized training as a key issue, which can lead to errors in forensic analysis and undermine the judicial process. He advocates for more structured training programs and certifications to ensure the competency of forensic professionals.

Resource Constraints in Forensic Investigations:

A major issue highlighted in the book is the lack of resources in many forensic labs, particularly in regions where funding for forensic science is limited. These constraints can lead to backlogs, delayed investigations, and insufficient analysis, undermining the effectiveness of forensic science in criminal justice.

4.2 Comparing this Book with Other literature on same Issue by other authors

Comparing the provisions with books such as:

Forensic Science: From the Crime Scene to the Crime Lab by Richard Saferstein¹¹

Book Details:

Publisher : Pearson; 3rd edition (13 January 2015)

Language : English

Paperback : 576 pages

ISBN-10 : 013359128X

When comparing “Forensic Science: From the Crime Scene to the Crime Lab” by Richard Saferstein with “Forensic Science in the Investigation of Crime” by Dr. S. Subramanian, both books focus on forensic science and its crucial role in criminal investigations, but they approach the subject from different perspectives and offer varying depth on certain topics. Here's a comparative analysis:

- iv. “Forensic Science: From the Crime Scene to the Crime Lab” by Richard Saferstein is a comprehensive textbook primarily aimed at students, educators, and forensic professionals. It is widely used in academic settings. “Forensic Science in the Investigation of Crime” by Dr. S. Subramanian focuses more on the practical application of forensic science in the context of the Indian legal system and law enforcement.

¹¹ RICHARD SAFERSTEIN, FORENSIC SCIENCE FROM THE CRIME SCENE TO THE CRIME LAB, Pearson; 3rd edition (13 January 2015)

- v. Richard Saferstein's book offers an extensive overview of forensic science, covering virtually every facet of the field. It includes chapters on fingerprint analysis, toxicology, DNA profiling, forensic anthropology, digital forensics, and more. Dr. S. Subramanian's book also covers key forensic science areas like DNA analysis, ballistics, toxicology, and crime scene management, but with a stronger emphasis on case studies from India.
- vi. Saferstein's book includes numerous case studies and examples from around the world, helping readers understand how forensic science is used in a variety of contexts. Subramanian's book provides more India-specific case studies, which reflect the challenges and nuances of applying forensic science in the Indian criminal justice system.
- vii. "Forensic Science: From the Crime Scene to the Crime Lab" takes a global perspective, offering examples from diverse legal and investigative systems across different countries, particularly the U.S. and Europe. "Forensic Science in the Investigation of Crime" offers a regional perspective focused on India. It deals with issues specific to India's legal system, resource constraints, and investigative Practices, making it highly relevant for Indian readers or those studying forensic science in the Indian context.¹²

Fundamentals of Forensic DNA Typing by John M. Butler

Book Details:

Publisher: Academic Press; 1st edition (30 September 2009)

Language: English

Paperback: 520 pages

ISBN-10: 0123749999

ISBN-13: 978-0123749994

"Fundamentals of Forensic DNA Typing" by John M. Butler and "Forensic Science in the Investigation of Crime" by Dr. S. Subramanian are two comprehensive texts in the field of forensic science, but they have distinct focuses and approaches.¹³

- i. John M. Butler's "Fundamentals of Forensic DNA Typing" dwelves into the molecular biology of DNA, technical aspects of DNA profiling, and interpretation

¹² *Ibid*

¹³ John M Butler, *Fundamentals of Forensic DNA Typing* 1st Edition (2009)

of DNA evidence in a forensic context. Butler's work is foundational in understanding genetic markers, PCR techniques, and how DNA is analyzed in criminal investigations. It is widely regarded as a technical manual for forensic practitioners, students, and scientists dealing with DNA evidence. Dr. S. Subramanian's book provides a broader overview of various forensic science techniques used in criminal investigations, not limited to DNA analysis.

- ii. Butler's book is highly detailed regarding DNA technology. It covers topics such as STR markers, Y-STR, and mitochondrial DNA analysis, providing readers with an in-depth understanding of how DNA evidence is processed. In contrast, Subramanian's book only provides a basic overview of DNA analysis among other forensic techniques. While DNA is mentioned, it is not explored with the depth or specificity seen in Butler's work.
- iii. John M. Butler's book is aimed at forensic scientists, DNA analysts, and students who are specifically focused on DNA technology. It assumes a prior understanding of genetics, biochemistry, and laboratory techniques, making it more suited for an audience that is already familiar with the basics of forensic science. Dr. S. Subramanian's book target audience is broader, including students, law enforcement professionals, legal practitioners, and individuals interested in general forensic science.¹⁴

4.3 Comparing this Book with other literature of same Author

Dr. S Subramanian has authored multiple works in the field of forensic science, each contributing uniquely to the broader understanding of the discipline. The book that will be compared is:

Industrial espionage causes and cure by Dr S Subramanian

Book Details:

- **ASIN:** B0072I071K
- **Publisher:** Manas Publication; 1st edition (1 January 1998)
- **Language:** English
- **Hardcover:** 455 pages
- **Reading age:** 7 years and up
- **Item Weight:** 980 g

¹⁴ *ibid*

- **Dimensions:** 24.8 x 16.3 x 3.3 cm
- **Country of Origin:** India¹⁵

Dr. S. Subramanian's works, "Industrial Espionage: Causes and Cure" and "Forensic Science in the Investigation of Crime," explore two distinct but critical areas of security and investigation. While both books focus on criminal behaviour, they differ significantly in subject matter, methods of investigation, and implications for law enforcement and industry. Industrial Espionage: Causes and Cure book focuses on corporate crime, particularly the theft of trade secrets and intellectual property. It deals with espionage carried out by individuals, rival companies, or foreign entities to gain competitive advantages in the business world. The book addresses economic espionage and outlines methods for identifying and preventing the leakage of proprietary information. Forensic Science in the Investigation of Crime book focuses on criminal investigations related to traditional crimes such as murder, theft, fraud, and other types of offenses where forensic science techniques (DNA analysis, ballistics, etc.) are used to gather evidence. It covers scientific methods to assist law enforcement in criminal investigations, ensuring the apprehension of suspects and justice delivery. Industrial espionage deals with white-collar crimes within the business and corporate sectors. The impact is largely financial and economic, affecting companies, industries, and sometimes national economies. Forensic Science book addresses a wide range of criminal offenses that involve physical harm, theft, or violation of laws. The scope is broader, dealing with violent crimes like homicides, rapes, or robberies, as well as non-violent crimes such as fraud and property crimes.

The impact of industrial espionage is felt at an economic level, with the potential for companies to lose millions due to stolen trade secrets. It can also result in a loss of competitive edge for businesses and affect entire industries. The impact of the crimes discussed in this book is more societal and personal, involving victims of violence or theft and the broader impact on communities. The book focuses on how forensic science can help bring justice to victims and deter future crime.

¹⁵ Dr S Subramanian, Industrial Espionage: Causes and Cure (Ed 1 1988)

While both books by Dr. S. Subramanian explore the realm of criminal activity, “Industrial Espionage: Causes and Cure” is more concerned with economic crimes in the corporate world and preventive strategies, whereas¹⁶ “Forensic Science in the Investigation of Crime” deals with traditional crimes and the scientific investigation techniques that follow the commission of a crime. Both books are invaluable resources within their respective fields, providing comprehensive insight into how different forms of crime are investigated and managed, but their focus, techniques, and audience differ significantly.¹⁷

5. CONCLUSION

In conclusion, "**Forensic Science in the Investigation of Crime**" by Dr. S. Subramanian is a comprehensive and insightful exploration of how scientific principles and methods are applied to solve criminal cases. The book effectively bridges the gap between law enforcement and forensic science, offering detailed explanations of various forensic techniques, such as DNA profiling, fingerprint analysis, toxicology, and ballistics, all of which are crucial in modern criminal investigations.

Dr. Subramanian’s work stands out for its practical approach, utilizing real-life case studies to illustrate the importance of forensic evidence in securing justice. He underscores the role of forensic experts and the ethical challenges they face in ensuring the integrity and reliability of evidence. Moreover, the book discusses the advancements in technology that have revolutionized forensic science, while also addressing the challenges of resource limitations and the need for proper training and expertise in the field.

The key takeaway from the book is the indispensable role of forensic science in the criminal justice system. It highlights not only the technical aspects of forensic investigations but also the importance of maintaining high standards of professionalism, accuracy, and ethics. Overall, "**Forensic Science in the Investigation of Crime**" is a valuable resource for law enforcement professionals, forensic scientists, legal practitioners, and anyone interested in the application of science to law. It is an essential read for understanding the critical role forensic science plays in modern-day crime-solving.

¹⁶ *ibid*

¹⁷ *ibid*

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