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Recent Trends in Crime Scene Investigation: Inclusion of Forensic Science under New Criminal Law

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Abstract: *The recent introduction of new Criminal Law in India is considered as the most momentous event in the annals of criminal justice administration. The inclusion of forensic visit to the crime scene and video recording of the entire procedure done at the scene of occurrence is now become mandatory in all criminal cases where the punishment is more than seven years. This eventually brought a sea change in terms of conducting forensic crime scene investigation by the police with the assistance of an expert. The underlying object is to collect vital clue materials and physical evidence found in crime scene with the help of scientific techniques. The systematic crime scene investigation involves various scientific procedures to be performed by experts at the crime site adopting novel methods with the aid of forensic tools*.

Keywords: Physical Evidence, Forensic Expert, Crime scene reconstruction, Crime scene survey, Preservation of evidence, Forensic visit.

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1. Introduction

The modern investigation pattern followed by the contemporary law enforcement agencies is predominantly based on scientific methods of crime detection. The crimes are solved by forensic techniques with sophisticated tools. The crime scene is examined by collection of various forensic evidence which acts as a vital clue for investigation. The first and most important step in every criminal case is investigating the crime scene. The primary obligation of a forensic expert is to identify physical evidence available in crime site. One of an expert's prime responsibilities is to gather, preserve, package, and send material evidence from the crime scene to the forensic lab. The concept of crime scene investigation largely rests on the Theory of Exchange propounded by French criminologist Edmond Locard. The core idea of this forensic principle is that a forensic scientist can identify and examine traces left at the crime scene as an effect of the elements that are exchanged when two items come into touch. Investigators are able to link perpetrators to victims, physical evidence, and the crime scene due to the rationale underlying this theory. With the introduction of new Criminal Laws the legislators have taken every effort to include forensic visit at crime scene as mandatory procedure in all offences where the punishment is more than seven years.

2. Crime Scene Investigation: A Scientific Approach

The most important initial stage in every criminal case is crime scene investigation.[1] In crime scene investigation (CSI), the crime scene is systematically searched, closely observed, and documented; the scene is photographed and sketched; and physical evidence at the crime scene is identified, processed, and collected.[2] The forensic investigation done with the help of an expert at the crime site is the foremost important aspect in collection of any evidence. In addition to the mechanical aspects of scene security, scientific crime scene investigation calls for more dynamic approaches like scene survey, scene analysis, proposition development through the connection of the scene, physical evidence, and people, and crime scene reconstruction.[3]

[1]Crime Scene Investigation – A Guide for Law Enforcement, Research Report submitted by Technical Working Group on Crime Scene Investigation, U.S. Department of Justice, January 2000, pp.1-3.

[2]See generally, Johann Paolo S Resurreccion, "Effectiveness of Scene of the Crime Operation Response", *IJESC*, Vol.9, Issue No.3, 2019, pp.20411-20416.

[3]Lee HC, Palmbach TM, Miller M (2001) *Henry Lee's Crime Scene Handbook*, Academic Press, San Diego, CA.

The scientific process of CSI encompasses the systematic, meticulous, and analytical examination of the crime scene.[4] The process commences with the forensic expert's early response to a crime scene and progresses through scene security, documentation, identification of physical evidence, enhancement techniques, collection, packaging, preservation, examination, and concludes with crime scene reconstruction.[5] The primary aim of crime scene evidence collection is to gather any items that may be interpreted as evidential in any plausible method.[6] The material evidence thus collected has to be forwarded to forensic laboratory for further analysis so as to enable the expert to furnish his opinion before the court during trial. The probative value of evidence depends upon the qualitative factors that are followed by experts while collecting the clue materials at crime scene. The forensic samples collected must be free from contamination and for this the crime scene has to be prevented from unnecessary tampering. Therefore it is *sine qua non* that the scene of occurrence will have to be preserved unaltered and undisturbed, for the examination by the experts.[7]

3. Principles of Crime Scene Investigation

Identifying, recording, gathering, preserving, analyzing, and reconstructing all pertinent physical evidence at crime site are the goals of crime scene investigation. For the investigative agencies to conduct investigations into the criminal cases, the physical evidence inspection has to offer valuable information. A proper crime scene investigation is defined by the combination of these criminal investigative goals with the analysis of forensic evidence. Crime scene investigation helps in collecting physical clue material at crime scene that links victims and suspects, the objects used for commission of crime and the place of crime. The gathering of forensic evidence during investigation enhances the evidential value during criminal trial. The basic principles of crime scene investigation can be explained with the help of Transfer Theory in the following diagram.

Figure 1: Transfer Theory in Forensic Science.

The Transfer Theory or Principle of Exchange as postulated by Edmond Locard states that the forensic scientist can identify and examine the materials that are exchanged when two entities come into contact. The relationships between a crime scene, a victim, a suspect, and a physical evidence are dealt with by the Theory of Exchange. For investigative purposes and for collection of forensic evidence a crime scene is classified into two types as primary and secondary crime scene. A primary crime scene is the original site where crime is committed first and the secondary crime scene is a microscopic crime scene where minute trace evidences are gathered around within the overall crime scene field.[8] The above theory underlines that every contact leaves a trace is considered as the fundamental and basic in Forensic Science.[9]

4. Collection of Physical Evidence at Crime Scene

The term physical evidence can be categorized based on the type of crime committed, the nature of evidence, its physical condition, or the case that has to be investigated.[10] It is to be noted that some material evidence tends to be destroyed unless proper care is taken while collecting the samples at crime scene.[11] Therefore, a crime scene investigator should be aware of the importance of physical evidence and its limitations, understand how different types of crime scenes interact, be thoughtful of the theory of transfer, and know the right techniques for identifying microscopic crime scenes among the more visible macroscopic crime scenes. The collection of forensic evidence at the scene of occurrence *interalia* include the objects or weapons used for commission of crime, any material such as gunshot pellet located in the body of a victim or pattern of bloodstain etc. Therefore, the simplest way to define physical evidence is that any evidence which might offer a helpful clue for the investigation of the crime.[12]

In cases of death careful examination of the scene of occurrence is very important. The preservation of crime scene, proper photography, meticulous sketching, proper collection and forwarding of evidentiary clues to forensic laboratory assumes vital significance.[13] There are certain basic instructions which every investigator shall follow while collecting material evidence from place of crime. The weapons should be lifted and handled in a unique way. Any bloodstain on the weapon should be allowed to

[4]Henry C. Lee, Elaine M. Pagliaro, "Forensic Evidence and Crime Scene Investigation", *Journal of Forensic Investigation*, 2013; 1(1): 5; John Louis Larsen, "The Importance of Evidence Collection Guidelines in Developing a Prosecutable Case", *The Prosecutor*, 2011, pp.29-36.

[5]*Supra* note 3.

[6]Fisher B, Fisher D (2012) *Techniques of Crime Scene Investigation*, CRC Press, Boca Raton, FL.

[7]C.E. Pratap, (2015) *Scientific Evidence in Criminal Investigation*, CTC Publications Pvt. Ltd, Chennai, p.225.

[8]Anna S. Knes, Madeleine de Gruijter, Matthijs C. Zuidberg, Christianne J. de Poot, "CSI-CSI: Comparing several investigative approaches toward crime scene improvement", *Science & Justice*, Volume 64, Issue 1, 2024, pp.63-72.

[9]Mummery D. "Every contact leaves a trace", *British Journal of General Practice*, 2021, Oct 28;71 (712): 512.

[10]Lee HC, Harris H (2011), *Physical Evidence in Forensic Science*, Lawyers and Judges Publishing Co., Inc, Phoenix, AZ.

[11]Dr. Kanak Chandra Baruah (2016), *Forensic Science for Crime Investigators*, Purbanchal Prakash, Guwahati, p.24.

[12]Lee HC, Palmbach TM (2006), "Crime Scene Management" in *Forensic Science and Law*, (ed. by Cyril Wecht and John Rago), CRC Press, Boca Raton, FL, pp.577-593.

[13]B.R. Sharma (2014), *Forensic Science in Criminal Investigation &Trials*, Universal Law Publishing, Haryana, p.1345.

dry and garments with bloodstain, seminal stain, vaginal discharge etc. should be dried properly before packing and stained areas should be marked.[14] The experts must ensure that the biological materials and bodily samples like finger print, blood, semen, saliva and tyre marks on the road etc. which are likely to be destroyed easily need to be cautiously preserved. The forensic scientist must collect every suspicious material at the crime scene even if it is of little use for the purpose of investigation and shall not leave any piece of evidence found available at crime site.

5. Crime Scene Sketching and Photography

The crime scene investigation team shall be formed in every criminal case comprising of a forensic expert, the crime scene photographer, police and other persons who are required to assist the team. Crime scene sketching and photography is considered as a significant step in investigation. The crime scene sketch exactly depicts the physical facts recounts the sequence of events at scene of occurrence.[15] Crime scene sketching include preparation of rough sketch and observation mahazar by the police. The rough sketch forms part of the case diary maintained by the investigation officer in every criminal case.[16] Sketching the crime scene is a way to pictorially show where things were found once a person leave the scene. The sketching of crime scene involves measurement of distances between relevant objects, plan the area, trace the objects and evidence within the outline.[17] It includes measuring of all items, locating furniture and fittings, and recording of room dimensions from fixed points.

Crime scene photography is technical photography which records the original crime scene and related areas. The photographs are taken to give an overall view of the scene of occurrence. The two categories of photos are generally taken at crime scene containing overall view and photos of items of evidence are photographed with a scale. Photographs are employed as documentary evidence in criminal cases and are intended to preserve the first appearance of physical evidence. The admissibility of photographic evidence depends on the major parameters such as the item being photographed has to be pertinent to the subject in hand; it also needs to be distortion-free and not distort the scene or the object it is meant to depict.[18]

6. Crime Scene Evidence *vis-à-vis* Forensic Utility

Laboratory analysis and the identification of physical evidence can be useful in guiding the investigation in the right direction. Forensic evidence gathered at the crime site has several uses. Material evidence serves as a crucial clue for investigators and allows experts to conduct scientific analysis on samples taken from the crime scene. Not every kind of physical evidence that is visible may be used to promptly link or connect to a suspect. However, identifying unknown substances is the most frequent application of physical evidence collected at crime scenes.[19] A seven-layer paint chip from the victim's clothes, for instance, can be utilized in a hit-and-run investigation to help determine the kind and quantity of vehicles that may have been involved in the collision. The amount of time spent on an investigation might be significantly decreased by using these data and vehicle databases.[20] A possible suspect may be identified using the DNA profiles from the semen stain in a victim's rape kit.

The crime scene investigator must ensure the chain of custody and preserving the evidence collected from the crime scene.[21] The primary goal of scrutiny of physical evidence is to give the investigator relevant information so they can look into cases. The definition of a proper scientific crime scene investigation is the meeting point of these goals and the analysis of forensic evidence. Physical evidence gathered from the crime scene is examined in a laboratory to provide forensic reports, which are decisive for both the criminal investigation and the courtroom trial process.[22] As a result, it is necessary that the investigation, documentation, gathering, and handling of crime scenes be done in a methodical manner using uniform, established procedures. The changing protocols and time hiatus undesirably affect the examination of evidences in the laboratories which leads to erroneous results.[23]

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[14] *Supra* note 11 at pp.24-25.

[15] Dr. Gupta & Agrawal (2013), *Forensic Science in Criminal Investigation & Trial (Prosecution and Defence)*, Premier Publishing Company, Allahabad, p.220.

[16] Chapter XIV, Rule 216 of Tamil Nadu Police Standing Orders.

[17] *Supra* note 15 at p.221.

[18] *Supra* note 13 at p.256.

[19] Peterson J (2005) *Census of Publicly Funded Forensic Crime Laboratories, 2002*, Bureau of Justice Statistics Bulletin (NCJS 207205, 2005). US Department of Justice, US Bureau of Justice Statistics, Washington DC.

[20] Bowen, R. Schnieder J (2007) "Forensic Databases: Paint, shoeprints and beyond", *NIJ Journal* 258: 34-38.

[21] Chain of custody pertains to the record-keeping procedure that enables the monitoring of evidence from the time it is received until it is analyzed and then released from the laboratory's control. The term 'chain of custody' or 'chain of evidence' refers to the continuity of possession or custody of evidence, as well as its movement and location, from the point of discovery and recovery in the crime scene or person, to its transportation to a laboratory for examination, and finally to its acceptance and admission in court. A piece of evidence's integrity is demonstrated by its chain of custody. See gen. Benner J. "Establish a Transparent Chain-of-Custody to Mitigate Risk and Ensure Quality of Specialized Samples". *Biopreserv Biobank*. 2009 Sep;7(3):151-3; Larry Quarino, Robert Wilson, *et.al.* "Quality assurance in forensic biology laboratory", *Forensic Sci. Int* 68(1994):17-28; Tomlinson JJ, Elliott-Smith W, Radosta T. "Laboratory information management system chain of custody: reliability and security", *J Autom Methods Manag Chem.* 2006; 2006:74907. doi: 10.1155/JAMMC/2006/74907. PMID: 17671623; PMCID: PMC1903459; Evans MM, Stagner PA, Rooms R. "Maintaining the chain of custody - evidence handling in forensic cases". *AORN J.* 2003 Oct;78(4):563-9. doi: 10.1016/s0001-2092(06)60664-9. PMID: 14575182.

[22] *Supra* note 10.

[23] Gaur J R, Kathane J. Prachi, and Prakash Shakti, "Scene of Crime Management – Problems and Practices", *International*

The scene of crime must be preserved and it should be free from contamination. The forensic experts must strictly adhere to contamination control practices by restricting the access of people into the crime site and secure the whole area by preventing entry of any foreign bodies.[24]

7. Mandatory Forensic Visit – A New Inclusion under Criminal Law

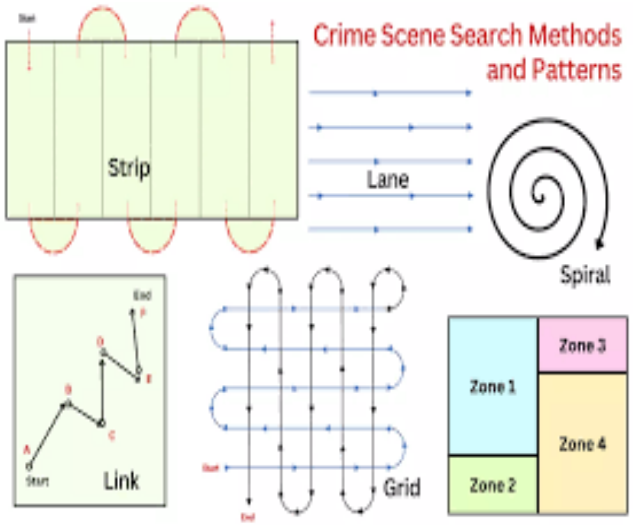
The newly enacted Bharatiya Nagarik Suraksha Sanhita, 2023[25](BNSS) has made the forensic visit mandatory in all offences where the punishment is more than seven years. When an officer in charge of a police station receives information about the commission of an offence that carries a sentence of more than seven years, they must arrange for a forensic expert to visit the crime scene, collect forensic evidence, and video record the proceedings on a mobile phone or other electronic device. This new inclusion is regarded as one of the key changes that criminal law has ever undergone. After inserting this provision under BNSS now a legislative backing is given to forensic evidence which emphasizes the need of crime scene investigation. The above provision is a welcoming step ahead in forensic science which facilitates for scientific method of investigation of crime. The wisdom of the drafters of the new Criminal Law could thus be envisioned from an overall outlook that forensic discipline is gaining momentum in the recent times. This specifies that any offence committed hereafter where it fits within the prescribed sentence as stated *supra* has to certainly come under the domain of forensic experts entrusted with the task of crime scene investigation by virtue of this statutory mandate.

8. Crime Scene Reconstruction: An Integral Facet of CSI

The reconstruction of crime scene is the last phase of forensic analysis. Investigational data, crime scene data, and laboratory examination of the tangible evidence are all used in the reconstruction process. Reconstruction is described as a procedure that applies both deductive and inductive reasoning.[26] When several forms of physical evidence, pattern information, analytical findings, investigative information, and other documented evidence are combined into a single entity, it is regarded as a difficult task. The aforementioned limitations restrict the quantity of information that a reconstruction may offer.[27] Crime scene investigation is an integral component of forensic system. Reconstructing a crime scene requires looking at a scene scientifically and interpreting the evidence from scene patterns. It entails researching relevant material and developing a theory logically.[28]

9. Crime Scene Survey and Methodological Search for Forensic Evidence

Crime scene after being protected should be methodically surveyed by the team of forensic experts to ensure that they do not miss out any physical evidence available at the scene of crime. In conducting methodic search for clue materials there are four major methods commonly followed by forensic experts. They are (1) strip method, (2) spiral method, (3) zone (or) quad method and (4) wheel method.[29] These methods are pictorially explained for easy understanding as follows.



The above diagram is only self explanatory and the forensic scientist who visit the scene of crime has to take a decision as to the selection of which of the particular method he prefers for searching of evidentiary clues amongst the patterns depending upon his convenience. These crime scene search patterns guides the experts in collection of evidence at the scene of occurrence. As stated earlier apart from primary crime scene survey a methodic crime scene investigation involves various scientific procedures to be performed by experts at the crime site adopting novel methods with the aid of forensic tools.[30]

10. Conclusion

The Indian criminal justice system has benefited greatly from technical advancements in the arena of forensic science. The recent inclusion of mandatory forensic visit under the new Criminal law is an appropriate initiative rightly taken in this regard. There is a ray of hope that in the days to come crime scene investigation will be part and parcel in every trial. The application of scientific

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[24]Hayden B. Baldwin and Cheryl Puskarich May, "Crime Scene Contamination Issues", Available at: https://www.crime-scene-investigator.net/crime-scene-contamination-issues.html. (Last visited on 02/01/2025).

[25]Section 176 (3) BNSS.

[26]*Supra* note 3.

[27]Miller, M (2009) "Crime Scene Investigation", pp.167-188 in *Forensic Science: An Introduction to Scientific and Investigative Techniques* (ed. by Stuart James and Jon Nordby), 3rd ed., CRC Press, Boca Raton, FL.

[28]Henry C. Lee, Elaine M. Pagliaro, "Forensic Evidence and Crime Scene Investigation", *Journal of Forensic Investigation*, 2013; 1(1): 5.

[29]Dr. Rukmani Krishnamurthy, (2020) *Introduction to Forensic Science in Criminal Investigation*, Selective & Scientific Books, New Delhi, 3rd Ed., pp.51-52.

[30]Sarita Jand, (2017) *Forensic Science and Law*, New Era Law Publications, Haryana, p.36.

techniques in criminal investigation becomes inevitable. The law has to keep in pace with the recent developments in the society. In that way the present legislation will be supplanting the earlier enactments that were in place. Every investigator must keep in mind that the forensic clue material collected by them at the crime scene will be the potential aid for investigation and it acts as a supporting evidence in criminal trial. Therefore due care must be given while conducting investigation at the crime scene thereby ensuring that the vital forensic samples are free from contamination and they reach the laboratory expeditiously to avoid tampering. It is also the need of hour that institutional regulatory mechanisms are to be devised for the forensic labs and expert scientists who handle the physical evidence. The quality control protocols are to be strictly implemented to achieve reliable results. The courts shall also appreciate the scientific evidence and the admissibility standards insofar as this branch of evidence must be properly followed by the trial courts.