CHAPTER 1

ADMISSIBILITY OF SCIENTIFIC EVIDENCE: AN INTRODUCTION AND HISTORICAL BACKGROUND

As a hunter tracks a wounded beast to its liar by its drop of blood, so let a king track crime to justice by closed searched food.

Manu’s Law Code (About 200 A.D.)

1.1 OVERVIEW

Man is a social and rational animal. Since inception of the mankind, man has always been interested in improving everything he has come across, anything which has come to his thoughts and everything that has been invented or discovered by him. All this has been because of man’s ability to think which allows him to attain perfection in life. All the energies that are within man, he utilizes to achieve perfection in anything and everything. The process of thinking gives birth to both positive as well as negative ideas. Negative ideas in today’s transitional society is genesis of crime, to deal with which every civilized nation has a set of rules called ‘law’. The word ‘law’ literally means rule of action established by authority. Its origin can be traced back to the times when the man, abandoning his individualistic way of life and his abodes on trees and in caves, came together to join hands, with others of his race and decided on a ‘group’ living. Sociologists connect this grouping of individuals with the development of agriculture which compelled the man to socialize his race and integrate efforts to cope with the needs of the agricultural revolution. The group-living enabled man to share materials and information. If we try to single out the cause, responsible for the civilization of man, it will be the decision to form ‘society’. The superior mental faculty of the human race, the phenomenon which has singled out Homo Sapiens from

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all other forms of life, endowed with the capacity to think and coupled with the
collectivization and carry over of knowledge from one generation to another soon
distinguished this one species from 5 million other forms of life that stalk this planet
making man the master of the Universe. It goes without saying that human beings have
an edge over all forms of life on the earth, as they are bestowed with the ability to think,
analyze and act accordingly.\(^5\)

While the social form of living led to steady increase in the competence of man
and swelled his funds of information, it generated many problems as well. There soon
developed a conflict between the law of biology and the needs of the social systems.
Man being a biological entity is also born with such inherent instincts which make him
a selfish system and give him concern for self-preservation. However, social systems
demand a conduct from every individual which, while serving his own purpose, would
not cut across the interests of any other human being\(^6\).

But since the beginning of human race crime in some form or other has existed.
With the progress of science and development of technology the notion of crime as well
as the methods used by criminals in commission of crime has undergone a phenomenal
transformation\(^7\). The very nature of crime itself has undergone complete transformation.
There is a conceptual shift in the terms of the costs of the criminal behavior and the
forms of criminality\(^8\). In the present era most of the human activities are carried with the
aid of modern technology as a consequence dependence of humans on technology is
increasing. In the celestial cosmos, the scientific and technological advancement has
assumed vast proportions, which were unimaginable a few decades ago\(^9\). The last
century has witnessed the maximum advancement in the field of technology leading to
dependency of every governmental affair, business activity and masses around the
world on technology\(^10\). In such a scenario the threat of crime is among the worst fears.

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\(^8\) Amita Verma, p 32.
\(^9\) M. Ponnaian, *Cyber Crimes, Modern Crimes and Human Rights*, P R P Journal of Human Rights,
Criminals are getting sophisticated day–by–day. They take help of hi-fi technology in commission of crimes. They are taking help of scientific technology to such an extent that within the time period of few seconds they remove themselves from crime-scene and mostly with no-evidence at crime site.

At the same time, in India, here, criminals are classy but laws are not. The legal procedure is mainly based on the Constitution of India, Indian Evidence Act, Code of Criminal Procedure, Code of Civil Procedure and Indian Penal Code. Cases are decided in India on the basis of adduced evidence. Crime detection, discovery, identification and analysis of criminal evidence are the means of law enforcement. The prosecution has to prove the guilt of accused beyond reasonable doubt. It is the responsibility of the law enforcing agencies to detect crime, apprehend perpetrators and to provide such evidence which result in conviction of criminal. India has enough legislation on various crimes but they are not latest. The laws prevalent are centuries old. To keep pace with changing needs of society, every other day a new law is passed by the Parliament. But, these laws are passed often after commission of new heinous crimes. India does not work in advance. To a certain extent it is tried to fit new crime committed into category of crimes already defined, similar to ‘Pigeon-hole’ theory by Salmond, which is referred mostly for law of torts. In this theory, liability arises only when the wrong done is covered under any of the existing tort\textsuperscript{11}. However, this was done centuries ago in civil law but India is doing this in 21\textsuperscript{st} century that too in criminal law. As for instance, before the Criminal Law (Amendment) Act, 2013, ‘acid-attacks’ were dealt with under Section 320 of the Indian Penal Code, 1860. Now when this crime reached its heights, section 326-A is added for which punishment not less than 10 years and which may extend upto life imprisonment and fine reasonable to meet medical expenses of the victim may be imposed. What can be said of this- Law changing with the changing needs or irony of biggest democracy of the world?

No doubt, detection of crime is difficult and it requires painstaking effort by a number of agencies. And now with the introduction of computers, mobile phones, internet services, etc. crime is increasing to a greater extent also, in addition to it

nevertheless in most of the parts of India, climatic, infrastructure and functional shortcomings create special difficulties in crime-detection. But sad part is on one hand the intelligent criminal has been quick to exploit science for his criminal acts, notwithstanding still on the other hand the police investigator is relying on his age-old art of interrogation, to detect crime. Where criminals are using sophisticated means for commission of crimes authorities are still dependant upon age old methods of investigations and evidence collection. In this changed scenario of crimes and criminals there is a need to use and take help of new scientific techniques and tools for investigation of crimes.

1.2 REVIEW OF LITERATURE

Researcher has gone through a considerable number of books and has reviewed articles on the topic of research.

Books:

Satyendra Kumar Kaul and Mohd. Hasan Zaidi, in the book “Narco-analysis, Brain-Mapping, Hypnosis and Lie Detector Tests in interrogation of Suspect”, published by Alia Law Agency, Allahabad in the year 2008, have analysed modern techniques exhaustively one by one. This book defines each scientific evidence, procedure of conducting these tests and law prevalent in various countries. In this book authors have peeped deep into historical aspect of evidence. They have discussed how term ‘evidence’ came into existence, meaning of the term ‘science’, application of science in medico-legal stream, meaning of scientific evidence and how far scientific evidence is admissible in India and other countries.

Jaising P. Modi, in his book “Medical Jurisprudence and Toxicology”, New Delhi: LexisNexis, 2008, deal with forensic science, its history, legal procedure, medical witnesses and evidences. Author has given reference of various case laws where science is used in daily routine in courts of law. Various scientific tests that are conducted to detect age, cause of death, method of causing death, etc.

Lyon, “Medical Jurisprudence and Toxicology”, Delhi: Delhi Law House, 2008, deals with criminal procedure, medical experts, etc and has laid down a number of cases
relating to relation of medical science with courts of law and criminal justice system. Author has given reference that science is used regularly in one way or other in courts of justice. Investigation is dependent on science.

**Nayan Joshi** in the book “Medical Jurisprudence and Toxicology”, New Delhi: Kamal Publishers, enclose a chapter on Narco-analysis which discuss to a sufficient length Polygraph and Brain Mapping and Narco-analysis. Author has given traced the history of such tools, how they are conducted, uses of such techniques and that they are inadmissible in the courts of law.

**Apurba Nandy**, “Principles of Forensic Medicine”, Calcutta: New Central Book Agency, gives precise knowledge about forensic medicine, legal procedures in medico legal cases, legal aspects of practice of medicine. Author has stated that courts of law are incomplete without forensic science. It is tools of forensic science only that help courts to arrive at correct decision and in efficient distribution of justice.

**P. Venkatesh**, “Police Diaries; Statements, Reports and Investigations with special reference to Scientific Evidence, DNA, Brain-Mapping Tests, Narco-analysis, Forensic Science and Cyber Crimes”, Allahabad: Premier Publishing Company, 2008, is a book which gives precise information about the scientific tools of investigation, how police authorities use them to apprehend criminals, how scientific tools of investigation assist courts and still some of the modern techniques are regarded inadequate and unreliable.

**Satish Chandra**, “Indian Evidence Act, 1872”, Faridabad: Allahabad Law Agency, 2012 is a comprehensive book on Evidence Law, author has discussed in detail different aspects of evidence, its admissibility and relevancy. Topic of research has been touched by the author and author has regarded it as inadmissible in the light of decision of honourable Supreme Court.

**Batuk Lal**, “The Law of Evidence”, Allahabad: Central Law Agency, 2012, has laid down in detail various types of evidence, standard of proof in civil as well as criminal cases and like facts. What type of evidence are admissible, case laws supporting admissibility in courts. Recent cases are discussed by the author and stated that these techniques are inadmissible.

**Durga Dass Basu**, “Introduction to the Constitution of India”, Gurgaon: LexisNexis, 2013, has touched the topic of research in the light of relevant provisions of the Indian Constitution. Author has stated that narco-analysis, brain mapping and polygraph tests are violative of provisions of Indian Constitution and hence invalid and inadmissible in India.

**Articles:**

Likewise, researcher read a good number of articles on the research topic. As for instance:

**Avani Bansal and Ruchi Mehta**, ‘March of Science and Technology- Wither Indian Evidence Law?’ *Criminal Law Journal*, April 2010, pp.102-109. In this article, authors have traced the journey of Indian Evidence Act. Various amendments acknowledged by the Act have been enumerated in the article along with the areas where silence of the Act along with techniques is deafening.


**Caesar Roy**, ‘Narco-analysis Test- Infringement of Individual Fundamental Rights and its Value as Evidence’, *Criminal Law Journal*, March 2009, pp. 69-72. In this article, author has discussed the pros and cons of Narco-analysis test in detail underlining the meaning, historical perspective and procedure to conduct the test. He wrapped up saying that necessary amendments in the existing laws should be made or new laws should be enacted to make Narco-analysis compulsory where interest of the public is involved.

Narco-analysis is against the notion of liberty, humanity and fundamental rights and will not be an effective tool for crime detection.

**K.O. Swapna**, ‘Narco-analysis- Legal and Human Right Aspects’, *Civil and Military Journal*, pp 208-216. In this article, author has pointed out obstacles in the way of Narco-analysis. Author has also referred various case laws that go in favour of Narco-analysis and has concluded that law should also change according to the needs of the society.


**Tathagata Choudhury**, ‘Narco-analysis and Article 20 (3): Blending the Realm of Individuals and Societal Rights’, *Criminal Law Journal*, January 2010, pp. 28-32. In this article, the author has discussed the philosophy behind right against self incrimination and position of Narco-analysis in U.S.A and concluded that in order to resolve the conflict, there is need to give wider interpretation to A 20(3).

### 1.3 RESEARCH GAP

Researcher is of opinion that the books and articles available on the topic of research generally explain the scientific techniques, their procedure, various aspects of law in the light of existing statutes and long established doctrines but somehow there is need to decode the existing statutes broadly to blend new scientific investigation tools and age old laws so as to facilitate the police and other investigating agencies in the administration of justice to detect, reveal and expose high-tech crimes and sophisticated criminals in the present scenario. No work has been done yet in view of researcher.

### 1.4 IDENTIFICATION AND FORMULATION OF RESEARCH PROBLEM

While highlighting the concept of scientific evidence in criminal administration of justice, it seems an area of research to make an analysis of scientific evidence i.e. evidence adduced through Narco-analysis, Polygraph and Brain-Mapping and to see its pros and cons. In order to advance the steps towards the research topic many
observations has come out from judicial as well as prosecution means. In countries like United States, Canada, Israel scientific evidence like Polygraph and Brain-Mapping are highly considered as accurate and reliable means of administration of justice. In Great Britain, in the year 2004 a law was introduced making it mandatory for each and every sex offender to go through the polygraph test before letting him loose from detention.

In India, majority of high courts and lower courts favour these means of evidence collection. In many of the cases like Ranjitsing Brahjaeeet Singh Sharma v. State of Maharashtra\textsuperscript{12}, Smt. Selvi and others v. State of Karnataka, etc Supreme Court has disclosed its mind for reliability of scientific evidences. In Ranjitsing Brahjaeeet Singh Sharma, the Supreme Court pointed out that admissibility of scientific test will depend upon its authenticity. In Smt. Selvi and others v. State of Karnataka, Supreme Court laid down a rule that police and other agencies can conduct these tests but with the prior permission of witnesses, suspect or accused as the case may be. In Ra\textit{mchandra Ram Reddy v. State of Maharashtra}\textsuperscript{13}, Bombay high court held that polygraph test does not result in making any incriminating statement by accused and subjecting accused to polygraph without consent does not amount to violation of A20 (3). Reason being protection under Article 20 (3) is against testimonial compulsion. It is protection granted to the use of statement. In polygraph test there is no statement so question of self-incrimination does not arise.

Even though there are many arguments from the institutions of administration of justice, still there is no any space for such like evidences in Indian Penal Code, 1860, Criminal Procedure Code, 1973 and Indian Evidence Act, 1872. As per the knowledge, no research has been conducted on the admissibility of such like evidence under Indian Evidence Act. Many times investigations agencies collect the evidence by such type of scientific evidence which becomes futile exercise by them when it is declared not admissible. Such type of provisions of law may create hindrances in the administration of criminal justice. Research will be focused on relevancy and admissibility of these evidences.

\textsuperscript{12} 2005 Cri. L.J. 2533
\textsuperscript{13} 2004(1) Bom CLJ(Cri) 651
1.5 SIGNIFICANCE OF THE STUDY

The present study is an attempt to analyse the need of advance and latest scientific methods of investigation. As criminals are getting classier, these deception detective techniques are very helpful in exhuming the truth from sophisticated as well as from hard-core criminal especially when it comes to white-collar crimes; police are increasingly looking to forensics to help them keep up to date.

Irony of modern jurisprudence is that there are many to defend the rights of the accused while none to defend the public cause and interest. An announcement was made by the Union Minister on March 20, 2007 that amendments will be made in the law to make data retrieved from scientific tools admissible in court. But the big question is, are forensic tests advanced enough to prove dependable and whether laws should be amended to manage such techniques?

In *Smt. Selvi Murugeshan and others v. State of Karnataka*, Karnataka High Court held that investigation under Section 2 (h) of Code of Criminal Procedure, 1973 includes collection of evidence and Narco-analysis is a procedure of collecting evidence.

In *Dinesh Dalmia v. State*, Madras High Court held that Conducting Brain-Mapping, Polygraph and Narco-analysis are like taking MRI and CT scan and their credibility can be evaluated during trial. This is the high time to use the scientific techniques of investigation as against the use of third degree methods.

Dispensation of justice through legal system has become much dependant on the medical science but how far this medical knowledge is admissible is still a controversial issue. An attempt would be made to give some suggestions so that such type of evidence should become a part of administration of justice.

1.6 OBJECTIVES OF THE STUDY

The study is conducted keeping in mind the following objectives and purposes:

1. To find out the historical development of Polygraph, Narco-analysis and Brain-Mapping techniques in administration of criminal justice.

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14 2006 Cri LJ 2401(Mad)
2. To see the present status of such like tests under Indian Evidence Act.

3. To see the relevancy and admissibility of Polygraph, Narco-analysis and Brain-Mapping under Indian Criminal Law.

4. To conduct a comparative study with some of other countries.

5. To highlight the jurisprudential norms on such type of scientific techniques.

6. To see the obstacles that blocks the use of these scientific techniques.

7. To give an analytical look on the topic of research and prove the hypothesis.

1.7 HYPOTHESIS

After formulation and identification of problem it can be well said that many of the countries of the world have codified laws on Narco-analysis, Polygraph and Brain-Mapping but in a country like India, a policy has not been formulated by the government. Such type of tests will serve as path-making in the administration of criminal justice in India. Scientific evidences like Brain-Mapping provide almost 100% accurate results so these can prove to be highly helpful in investigation and detection of crime. In criminal justice system these scientific evidences can successfully get to the bottom of intricate cases. These techniques can help in making administration of justice more accurate and flawless. Even though there are a lot of resentments from different intelligencia of the country, a group of positive schools gave reservations in support of Narco-analysis, Polygraph and Brain-Mapping. After considering various judgments of hon’ble Supreme Court and various High Courts, hypothesis can be forwarded with the observation that such like scientific evidences can play a very vital role in the administration of criminal justice. If the legislature amends the law to include the evidence collected by Narco-analysis, Polygraph and Brain-Mapping it will be proved a milestone in distribution of criminal justice. This hypothesis will be proved by given methodology.

1.8 RESEARCH METHODOLOGY

This research is purely doctrinal and analytical research. While writing thesis the researcher has collected data from books of eminent authors, articles from Law Journals, and websites. Experts who conduct such tests are consulted. Judicial
Pronouncements are referred. References of the following cases in which scientific tests have been performed are given:

1. The prime accused in multi-crore stamp paper scam Abdul Karim Telgi was subjected to Narco-analysis, Polygraph and BrainMapping. He revealed names of leading politicians and police officers during tests. Also, how he had done scam of rupees 32000 crore.

2. Polygraph test was conducted on sitting MLA of Tamil Nadu, her husband and friend in case of honour killing and tests showed the involvement of accused people.

3. Narco-analysis, Brain-Mapping was done on Abdul Karim, the suspect of the attack on the Indian Institute of Science, Bangalore, who disclosed the names of the terrorists who had conducted the attack.

4. Mumbai Blasts case: Narco-analysis was conducted on Ahmad Sheikh and Tanveer Ansari, prime suspects of Mumbai blast case for detection of clue in terrorist mind.

5. Madhur Bhandarkar case, Preeti Jain, an actress was put to lie-detector and brain-Mapping test and contract killer involved, Naresh Pardesi to Narco-analysis test where he revealed that Preeti hired him for eliminating Madhur Bhandarkar.

6. Abhishek Kasliwal’s case: Polygraph and Brain-Mapping was conducted on Abhishek Kasliwal who was accused of raping a 52 year old woman in his car. The tests confirmed the case of prosecution.

7. Abu Salem’s case: Narco-analysis, Polygraph and Brain-Mapping was conducted on gangster Abu Salem which gave new direction to the investigating agencies.

8. Shivani Bhatnagar's case: The Indian Express Journalist Shivani Bhatnagar was murdered in her apartment. To know the reality, Polygraph, Narco-analysis and Brain-Mapping was conducted on her husband, sister, brothers and brother-in-law.
9. Madhumita Shukla’s case: A former minister of Uttar Pradesh, Amarmani Tripathi was subjected to polygraph test on the charges of conspiracy of a murder of a poetess Madhumita Shukla.

10. Nithari case: Narco-analysis, Polygraph and Brain-Mapping was conducted in Nithari’s case of prime accused, Moninder Singh Pandher and his domestic servant Surinder Koli and also on a female servant who allegedly lured children who were killed by duo.\(^{15}\)

11. Aarushi murder case: In Aarushi’s murder case compounder of dentist Dr. Talwar was put to polygraph test by CBI.

Apart from these court nodded its head for conducting these tests in various other high profile cases as for instance in Indira Gandhi Murder case polygraph test was conducted. Recently, in a case of honour killing, Delhi High Court permitted to conduct polygraph test on the family members of the deceased, Monika Dagar. Also, in a case of child swapping in Hyderabad, suspects would be subjected to polygraph test. All these cases are referred.

1.9 RESEARCH QUESTIONS

Following are the questions that were framed for research. Research work has come out with fruitful riposte to all the questions.

Q1. What is the status of admissibility of ‘Scientific Evidence’ under Indian Evidence Law?

Q2. What will be the effects of tests like Narco-analysis, Polygraph and Brain-Mapping on Article 20 of the Constitution?

Q3. What is the effect of these tests i.e. Narco-analysis, Polygraph and Brain-Mapping on Human Rights of an individual?

Q4. Will the collection of such type of evidences effect the biological structure of human beings?

\(^{15}\) Satyendra Kumar Kaul, 612
Q5. What is the judicial approach on admissibility of evidence collected by Narco-analysis, Polygraph and Brain-Mapping?

Q6. Will such type of evidence give uncontrolled power to the prosecution?

1.10 CHAPTERISATION PLAN

An endeavour is made in the study to thrash out in detail the Narco-analysis, Polygraph and Brain-Mapping tests and their admissibility. To attain correct and appropriate approach following chapterization strategy has been adopted:

CHAPTER 1: Admissibility of Scientific Evidence: An Introduction And Historical Background

CHAPTER 2: Narco-Analysis, Polygraph And Brain-Mapping: A Glimpse

CHAPTER 3: Admissibility of Scientific Evidence: A Vision In A Globe

CHAPTER 4: Admissibility of Scientific Evidence Under Indian Laws


CHAPTER 6: Conclusion and Suggestions

Many people are not aware that science plays a significant role in the detection of crime and apprehension of criminals. The penalological offences under Indian Penal Code, 1860 are categorised under different heads. This categorisation is based on heinous nature, gravity, intensity and mode of criminal act done, which is nothing but a medical concept and scientific study of an act. The whole profile of Indian Penal Code is based on medical analysis, reports, technical assistance and scientific knowledge, which facilitate the task of courts to search and investigate the crime\textsuperscript{16}.

The barbaric and torturous methods of detecting crime have also no place in a civilized society. In these circumstances, what can the police investigator turn to, except the developing Forensic Science? In this framework, existence of forensic science originated\textsuperscript{17}. With the advancement of science and technology, the criminals have

\textsuperscript{16} Namarata Shrey, p 236.
\textsuperscript{17} B. S. Nabar, p 1.
adopted new methods and techniques for committing offences. At the same time, advances in Forensic Sciences have made detection of crime scientifically feasible. But admissibility of medical science is questioned now and then. But to know its evidentiary value in the criminal administration we need to know the meaning of scientific evidence and its historical background.

1.11 MEANING OF SCIENTIFIC EVIDENCE

Before putting into words the term ‘scientific evidence’, it is imperative to identify the concepts “Evidence” and “Science”. The term ‘evidence’ means “anything by which any alleged matter of fact is either established or disproved”. Whosoever makes the controversial thing apparent and clear in the court of law is evidence. Where the question is whether the explosion took place before a fire occurred. The noise of the explosion and its flash are evident of it. Persons who saw the flash or heard the noise can give evidence of the fact of the explosion. Evidence can be two forms technically i.e. oral and documentary, additionally, electronic records can be produced as evidence including video conferencing\textsuperscript{18}. If the happening of a fact is recorded on anything apart from human memory, that record is an evidence of the happening. Evidence can be defined as any material which tends to persuade the court of the truth or probability of some fact asserted before it\textsuperscript{19}.

According to Webster dictionary, evidence is that which is legally submitted to a competent court or tribunal as a means of ascertaining the truth or otherwise of an alleged matter of fact under investigation\textsuperscript{20}.

Section 3 of Indian Evidence Act, 1872 defines evidence as

"Evidence" means and includes

(1) All statements which the Court permits or requires to be made before it by witnesses, in relation to matters of fact under inquiry; such statements are called oral evidence;

(2) All documents including electronic records produced for the inspection of the Court, such statements are called documentary evidence”;

The section has not defined the term evidence in real sense but is rather a statement of what the term evidence includes, namely oral account of the happening of a fact given by those who have personally witnessed the happening and any document in which happening of the fact is recorded. Section 3 is just a statement of kinds of evidence. It tells us that evidence is of two types: Oral and Documentary but this does not mean that there can be no other type of evidence. As for instance if a judge inspects scene of occurrence it is regarded as evidence. Admissions, confessions, all are evidence though the Act does not regard them as relevant evidence. But even these are put under one category or the other. If any statement is given through mouth then it is oral evidence and if anything is recorded then it is documentary evidence.

In *Pushpadevi M. Jatin v. M. L. Wadhwan*, Supreme Court has made it clear that where the evidence offered comes within the meaning of its definition, the court can act and need not to concern itself with the method by which it was obtained. Sir, Lawrence Jenkins, in *Barinder Kumar Ghose v. Emperor* has observed that relevant evidence remains relevant despite the fact that it was not obtained by following proper procedure of law.

“The Latin term *scientia* gave the birth to the term science, which means knowledge. It is a systematic enterprise that builds and organizes knowledge in the form of testable explanations and predictions about the universe. In an older and closely related meaning, science also refers to a body of knowledge itself, of the type that can be rationally explained and reliably applied. In modern usage, science most often indicates to procedure of gaining knowledge, not only the knowledge itself. It is also frequently limited to those branches of study that tend to explain the phenomena of the material universe. On the other hand, science has also persisted to be used in a broad sense to symbolize reliable and teachable knowledge about a topic.”

The term Science is used in Indian Evidence Act, 1872 under Section 45 as:

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21 AIR 1987 SC 1748.
22 ILR (1910) 37 Cal 467.
“When the Court has to form an opinion upon a point of foreign law, or of science, or art, or as to identity of handwriting [or finger impressions], the opinions upon that point of persons specially skilled in such foreign law, science or art, [or in questions as to identity of handwriting] [ or finger impressions] are relevant facts. Such persons are called experts”.

According to Taber’s Medical Dictionary,\(^{24}\) is the intellectual process for using all of the mental and physical resources available in order to better understand, explain, quantitate and predict normal as well as unusual natural phenomena. New oxford advanced learner’s dictionary\(^{25}\) has defined science as the understanding about the composition and behavior of the both natural as well as physical world, relying on the data that one can prove.

Scientific Evidence may be defined as fact or opinion evidence that purports to draw on specialized knowledge of science or to rely on scientific principles for its evidentiary value\(^{26}\). In simple terms, scientific evidence is evidence used in courts and which is arrived at by scientific or technical means\(^{27}\).

Application of science in law is commonly known as Forensic Science. The area of its application is quite wide and comprehensive.\(^{28}\) Forensic science has been defined as the application of the principle of medicine to the purpose of law. Forensic medicine deals almost entirely with crimes against the persons, in which medical examination and evidence are required. Forensic science is mostly an exercise of common sense, combined with the application of knowledge and experience already acquired in the study of other branches of medicine, surgery, obstetrics, etc. Its aim is to find out the truth. Its particular field of activity is judicial investigation, both civil and criminal. All medical work is of a responsible character, especially medico-legal work. In all the cases of crimes, involving the person eg: murder, suicide, assault, sexual offences, traffic accident, poisoning etc, the help of medical practitioner is sought by the police.

\(^{24}\) 17\(^{th}\) edition, p 1761.
\(^{25}\) 7\(^{th}\) edition, p 1357
In some cases, the doctor is the chief source of evidence upon which legal decisions are made. In cases of sudden death, the authorities depend completely on medical evidence in establishing the cause of death and in case of accident to determine blame. \(^{29}\)

The word ‘forensic’ is derived from a Latin term ‘forensis’, which means ‘of the forum’. In Rome, forum was the meeting place where civil and legal matters were discussed by those with public responsibility. Forensic science is the application of natural sciences to matters of the law. In practice, forensic science draws upon physics, chemistry, biology, and other scientific principles and methods. It is concerned with the recognition, identification, individualization, and evaluation of physical evidence. Literally, the word forensic means ‘something that belongs to courts of law’ but in common parlance law and science contained together is called forensic science. It is the application of the methods and techniques of the basic sciences to legal issues.

Forensic medicine is usually associated with the detection of violent crime, but this definition is too narrow. Even though medical jurisprudence, forensic medicine and legal medicine are terms commonly used to denote the branch of medicine which deals with the application of the principles and knowledge of medicine for the purpose of law, both civil and criminal, they bear different meanings. Medical jurisprudence embraces all questions which affect the civil or social rights of individuals as well as cases of injuries to persons, and brings the medical practitioner in contact with the law. Thus, medical jurisprudence deals with the legal aspect of medical practice, while forensic medicine deals with the application of medical knowledge to the administration of law. In its broader sense, forensic science is the application of science to those civil and criminal laws that are enforced by police agencies and courts \(^{30}\).

Medical Jurisprudence, or as it is sometimes called, forensic, legal or state medicine may be defined to be that science which teaches the application of every branch of medicinal knowledge to the purposes of the Law, hence its limits on the one hand, the requirements of the law, and on the other, the whole range of medicine. Anatomy, physiology, medicine, surgery, chemistry, physics and botany lend their aid


as necessity arises, and in some cases, all these branches of science are required to enable a court of law to arrive at a proper conclusion on a contested question affecting life and property\textsuperscript{31}

Forensic Science can be defined more broadly as that scientific discipline which is directed to the recognition, identification, individualization and evaluation of physical evidence by the application of the principles and methods of natural sciences for the purpose of administration of criminal justice\textsuperscript{32}. It is very charming, challenging, dynamic and exciting science and is one of the modern methods used in identifying crimes and criminals.

1.12 HISTORICAL BACKGROUND: ORIGIN AND DEVELOPMENT OF SCIENTIFIC EVIDENCE

Scientific Evidence is a not of recent growth. Several of the old codes contain matters of Forensic medicine interest, though the mention of such subject is on the whole meager. However, references have been found in Vedas, in the code of Manu, in the Puranas and early Greek writers, notably Galen, discussed questions about legitimacy, simulated diseases etc. Manu also forbade corporal punishment of pregnant women and in Vedic literature (Circa 650-10 B.C) abortion or slaying of an embryo was a specified crime.\textsuperscript{33}

1.12.1 India: The application of science and technology to the detection and investigation of crime and administration of justice is not new to India. Although our ancestors did not know the Forensic Science in its present form, scientific methods in one way or the other seem to have been followed in the investigation of crime. Its detailed reference is found in Kautilya’s ‘Arthashastra’, which was written around 2300 years ago. Indians studied various patterns of papillary lines thousands of years ago. It is presumed that they knew about the persistency and individuality of fingerprints, which they used as signatures. The Indians knew for long that the handprints, known as the ‘Tarija’ were inimitable. The use of fingerprints as signatures by illiterate people in

\textsuperscript{32} B. S. Nabar, p 1.
\textsuperscript{33} I.B. Lyon, 4.
India, introduced centuries ago, was considered by some people as ceremonial only, till it was scientifically proved that identification from fingerprint was infallible\textsuperscript{34}.

1.12.2 Egypt: Legal provisions controlling medical practice existed in ancient Egypt. Improper treatment and causing death of the patient were punished. Egyptians are famous for artificial preservation of dead bodies by mummification. The works of Homer, Herodotus and Diodorus are ancient literatures containing medico-legal matters. The “papyrus” of ancient Egypt gives an account of sexual perversions, marriage customs and diagnosis of poisoning. All these date back to about 3000 B.C. Imhotep, a celebrated man of this period, was the grand vizir, chief justice and physician to King Zoser of Egypt. He was the first man to combine the science of law and medicine, and is considered by many as the first medico-legal expert.

1.12.3 Babylon: The first law code of Babylon was written by King Hammurabi in 2200 B.C., which prescribed laws regulating medical practice and punishments for civil and criminal liabilities of physicians, adultery, rape, incest and violent deaths. Sir Sydney Smith (1883-1969), a contemporary of Sir Bernard Spilsbury having studied in Edinburgh, came to Egypt and pioneered the scientific investigation of crime in Egypt. He also wrote a textbook on forensic science.

1.12.4 Greece: In Greece, the contribution of Hippocrates (460-355 B.C.) to modern medicine is most outstanding. Besides other things, the ‘Hippocratic Oath’ as a part of medical law and ethics continues to occupy its place in medicine. Aristotle (384-322 B.C.), fixed the animation of the foetus at the 40\textsuperscript{th} day, and advocated abortion for population control. Archimedes (287-212 B.C.E), laid the first foundation of forensic science by detecting the gold adultration in the crown of the king of Syracuse.

1.12.5 Rome: In Rome, Numa Pompilius (600 B.C.) made a provision to open the body of a woman immediately after the death during confinement. An article of the Lex Aquillie (572 B.C.) deals with lethality of wounds and expert medical opinion in assessing their gravity. In XII table of 449 B.C., a period of three hundred days was set for the duration of pregnancy and birth to take place within ten months. Incapacity of the insane was recognized and disposal of dead controlled. Lex Cornelia of Sulla (138-

\textsuperscript{34} Nayan Joshi, \textit{Medical Jurisprudence and Toxicology}, Kamal Publishers: New Delhi, 2008, p 14.
78 B.C.) provides that five midwives should prove the pregnancy. Inducing abortion, administration of aphrodisiacs and a physician causing death of his patient were heavily punished. When Julius Caesar (100-44 B.C.) was murdered, his body was examined by Antistius, a physician. He opined that out of 23 only one injury was fatal and he is another person who is considered by many to be the first medico-legal expert. Plini, the elder (323-79 B.C.) wrote superfoetation, of suspended animation, of sudden natural death, or suicide, of the age of menopause and signs of maturity in the foetus. The place of the physician in courts and in legal matters (expert witness) has been clearly shown under the rule of Emperor Justinian (483-565 A.D.). Under the Justinian Code, also considered as the earliest Medical Code in ancient Europe to define the role of medico-legal experts in dealing with medico-legal problems, physicians were supposed to prove pregnancy, time of delivery, sterility, impotence, rape, poisoning, and mental illness. In the ‘digest’, it has been remarked, ‘physicians are not ordinary witnesses but they give judgment rather than testimony’ thus recognizing the special status of expert witness, of expertise and implying and establishing that the medico-legist was an impartial arbiter.

1.12.6 Jerusalem: the Assizes of Jerusalem (a code of laws) framed in 1100 AD by the crusader, made a provision for a court order for the medical examination by a physician, apothecary or surgeon, for non-attendance in courts on health grounds, and for the examination of the corpse in murder cases to find out the injuries.

1.12.7 Italy: in Italy, Roger II of Sicily, in 1140 AD, brought medical practice under law, and in 1224 AD, Frederick II ordained public examinations for physicians based on Hippocrates, Galen and Avicenna. Rules were framed for the admission, teaching and training of physicians. From the end of the 13th century, medico-legal works of different kinds, as well as autopsies were conducted by doctors in Bologna and other parts of Italy. The first medico-legal autopsy was done by Bartholomeo Devarignana of Bologna in 1302.

1.12.8 France: In France, the Bishops of Maine and Anjou are said to have medical experts in their service from the 11th century. From 1260 AD, provisions were made for medical expertise and surgeons and physicians were sworn to give evidence in courts. The right of autopsy was given to the faculty of Montpellier by the Pope in 1374 AD.
1.13 RELATIONSHIP BETWEEN SCIENCE AND LAW

Change is the only permanent thing. With the advancement and technological development, whole universe is undergoing a change. Every aspect of life is now-a-days being governed by scientific inventions and discoveries scientific knowledge has made inroads in legal sphere as well. For example, if a patient is terminally ill, can he/she be given liberty to commit suicide through the assistance of a doctor. If not, to what extent can medical technology assist in reducing the risk of dying in severe pain. Here, science and law are interdependent on each other. Science and law fall under same legal definition of sciences, in that they case a rational approach to resolve complex multifactorial problems. Both science and law in the world of today touch each other at various points. Law regulates science and people dedicated in its research likewise the latter helps law in dissemination of justice. However, the achievement of equilibrium between the two is a highly complicated issue. If we examine the rules of evidence on which if was framed. One of them is all facts having rational probative value, i.e. which help the court to come to a conclusion upon the existence or non-existence of the matter in controversy, are admissible in evidence, unless excluded by some rule of paramount importance.

With the advent of science and technology, every aspect of human life has been revolutionized and the court room exercise is not an exception to this rule. Courts too have witnessed the widespread introduction of numerous scientific evidentiary techniques and breakthroughs providing potentially valuable investigative tools.

Nations across the globe are embracing the scientific techniques. They are resorting to the liberal approach towards scientific techniques. Existence of crime is established from the time of Adam. The Bible and the Quran give vivid examples of first crime committed by one son of Adam. It can be safely said that the crime, in one form or the other, was present from time immemorial, similarly, the investigation and

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35 Parekh and Singh, p 1.
36 Satyendra K. Kaul, p 3.
39 Nayan Joshi, 180.
detection of crime is also of same age as of crime. With the advancement of science and technology, the criminals have adopted new methods and techniques for committing offences, and science has also helped the investigation agencies in their efforts to nab the criminals or real culprits. Investigators are not lagging behind. The ways of interrogation of criminals by using third degree methods are now giving way to new scientific methods of investigation.

The importance and the utility of the scientific aids in the investigation of crime have been accepted. It does not require any further justification. The scientific investigation forms an important chain in establishing what is known as ‘corpus delicti’ or the body of the offence\(^\text{40}\). Investigators have been taking assistance of science in cracking investigations. Science has been part and parcel of Indian Legal System. Courts are dependant on science for deciding each and every case. In one form or other science is aiding courts to reach at just pronouncements.

The scientific test about age as a result of \textit{epiphysis} of the bones is held to be most trustworthy\(^\text{41}\). In \textit{Harpal Singh v. state of H.P.}\(^\text{42}\), age of a girl was in question. Radiologist after examination of the girl found that she was about 15 years of age and this was corroborated by an entry in the admission register in the government school wherein the girl was a student, which was proved by the Headmaster, and by a certified copy of the relevant entry in the birth register.

In state of \textit{Tamil Nadu v. Rajendran},\(^\text{43}\) the wife was found dead in a hut which had caught fire. But the medical evidence showed that wife died due to \textit{asphyxia} as a result of strangulation and not on account of burn injuries. Later, in trail court came to the conclusion that it was husband who strangulated his wife thereafter set hut on fire. It is important to note that usually with death blood disappears from heart but the heart in asphyxia, specifically right chambers, is always found full of dark venous blood.\(^\text{44}\)

\begin{footnotes}
\item[40] Manoj H Parekh, p 6.
\item[42] AIR 1981 SC 361
\item[43] (1999) 8 SLC 679
\item[44] Raju and Jhala, \textit{Medical Jurisprudence} p 226
\end{footnotes}
One case which brought the DNA controversy to the fore was the rape and murder of Priyadarshini Mattoo\textsuperscript{45}. At trial, the prosecution case relied on the DNA test of the vaginal swab, which was positive.

DNA testing was also used to prove that former Asom Gana Parihad Minister Rajendra Mushahary had raped a woman twice and made her pregnant, and therefore was the biological father of the woman’s child\textsuperscript{46}.

Also, in reaching to the late Rajiv Gandhi’s murderer Dhanu, DNA testing of her mutilated body was very helpful. Similarly, terrorist attack on WTO building on 9/11 in New York and recognition of the main accused Atta was also confirmed by DNA test. DNA is an organic substance i.e. chemical basis of life which is there in every cell in the human body except Red blood cells. This organic substance combining with proteins forms the chromosomes, a thread like structure, responsible for carrying the genetic character from one person to its offspring. This test can help us to determine whether a particular patch of blood, semen, hair, etc. found from the scene of occurrence of crime or from the body of the criminal or victim belongs to the accused person or victim or not. Besides the above samples it can also be detected from the saliva, body fluids, bones, wine, body organs and even form charred, damaged mutilated remain of a body.\textsuperscript{47}

\textbf{1.14 NEED OF SCIENTIFIC EVIDENCE}

In criminal investigation use of Forensic Science is the need of the modern times. In India, the investigation and crimes and prosecution of criminals are not up to the mark. Even in heinous crimes large number of criminals could not be prosecuted and a few percentage of trials end in acquittal as a result of which number of criminals as well as crimes are increasing day by day. These frequent acquittals are mainly due to obsolete techniques of investigation which leave many loopholes. Thus, for effective investigation, scientific ways of investigation is very necessary. The 3\textsuperscript{rd} degree methods used by investigating agencies in British period are not acceptable to the new generation of crime investigating agencies, judges and public at large. ‘Third degree’ methods used
by investigating agencies for making confessions has not completely vanished and their misuse has increased\(^4^8\).

Crimes have gone through scientific and technological development but for their investigation, agencies are still following old procedures the outcome of which is not enough and not up to the mark of satisfaction. Moreover, it is still based on the old procedures which involve extreme mental and physical torture resulting to a gross human right violation.

There is urgent and widespread need for the application of forensic science in criminal investigation. The present day picture of crime investigation and prosecution of criminals, is a sad story. A large percentage of the murder trials, ultimately, end in acquittal and these frequent acquittals also embolden the criminals. And the reason behind this is said to be non-proper handling and managing of the investigation. Investigation must result in finding the truth and gleaning of the evidences which can be perceived by the judicial systems objectively in the direction of finding the truth\(^4^9\). The justice is there, where the guilty is punished according to law and for that an investigation without any loophole is must. Investigation in detection of crime is an important step in the administration of justice; hence investigation must be prompt, fair and impartial. The right to speedy trial has been recognized as a fundamental right enshrined under Article 21 of the Indian Constitution in *State of Maharashtra v. Champalal Punjafishah*\(^5^0\).

The major percentage of acquittal cases shows the failure on the part of prosecution mainly due to improper investigation and witnesses turning hostile. Now-a-days the ‘eye-witnesses’ upon whom our judiciary mainly rely has become a rare species, the reasons shown are threat and fear. Due to old age procedures investigating agencies are not able to collect sufficient evidences. Besides, crimes are so well planned and efficiently committed by using technology that hardly any evidence or clue is available on the crime scene.


\(^5^0\) AIR 1981 SC1675
Furthermore, these scientific techniques can swap atrocities in police custody. Custodial deaths, torture are widespread in our country. For hardly a day passes without the news of police atrocities, torture and brutality being reported\textsuperscript{51}. In a case recently accused died in police custody due to severe beating. Police caused as many as 18 injuries on his various body parts for the purpose of extorting information from him regarding theft of a moped\textsuperscript{52}. Supreme Court also articulated in \textit{D. K. Basu v. State of West Bengal}\textsuperscript{53}, enforcing agencies must act within the bonds of law and there is need for developing scientific methods of investigation and interrogation of accused as custodial deaths and torture is nothing but a blow at the rule of law.

The need for the application of science in criminal investigation has arisen from the following factors:

\textbf{1.14.1 Social Changes:} The society is undergoing drastic social changes at a very rapid pace. India has changed from a colonial subject race to a democratic republic. Sizeable industrial complex has sprung up. The transport facilities have been revolutionized. There is a growing shift from a rural society to an urban one. These changes have made the old techniques of criminal investigation obsolete. In the British days the police was so much feared that once it had laid its hands upon an individual, he would ‘confess’ to any crime, he may not have even known. The fear is vanishing now. The use of ‘third degree’ techniques used in those days does not find favour with the new generation of police officers and judges.

\textbf{1.14.2 Hiding facilities:} The quick means of transport and the high density of population in cities have facilitated the commission of crimes. The criminal an hide himself in a corner of a city or move away to thousands of miles in a few hours. He, thus, often escapes apprehension and prosecution.

\textbf{1.14.3 Technical knowledge:} The technical knowledge of an average man has increased tremendously in recent years. The crime techniques are getting refined. The investigating officer, therefore, needs modern methods to combat the modern criminal.

\textsuperscript{52} V. Shekhar v. State of Karnataka 1991 Cri LJ 1100
\textsuperscript{53} AIR 1997 SC 610
1.14.4 **Wide field:** The field of activities of the criminal is widening at a terrific rate. Formerly, the criminals were usually local, now we find that national or international criminal is a common phenomenon. Smuggling, drug trafficking, financial frauds and forgeries are other fertile and ever expanding fields.

1.14.5 **Better evidence:** The physical evidence evaluated by an expert is objective. If a fingerprint is found at the scene of crime, it can belong to only one person. If this person happens to be the suspect, he must account for its presence at the science. Likewise, if a bullet is recovered from a dead body, it can attributed to only one firearm. If this firearm happens to be that of the accused, he must account for its involvement in the crime. Such evidence is always verifiable\(^{54}\).

Most importantly, one should keep in mind a victim’s perspective. He is the foremost sufferer and he also has a right to speedy, effective investigation and trial. One cannot deny victim’s interest in quick justice as we all are aware justice delayed is justice denied.

1.15 **NARCO-ANALYSIS, POLYGRAPH AND BRAIN-MAPPING**

Supreme Court recognized the requirement, the necessity of scientific investigation in *Som Prakash v. State of Delhi*\(^ {55}\). Law Commission also emphasized on the need of training of Police officers in using scientific methods of investigation.\(^ {56}\) The present study is concerned with the commonly used techniques in India to adduce scientific evidences, Narco-analysis, Polygraph and Brain Mapping. Innovation of forensic tools like Narcoanalysis, Brain-mapping and Polygraph tests have proved to be the momentous progress of forensic science in the 21\(^{st}\) century.

**Narcoanalysis** has become an increasingly, perhaps most common term in India. It refers to the process of psychotherapy conducted on a subject by inducing a sleep like state with aid of drugs. Human beings have the tendency of speaking lies from the time immemorial. The baggage of truth is always heavy so only some hold it. A person is able to lie by using his imagination. In this test, the subject’s inhibitions are lowered


\(^{55}\) AIR 1974 SC 983

\(^{56}\) 14\(^{th}\) Law Commission Report.
down by interfering with his nervous system at the molecular level. In sleep-like state efforts are made to obtain “probative truth” about the crime as in sleep like state, it becomes difficult though not impossible for him to lie. It is believed that if a person is administered a drug which suppresses his reasoning power without affecting his memory and speech, he can be made to tell the truth. Some drugs have been found to create this ‘twilight state’ in some persons\textsuperscript{57} and with the use of these drugs investigating agencies try to arrive at the truth. Narcoanalysis is a form of psychotherapy and an effective aid to scientific interrogation. It is a process whereby a subject is put to sleep, or into a semi-somnolent state by means of chemical injections and then interrogated while in a dream like state\textsuperscript{58}.

**Polygraph** is another important scientific tool of investigation. Polygraph is popularly known as lie detector and sometimes referred to as psycho- physiological detection. It is an instrument which measures and records physiological responses such as blood pressure, pulse, respiration and skin conductivity while the subject is asked a series of questions and answers them. The polygraph measures physiological changes caused by autonomic nervous system during questioning. The autonomic nervous system changes are beyond reasonable control of an individual and hence autonomic nervous system response changes are observed when the subject tries to tell a lie.

Polygraph is a device that records simultaneously tracing of several different pulsations, as arterial and venous pulse waves, and the apex beat of heart\textsuperscript{59}. According to Science and Technology encyclopedia, “Lie Detector” is a device intended to detect an involuntary physiological response that all persons exhibit when lying but never when telling the truth. According to Encyclopedia Britannica, “Lie Detector” is an instrument for recording physiological phenomena (including blood pressure, pulse rate and respiration) of a human subject as he or she answers questions asked by an operator. The principle behind the polygraph technique is that the suspect fears detection of lie and creates in the subject an emotion of fear which consequently results physiological changes which are captured by various instruments. Polygraph test is basically based on

\textsuperscript{57} Nayan Joshi, p 267
\textsuperscript{58} Satyendra Kumar Kaul, 429
\textsuperscript{59} Taber’s Medical Dictionary 17\textsuperscript{th} edition, p.1553
the theory that generally a person telling a lie becomes nervous and shaky. Due to this position physiological changes occur in the person’s body. In polygraph test subject is asked a series of question. These questions are controlled questions. Some questions are asked generally even though the answers to them are already known. For instance name and address of the subject. While answering these questions no change transpires. After this, relevant questions are asked and if the subject tries to lie physiological changes takes place. Physiological changes may crop up in shape of increased or decreased blood pressure, change in pulse rate or heartbeats, sweating, dryness of mouth, etc. These changes are far from the reasonable and practical control of subject thus whenever subject tries to lie polygraph machine apprehends the lie.

**Brain Mapping** is one more valuable scientific tool for investigation of crimes. Brain Mapping is also known as Late Positive Complex or P3 or P300. It is a component of averaged brain potentials. In this test no questions are asked from the accused. He is made to sit in evoked potential recording machine and is shown objects relating to crime scene or is made to hear sounds pertaining to crime site. The sensors from his head pick the event related potentials in the form of Brain Mapping only if the person has been at the site of crime. The accuracy of Brain Mapping is almost 100%.

Brain Mapping is a response of the brain to a stimulus which is shown to the subject. In 1965, scientists were working on the research of Event Related Potentials and it was discovered by Sutton and his colleagues. It is very robust Event Related Potential. As soon as it recognizes the stimuli it sends the reaction within 300 milliseconds of seeing the stimuli. If the person is attentive to the stimuli its response would be the fastest. If more time is taken for making decision the more time is spent for the responses of P300. Its latency shows the amount taken by it in arriving at a decision. When the brain recognizes a person or a sound, it generates a particular type of electric wave which is called P300. In this test sensors are attached to the head of the subject and the subject is seated before a computer monitor. The sensors catch the electrical activity in the brain and register P300 wave, which are generated only if the

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60 Satyendra Kumar Kaul, p 578.
61 Satyendra Kumar Kaul, p249
subject has some connection with the pictures shown to him and the sounds which he is made to hear.

1.16 CONCLUSION

It can be concluded with the observation that with the change in crime-patterns and “progress” of criminals it is imperative necessity to hold investigations scientifically and to make all sorts of scientific evidences admissible in the courts. If a nation is not able to do so that means that nation is itself letting lawbreakers loose in the society for committing crimes. It was aptly remarked by the honourable Supreme Court, “We must not forget that the object of criminal law process is to find out the truth and not to shield the accused from the consequences of his wrongdoing.”63 By using age old techniques of investigations government is actually providing armor to the felonious people. Law in any country is in essence the reflection of, and is based on, the common law of the land. Law to be living, has to be in harmony with the changing needs and aspiration of the society as a whole. So, when there is availability of scientific tools investigation authorities must utilize them to grab hold of criminals.