CHAPTER 8

CONCLUSION AND SUGGESTIONS

Absolute justice is the objective of the judicial system functioning in a society where rule of law prevails. In the quest for justice, the judges may have to face and tackle a multitude of issues. Majority of them have a bearing on disciplines other than law. In such situations it is not wise for the judge to act as an allrounder and settle the issue solely on the basis of his sketchy knowledge of other disciplines. The only recourse a judge can have in such situations is to get the advice of an expert or a person having special knowledge in the relevant discipline. There need be no hesitation on the judge in receiving the opinion of persons having special knowledge or even receiving views, beliefs or opinions from laymen; if they have witnessed the foundational facts. No legal system will compel a person to decide an issue against his knowledge and commonsense. The ultimate fact determination should be the outcome of the 'quest for truth.'

The traditional view in the common law that witnesses should confine their testimonies to facts they have direct knowledge is not a blanket rule in the modern world to bar the evidence of knowledgeable persons in any field. As an exception to this traditional rule, judges may receive the opinion, belief or inferences of lay witnesses in a situation in which it is not possible for them to speak about the things they have observed directly without padding them with their inferences or opinions. These opinions, inferences and beliefs cannot be put in the straitjacket formula of distinguishing pure facts from opinions. In reality, the judges are knowingly or unknowingly receiving opinions, inferences and beliefs in the name of facts. However, this cannot be taken as an excuse in
receiving opinions and inferences from lay witnesses. Well identifiable standards shall be prescribed and adopted by the judiciary regarding the extent to which such lay witnesses could be allowed in stating mixed testimony of facts and opinions. Actual observation of the foundational facts must be the validating factor for admitting lay opinion testimonies. Similarly, if the point on which a lay witness gives testimony needs any special knowledge, experience, skill or training, the witness shall not be permitted to give his opinion unless he is a person having such knowledge, experience, skill or training. In all situations in which the opinions or inferences of lay witnesses are admitted, the judges should make their own conclusions after sifting the inferences drawn by the lay witness from the observed facts. While making such conclusions, the judge must compare them with the rest of the evidence already before him. He should use his discretion in omitting the statements that are highly misleading, confusing and prejudicial. Thus the conclusion which one can reach from the foregoing analysis is that a lay witness may be permitted to testify his opinions, inferences or beliefs, if his testimony is (1) helpful to the judges in deciding the fact in issue; (2) the lay witness has actual knowledge about the foundational facts; (3) his opinions or inferences do not encroach upon the province of the judges; and (4) above all, he has adequate capacity to reach a reasonable conclusion from the facts he observed. If these things are satisfied, even minor inconsistencies in the facts stated will not affect to any significant extent the credibility of the evidence. The plausibility and irrationality of the inferences and opinions made by the lay witness will affect the weight of the evidence though they will be no ground for dismissing the admissibility of the evidence outright.

The philosophy behind the admissibility of an expert's testimony lies on the fact that he is a witness having some special skill, knowledge or experience
in some complex subject, which the judges lack. A person is an 'expert' only if he had some superior experience, skill or training in the field. From the word 'expert' itself, it is clear that he has given some special status different from that given to other witnesses. He is permitted to express his opinions, inferences and beliefs even from hearsay evidence having no foundational facts. His opinion testimony is admitted because it will add some additional knowledge, which the judges did not have earlier. From the evaluation of the definitions given by various jurists, it can be said that an expert is a person having some experiential capacity in testifying the matter for which he can be called. He shall be qualified to give his opinion as an expert. This shows that some real expertisation must be there to qualify a person to be treated as an expert.

The final say about the admissibility of an expert's opinion depends on (1) whether the evidence is helpful to the trier of fact in determining a fact in issue; (2) whether the witness is qualified to give evidence as an expert; (3) whether the probative value of the evidence outweighs any potential danger of unfair prejudice.

From the foregoing analysis the researcher suggests that it is high time to expand the provision in Section 45 of the Indian Evidence Act to accommodate the opinion of experts in all fields.

The analysis conducted in chapter1 indicates why a serious discussion on the subject is necessary. The researcher has considered in detail the limitations of the expert testimony. From very early days of the reception of the expert testimony, heated discussions are going on regarding the extent of admissibility of the testimony of experts. The legal community has propounded various limitations in order to defend the encroachment of the experts in to the judicial
process. The common knowledge rule, basis rule and the ultimate issue rule are some of the prominent rules, which dominate in this area. The legal laconicism of these rules is based on the words “court is the expert of the experts”. In this sense the meaning of the term expert is misnomer. An expert is an expert only in his field in which he is going to testify and it does not give him any authority to act as an expert in deciding the issues before a court of law or for explaining the issues which are within the common knowledge of the judges. Thus the underlying principle behind the common knowledge rule is that if the judges can draw inference and conclusion from their common experience, the conclusions made by the witness will be superfluous. However, the analysis conducted by the researcher on this legal concept shows that the common knowledge rule is misleading. Its interpretation makes confusion in its application. It is difficult for judges to draw a dividing line between the matters that are within the common knowledge of a judge and those outside their knowledge.

Similarly, evidence that is otherwise inadmissible does not become admissible simply because it was considered by an expert in forming his conclusions. An expert may not under the guise of stating the reasons for his opinions, testify to matters of hearsay in the course of his examination unless such matters are admissible under some statutory or other recognized exception to the hearsay rule. Thus the rule excluding the opinion of an expert on hearsay or other persons seeks to limit the expert's testimony on his first-hand knowledge. The analysis conducted on this legal principle shows that the rule is highly incompatible with the developments of science.

The modern jurisprudential view is that expert testimony can also be allowed on general propositions of legal issues. This view has been
strengthened by enacting several technical and complex legislations. However, the issue regarding the admissibility of pure expert legal testimony, which purports to apply the law to the facts of the particular case to produce a specific proposition, has not yet been finally settled.

From the overall analysis of the limitations on the admissibility of expert evidence, it emerges that the exclusionary rules can only be a matter of form rather than substance. Courts were earlier reluctant to apply the rules strictly. Under the current position, opinion testimony is not excluded merely because it relates to a fact in issue or an ultimate issue or matters that are in the common knowledge of the jurors. Legislations in most countries afford this change. However, opinion of experts having no base continues to be excluded in all jurisdictions. Now hearsay opinion can be said to have a limited application on the exclusionary rules. Recommendations were made proposing that witness be permitted to give opinion evidence in any proceeding if that opinion will help the court to understand the related evidence or to ascertain any fact that is of consequence to the determination of the issue in question. At the same time courts have cautioned that such evidence should not be received at its face value.¹ Similarly, exclusion in offering expert legal testimony in the form of general propositions of law also could not be put in a watertight compartment. Judges can receive the legal testimony in harmony with their own view of law and reject others. Instead of that, rejecting the entire evidence, which comes before them, may be indiscreet. The reasoning behind this is simple, 'why not a person having a high legal faculty help the judicial officer, if it can be done by a counsel who is only having a limited legal knowledge'. If legislators can depend

¹ See, Supra n.186 in chapter 1
on expert's knowledge for drafting technical legislations, no doubt, judiciary can also use such experts for their interpretation.

Scientific expert testimony has flooded into the trial system within a short span of time. From the beginning of the 21st Century the growth in all areas of science and technology in society has had its reverberations in the courtroom. Now the judges are in the dark regarding the legal standards by which the scientific expert testimony is to be evaluated. The legal system has adjusted its mind to receive the information given by the scientific faculty for resolving legal disputes; at the same time it will not allow any 'junk science' to intrude into the system. It is in this context that courts decide, what kind of scientific and technical information the legal system will take into consideration. From the very first time of its invasion, the attitude of the judiciary towards the appreciation of scientific evidence is significant. The judges have judged the scientific evidence both in the case of its admissibility and regarding the evaluation of its weight in a fashion different from that applied to other type of evidence.

In the appreciation of evidence in question, the first stage is to determine the "relevance" of the particular piece of evidence tendered to prove the fact in issue. Simply relevance is the logical connection between the facts adduced as evidence with the facts sought to be proved. However, legal relevance requires some thing more than logical relation; it insists a close relationship between facts adduced and facts sought to be proved. After considering various definitions given by the writers on evidence, it is concluded that the question of relevance had its roots in logic and not law. Long ago Thayer rightly said that "the law furnishes no test of relevancy," but relies instead on "logic and general
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Thus a particular piece of evidence can be said to be relevant if it has any tendency to make the existence of any consequential fact more or less probable. Relevance in connection with common understanding and in connection with the law of evidence has the same meaning and scope; the depth of relevance lies on reason and logic. The principle of relevance should not be confused with the principle of admissibility. In the law of evidence, admissibility is some thing more than relevance. If relevance had its root in reasoning and logic, admissibility had its root in the technicalities provided by the law of evidence. The facts, though relevant need not compulsorily be admitted. The most relevant facts may be rejected on the basis of the technicalities like "unfair prejudice", "confusion", "misleading the jury", "undue delay", "waste of time", or "needless presentation of cumulative evidence", "public policy" and "morality". Here the most relevant facts did not satisfy the technicalities provided by the law of evidence.

Recently, courts recognized that science is the best way to know some of the complicated issues in the legal fact-finding. It is the general belief about science that one can believe it than any other thing because it is a social process in which there is critical evaluation like testability, falsifiability or refutability. Science approaches the world in a quite different manner than any other discipline in the world. Science looks at every thing unnaturally; common sense, belief and predictions have no place in science. In science, observations have a higher rank than explanations and rationalizations. The history of science demonstrates that scientific phenomena are commonly confirmed and validated.

2 Supra n.27 in chapter 2.
long before their cause and underlying processes are certain. All scientific reasoning starts with an observation and rational explanations are secondary to experience. Traditionally, scientific reasoning is thought of as consisting of a reiterative process including five steps: observation, tentative description, hypothesis and prediction, testing of the hypothesis, and modification of the result by repetition of all elements. Whatever merits the scientific discipline has, the problem is that along with good scientific truths pseudo-science or bad science may intrude into the trial system and vitiate the entire process. Therefore, it is the duty of the fact finder in law-science relationship to detach good science from bad science. Every piece of evidence that comes before the court of law shall be reliable for its admissibility. The legal machinery has formed its own process to evaluate the reliability of scientific evidence.

In the law-science relationship, the concept of “junk-science” has evolved as a tool to describe the judicial acceptance of unreliable scientific evidence, which results in miscarriage of justice. Actually the term “junk science” denotes illegitimate scientific techniques, which are not generally accepted by the scientific community. It may also include the novel scientific techniques developed by some scientists for satisfying the claims of the litigants in civil or criminal cases. From the writings of Peter Huber, a prominent critic of junk-science, one can easily identify junk-science from good science. However, here the problem faced by the legal community is not simple. It is this: as a non-scientist having no background in evaluating scientific problems, how far judges can handle the junk-science problem? With regard to this issue two prominent questions unanswered by the legal community are:

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1. Whether judges are capable and willing to evaluate scientific evidence to identify the junk-science;

2. If judges are not capable and willing then what method can be adopted to eradicate junk-science from the courtroom.

One of the methods discussed by the researcher for the evaluation of scientific evidence adduced before the court is the analysis of the scientific testimony in the light of theory and technique. Through this method court will critically evaluate the theory and technique from the viewpoint of a non-collaborator, who is outside the laboratory in which the particular theory and technique have been developed. But courts should take reasonable care in identifying a suitable person for evaluating the theory and technique before them. From the foregoing analysis it is submitted that the following things shall be taken into consideration by a court before selecting a person:

1. The person must be a member of the relevant scientific community in which the theory or technique falls;

2. The person must be a disinterested person regarding the particular issue;

3. The qualification of disinterested scholars can be established through their publications, academic positions and positions in scholarly associations;

4. The opinion of a single person shall be insisted;

5. If there is any person having the special knowledge about the forensic application of the theory or technique, such a person shall be appointed against any person having mere academic qualifications.
Similarly, the theory of falsification also serves to some extent in detaching junk science from good science. However, the critical evaluation of the theory shows that it will be a Herculean task for the proponents of the forensic techniques in subjecting their novel techniques before the theory of falsifiability. If this theory is applied in its strict sense it will weaken the research in forensic science and the related disciplines.

The courts in different jurisdictions have propounded various standards to evaluate scientific expert testimony. However, two major standards are the "reliability rule" of the United States and the "helpfulness rule" of the United Kingdom. Under reliability standard, the proponent of every scientific methodology must satisfy the court that his technique and the theory and the methodology underlying that technique are reliable and accepted by the general scientific community. The first case in the set was enunciated by a Federal Appeals court in *Frye v. United States*[^4] in which court said the novel scientific discovery or invention must be sufficiently established to have gained general acceptance in the particular field in which it belongs. The general acceptance test as formulated by the *Frye* court insists the United States courts to hand over the evaluating function of the scientific expert testimony to the scientists in the relevant field. But the test formulated in *Frye* was later criticized as very restrictive and against the liberal criteria provided by Rule 402 of the Federal Rules of Evidence. Rule 402 states that, "all relevant evidence is admissible except as otherwise provided... evidence which is not relevant is not admissible". Therefore the United States Supreme Court in its path breaking decision *Daubert v. Merrell Dow Pharmaceuticals*,[^5] revisited the reliability criteria.

[^4]: *Supra* n.69, in chapter 2.
[^5]: *Supra* n.34, in chapter 2.
set out by the *Frye* court. *Daubert* court made a different approach in evaluating the scientific evidence. Court through its four-factor test insisted the trial judges to become a gatekeeper while considering the admissibility of scientific evidence. The *Daubert* Court viewed science as an empirical endeavor. The court mentioned four indicators of good science. They were (i) peer review (ii) publication (iii) the existence of known or potential error rates and in existence of standards controlling the technique’s operation. General acceptance of the methodology within the scientific community, although no longer dispositive, still remained a factor to be considered. Second, the Court explained that by relevancy it meant that the expert’s theory must fit the facts of the case. Thus what *Daubert* precedent has made out in the United States law of expert testimony is uniformity and certainty among U.S. courts in determining the admissibility of expert’s testimony in theory and practice. The main problem of the *Daubert* decision is that the Court decided *Daubert* on statutory rather than constitutional grounds, and, consequently, each State remains free to fashion its own standard for admitting scientific evidence. Since the proclamation of the *Daubert* guidelines, the majority of the courts in United States followed the general acceptance test as propounded in *Frye*. This shows the courts unwillingness to act as gatekeeper’s in evaluating scientific expert testimony. Courts reluctance continued even after the amendment of the Federal Rules of Evidence in 2000. Therefore, from the foregoing analysis one can come to the conclusion that in United States there is no uniform standard to evaluate scientific evidence. At the same time the ‘helpfulness standard’ provided in United Kingdom does not yield much advantage because judges are not duty bound to check the reliability of the scientific technique but they may admit any piece of scientific evidence if it is helpful to them in determining the fact in issue.
In contrast, insisting of corroboration in India can be considered as an effective check against the intrusion of bad science into the court, but it will not give any better results in the determination of the reliability of scientific evidence. Actually by adopting this standard the courts in India are avoiding the task of the evaluation of scientific evidence. From the overall analysis in chapter 2, it is concluded that there must be a proper standard for the evaluation of scientific evidence and the courts must uniformly follow that standard despite any jurisdictional difference.6

Since the advent of genetic fingerprinting, the technology became a helping hand to the criminal justice system. The development of this technology not only helped the law enforcement machinery to easily identify the real culprits but also helped the accused in extricating themselves from false cases. It also helps the prosecutors in establishing guilt of the accused beyond reasonable doubt and helps courts in the search for and getting at the truth. Its introduction to the criminal justice system has made revolution in identifying the violent perpetrators of rape and murder and in confirming their guilt with a very high degree of confidence. The great significance of the DNA typing from other biological stain evidence is that it is more powerful than other methods in discriminating individuals. Moreover, the advances in DNA technology like STR typing and mitochondrial DNA testing have made DNA testing an established part of sexual assault investigation and prosecution, especially for cases in which identification is the primary issue. Thus DNA evidence has transformed the proof of identity in criminal litigation, but it has also introduced daunting problems. Almost all techniques related with the DNA typing process has secured the acceptance of the members in the scientific community, but there

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6 A three-part test is provided in the suggestion.
are two prominent problems associated with the fixing of the reliability of DNA results in the case of specific application. One of the problems is often connected with the reliability of the collection of bodily samples for forensic DNA analysis. The other issue is with regard to the human and technical errors at the time of the DNA analysis.

The possibility of contamination while collecting DNA samples or pre-analytical error and the possibility of human and technical errors like band shifting, over or under digestion of enzymes of the DNA samples, examiner bias while conducting the analysis and problems connected with the using of probes and star activity will directly affect the DNA typing results. Therefore, courts must be very vigilant while evaluating the DNA test results. Judges should not accept the test report of the laboratories at face value without conducting a detailed evaluation of the reliability of the application of the DNA technique in the case in hand. Due to the sensitive nature and chances in occurring errors in DNA evidence, the following suggestions are made for better evaluation:

1. Judges must act as gatekeepers while evaluating DNA evidence;

2. The trial judges must conduct a pre-trial hearing before admitting the DNA evidence. It will eliminate time-consuming and confusing expert testimony from both parties to a jury. Judges operating under this system may appoint special masters to assist them in the evaluation of DNA evidence during pretrial hearings. Presenting DNA evidence to judges in this pretrial fashion will expedite the litigation process and make it more efficient in several ways;
3. The State must form an expert panel including DNA experts and the courts while evaluating the scientific procedures of the DNA typing must utilize their service;

4. A national level regulatory body must be created to establish and regulate the rules on some important aspects of DNA evidence. The body should develop and implement strict standards for handling and testing DNA evidence;

5. State must make law nsisting all DNA laboratories to apply for accreditation;

6. Trial court must examine the chain- of -custody of the DNA samples from the time of collection to the determination of DNA results in a particular case in which DNA typing has been conducted. Court must insist on proving this chain of custody and if there is any doubt about the chain, the evidence must be excluded.

While applying the DNA fingerprinting technique and the population genetics, it is necessary to distinguish its weight and the admissibility. If the steps in a DNA fingerprinting technique and the method of calculating the probability figures derived from the application of the technique is found to be generally accepted in a scientific community and can be reasonably relied upon, the evidence derived from that technique can be admitted. At the same time, this evaluation is not enough to give clearance regarding the case specific application of the technique. While considering a case of specific application, it is necessary to have a threadbare analysis of the evidence and its background. Judges must evaluate it on part-by-part basis so that the problems and complications over the correctness of the sum result may affect the weight and
not the admissibility of the technique. Therefore, the general issues in DNA typing, population genetics and statistical interpretation are matters affecting the admissibility of the evidence and not the weight of the case where specific application of the technique is made. Thus the weight to be attached to the DNA typing result depends on the procedures followed by the DNA laboratories. The more the satisfaction in the underlying procedures followed by a DNA lab, the more weight can be attributed to the evidence. The only qualification, which should be provided, is that if the evidence of the DNA typing is totally unreliable which has the potential to create confusion or misleading to the judges, it should be excluded as having no probative value.

The four part evaluating factors provided by the Daubert court can be considered as a proper means for determining the admissibility and weight of the DNA evidence. The attitude of the Daubert court that the judges while evaluating the DNA evidence should act as scientific gatekeepers is a very effective recommendation.

Though the scientific community has accepted the foundations for the use of the mitochondrial DNA as a reliable genetic material establishing the individuality of a person, it is highly doubtful among the legal personalities. Challenges to mitochondrial DNA analysis often focus on the issue of paternal leakage, especially in criminal cases. The analysis of the decisions show that the related issues on the mitochondrial DNA typing like heteroplasmy, nomenclature and interpretation are not well grounded and hence unsustainable. However, courts should give considerable attention while interpreting the mitochondrial DNA test results in criminal cases.
Perhaps more than any other stage - the interpretation of the DNA results, the ‘profile’ has caused the greatest outcry for uniform standards. This includes the statistical processes used in defining a ‘match’ and the actual process of interpreting the bands. The results of DNA typing may either qualitatively include or exclude a potential suspect as the donor of DNA in an evidence sample. Exclusions require no statistical analysis since they are absolute. Inclusions require some assessment of how likely it would be to get the observed genetic match if, in fact, the suspect did not leave the DNA evidence. To complete this statistical assessment, it is necessary to quantify the chance of two events. (i) How likely is it that the suspect coincidentally has a DNA profile that matches the profile of the unknown person who really did leave the DNA evidence? (ii) How likely is it that the laboratory would declare a match between the evidence and the suspect when in fact their DNA profiles do not match? The events described in questions (i) and (ii) could both lead to a declared match when the suspect was not the source of the DNA and thus the chances of each event must be statistically evaluated.

Bayesian methods involve commencing with a prior probability, based on all evidence other than the DNA profile, and then using the DNA evidence to generate a modified or posterior probability. In a case where the defendant has been initially identified for other reasons, the prior probability would be much higher. Unfortunately, the application of Bayesian methods in the courtroom is highly controversial, as it may either usurp the jury’s role by having an expert fix the prior probability, or if the jury fixes the probability, it is required to translate subjective beliefs into a hard number. A possible solution is to report the DNA test results in words like inconclusive, weak, support, moderate support, moderately strong support, strong support, very strong support, and conclusive
so as to allow the judges to combine them with other evidence with the help of reasoning and commonsense.

Anyhow, scientific evidence either DNA typing or other evidence is valuable for its ability to lead the fact finder to truth. Whether it be legal truth or objective truth, the role and importance of science in the law is clear. The primary goal of the law is justice. Justice cannot be achieved without the presumption that the legal process is "finding" truth, and therefore scientific evidence is also valuable for its ability to help administer justice. Therefore the court of law should hear all of the scientific evidence available that will help acquaint them with truth. At the same time they should not give any preference to the evidence derived through scientific methods different from other type of evidence. It must put under the keen observation of the traditional evidential rule "the standard of proof" and it should be different in civil and criminal cases and differently considered for different cases.

In India, the DNA evidence and the standards for its admissibility is in its infant stage. Indian judicial system has only less experience in handling DNA evidence in civil and criminal cases. There is no legislation dealing with the issues on DNA evidence and its admissibility. The apex court has put the opinion of DNA expert under Section 45 of the Indian Evidence Act without evaluating its relevance in the Indian context. In future it is expected that more cases will be decided on the basis of this evidence. Therefore, in India, it is necessary to have a legislation dealing with DNA evidence. The researcher has attempted to draft a model legislation on the subject.7

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7 Model legislation is provided in Appendix B, which covers the provisions on DNA evidence.
Criminal investigation and inquiry are the roads through which the legal system travels to the ends of criminal justice. While traveling through this road, the system has to use different shortcuts to attain the ultimate justice. Sometimes while using these shortcuts there is a possibility of causing miscarriage of justice. Collecting forensic samples from the suspects and the denial of access to the forensic laboratories managed by the State are two situations in which miscarriage of justice may take place. It is the fundamental principle of the criminal jurisprudence that the accused in every criminal case must be given fair hearing and access to all facilities available to the State. If the State is using any advantages of any alien discipline like science, it should also be made available to the defence. It is also the constitutional obligation of every State that the defence must have equal opportunity to defend each and every contention raised by the State to establish the guilt of the accused. Therefore, State must make sure that the constitutional and legal provisions are in conformity with these basic principles.

The focus on forensic scientific evidence as an evidentiary mechanism is connected to a broader inquiry into the role of forensic science in law and criminal investigations. The research on the subject is also clearly related to and holds enormous implications for the broader interest in the civil liberties of the citizens at large. The use of scientific evidence has raised a number of concerns about increased police powers and the unquestioning adoption of a conservative crime control agenda in the administration of the criminal justice system. These concerns are more clearly legitimate from the point of view of societal interest than individual interest. However, a critical debate over the use of scientific technology warrants that utmost care should be taken by the legal system while interfering with the individuals' personal liberty. The unethical and unlimited use
of scientific faculty for the solution to the problem of determining criminality may result in vitiation of the criminal justice process. Care should be taken not to engage in scientific adventurism or allow DNA or other expert evidence to weaken the ordinary processes of the criminal justice system.

In the legal community the traditional opinion about an expert is that he is "an intellectual prostitute ready to sell his opinion and enlist in the services of the side that pays him... testimony of a dangerous character not much to be relied on, or of the very lowest order that is ever allowed in the court of justice". The discussion in chapter 7, tries to find out the reality of the above quoted sentence. This trend has been set owing to the partisanship of the experts and the unreliable character of the evidence often given by them. The result is that this class of testimony has lost most of its effectiveness in the legal system due to the evils developed in the experts' profession.

In the foregoing analysis, it has been identified that the major problem relating to expert testimony depends on the professional ethics and the degree of professionalism prevailing in the field to which the experts belong. Ethics in forensic setting is different from that in legal profession. A forensic scientist is under the obligation to tell the whole truth before a court of law. As public servants they have a duty towards the public. But there are certain factors, which may seriously affect the forensic scientist and the forensic profession as a whole. Hiding one's professional incompetence, approaching the issue with partiality and bias, making illegal monetary benefits and subjecting to extraneous influence are some of the ills, which undermine the credibility of the testimony of experts. Forensic profession requires a forensic scientist to announce correctly

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his expert status when he is required to testify as an expert in a particular subject. He shall not express any overenthusiastic statements regarding his qualifications or experience. Every forensic scientist is ethically obliged to state his competency in a particular field of scientific examination. Personal bias of a forensic scientist can be considered as a mortal blow to his ability and impartiality to testify as a forensic expert. If the subjective way of interpretation of forensic evidence is required, it must be done very carefully avoiding any kind of bias. Chance for extraneous influence shall be avoided to the maximum extent.

In forensic science, quality means two things viz. quality of a forensic lab and the quality of a forensic scientist. The quality in forensic lab means "fitness of the laboratories for the forensic science service" and quality of forensic service means one "achieved by the competent forensic practitioners that work under the guidance of a quality system and with the right philosophy and approach". In forensics, quality of any particular evidence almost depends on the person and the laboratory that handled the evidence sample. Factors like validation of a particular technique, quality of the instruments used for analysis, competency of the persons employed for the analysis, standards provided for avoiding contamination, accreditation of the laboratory, certification to the forensic personal and the crime laboratory proficiency testing to evaluate the continued capacity for analysis, the competency of technical support personnel and the quality performance of the laboratory will affect to a great extent the quality of the evidence tendered by the expert.

The reliability of forensic scientific evidence depends on the quality of the work done by the scientists and the quality of the instruments used by them for the work. The forensic scientists must keep in mind that in each and every work
they are engaged, they are not only helping the law enforcement machinery but also guiding in arrived the right decision. They should not turn their heads to any extraneous factor influencing their test results and should remember that they are accountable to the judicial system and the public for their acts and omissions. Reformation of the forensic scientific discipline must start from the discipline itself and if they do so in right earnest, it may not be for others to make any general recommendations for the improvement of the quality of expert evidence tendered by the members of the discipline.

A careful perusal of the foregoing discussion would reveal that there is an urgent need to evolve a healthy and sound law-science relationship. Therefore, the following suggestions are offered to ensure that good science and forensic personnel with high esteem will serve the criminal justice system effectively. From the analysis of the legislations, authorities and judicial decisions in the developed Nations, the conclusion to which the researcher has reached is that in India it is high time to think about the suitable amendments in the Indian Evidence Act and the Code of Criminal Procedure regarding the rules and procedures on both expert and lay witness testimonies. Therefore, the following suggestions are offered as possible means to ensure that the judicial evaluation of the scientific expert testimony is in par with the developed countries.

Suggestions for Law Reform

1. **Section 45 of the Indian Evidence Act should be suitably amended to expand the areas in which expert testimony may be given.** The amended Section may be as follows:
   
   45. Opinion of experts: When the Court has to form an opinion upon scientific, technical or other specialized knowledge, the opinions or inferences upon that point of persons specially skilled in or having experience, knowledge, training or education are relevant:
Provided that such opinion or inference will assist the trier of fact to understand the evidence or to determine a fact in issue.

**Scope of the amended Section**

Thus under the amended Section, the opinions or inferences of persons becomes relevant, if it is helpful for the determination of the fact in issue or any other facts connected with the fact in issue. The legislative intention in amending this Section ought to be to expand the areas in which a person can testify in the capacity of an expert. Accordingly, a witness is an expert witness and he will be qualified to testify, if the Judge finds that his testimony requires special knowledge, skill, experience or training and that the witness has the said requisites. The scope of the amended Section is that it gives a wider meaning to the term expert than that provided in the existing Section. The field of the testimony is not limited merely to the terms "science or art" but extended to all specialised knowledge. Similarly, under the amended Section the term expert is viewed in a broad sense as a person qualified by knowledge, skill, experience, training or education.

2. **In the Indian Evidence Act, a new Section 45-A should be inserted to read as under**

   45-A. Opinion Testimony by lay witnesses: If the Court has to form certain conclusions from the facts testified by a witness who had testified not as an expert are relevant, if he could not explain them directly except in the form of opinions or inferences; the court may consider such evidence.

   Provided that such opinion or inference is (a) rationally based on the perception of the witness (b) helpful to a clear understanding of the witness testimony or the determination of a fact in issue (c) limited to his common
experience warranting no need of special skill and experience as an expert and
(d) in conformity with the province of the judges.

Scope of the new Section

The proposed Section authorises courts to admit opinion testimony given
by lay witnesses, speaking in term of generality or conclusions, if it is rationally
based on their perception and helpful to the court in understanding the testimony
or for the determination of a fact in issue. The proposed Section seeks to
eliminate the old dichotomy, 'lay witnesses testify to facts and not opinions
based on facts'. The proviso to the proposed Section can be considered as a
condition precedent to be satisfied by the court before admitting the opinions of
lay witnesses. In sum, the legislative intention behind this Section ought to be to
give a discretionary power to the Judges to sift the opinions and inferences of
the lay witnesses for the determination of a fact in issue. But specifically this
Section does not permit a lay witness to express an opinion as to matters, which
are beyond the sphere of his common knowledge and needs special skill of an
expert as required in Section 45 of the Evidence Act. Similarly such opinion
cannot usurp the functions of the Judges.

3. Section 51 of the Indian Evidence Act should be amended to include a
three-part reliability test for determining the reliability of the opinion
testimony. The amended Section may be as follows:

51. Grounds of opinion when relevant: Whenever the opinion of any person
is relevant (1) the facts or data on which such opinion is based (2) the principles
and methods employed by the person who is giving the opinion and (3) evidence
about the correct application of the principles and methods in connection with the
particular case are also relevant.
Scope of the amended Section

The principle behind this amended Section is to provide a test for the proper evaluation of an opinion testimony especially the scientific opinion testimony. This Section must be read in the light of Section 45. The first part of this Section clearly requires the expert to prove the facts and data on which his testimony is based. The second part is entirely based on the factors, which include the testability of the theory or technique, known or potential error rate of the technique, peer review and publication and general acceptance of the technique within the relevant scientific community. The third part exclusively deals with some specific factors while applying the technique on a particular occasion. They include, (1) whether the expert’s opinion was developed expressly for the purpose of testifying, or as a result of independent research; (2) whether the expert has unjustifiably extrapolated his opinion from an accepted premise and applied it to an unfounded conclusion; (3) whether the expert has adequately considered and excluded obvious alternative explanations; (4) whether the expert is as careful as he would be in his regular professional work outside his paid litigation consulting. In order to satisfy these things the expert shall adduce all data connected with the test he has conducted.

4. A new part shall be inserted in Chapter XXIII of the Code of Criminal Procedure, dealing with the provisions relating to the expert evidence in criminal trials.

C- Provisions as to Expert Evidence in Criminal Trials.

299 A. Procedure for admitting expert evidence in criminal trials:

(1) The expert evidence may be received in criminal trials as oral evidence or written reports.

(2) In fast track courts, expert evidence shall be adduced in the form of written reports unless the court is of opinion that it is necessary for
the ends of justice to take oral testimony of an expert in addition to his written reports.

(3) The accused may with the leave of the court, call any expert to cross examine him, if any doubts arise regarding the reliability of the evidence in general or in connection with the tests or procedures the expert applied for arriving at a particular conclusion in that particular case.

(4) The evidence of an expert shall not be relied on unless his evidence is subjected to testing or clarified to the opposite party.

299 B. Experts report and its contents:

(1) The expert's report must be a speaking report in which he must state the substance of all material instructions, on the basis of which the report was written.

(2) The report must be directed to the court and it must contain the name, designation and qualifications of the expert.

(3) In the report the expert must specifically state the following things:

(a) Name of the test he conducted;

(b) The theory and technique he used;

(c) The validation of that theory and technique;

(d) The application of that theory or technique in the particular case;

(e) The potential rate of error;

(f) The existence and maintenance of standards;
(g) The care with which the scientific technique has been employed and whether it is susceptible to abuse;

(h) Whether there are analogous relationships with other types of scientific techniques that are routinely admitted in evidence;

(i) The presence of foolproof characteristics;

(j) The existence of specialized literature;

(k) The novelty of the technique in its relationship to more established areas of scientific analysis;

(l) Whether the technique has been generally accepted by experts in the field;

(m) The nature and breadth of the inference adduced;

(n) The clarity with which the technique may be explained;

(o) The extent to which basic data may be verified by the court and the jury;

(p) The availability of other experts to evaluate the technique;

(q) The probative significance of the evidence;

(r) If an expert is depending on hearsay statements for his opinion, he must state those statements specifically in the report.

299 C. Disclosure of the expert's report to the opposite side:

(1) Either party in a criminal trial are bound to disclose the expert's report to the opposite side.

(2) The prosecution shall disclose the report of the expert to the accused 60 days before the commencement of the trial.
(3) The accused is also duty bound to disclose the report of the expert to the prosecution, if he had requested for any expert analysis at any stage of the trial.

(4) A party who fails to disclose an expert's report cannot use the report at the trial or call the expert to give oral evidence unless the court or the opposite side gives permission for the same.

(5) If the report has been given by the expert directly to the court, the court shall give the copy of the report free of cost to the parties.

299 D. Requesting the reply of the expert:

(1) If an expert's report is served on the opposite side, he may serve written questions about the report to its proponent with the leave of the court.

(2) If written questions are served on the concerned expert, he shall give clarifications for the questions and those clarifications will be treated as forming part of the report.

299 E. Procedure regarding the appointment of Assessors:

(1) The court may appoint assessors to assess the evidence given by the experts.

(2) The assessors are persons having special skill and experience in the field in which they are assessing.

(3) The assessors are not witnesses in the case but they are part of the court in that particular trial.
(4) The assessors shall prepare a report after the completion of the trial and the copy of the said report shall be given to either parties free of cost.

(5) After giving a hearing to the parties on the report of the assessors, court may use it as evidence to support or contradict the evidence given by the experts in that particular case.

299 F. Duties of an Expert in Criminal Cases:

1. An expert either appointed by the prosecution or by the defence, is duty bound to the court and not to the parties who appointed him.

2. His primary duty is to help the court in matters in which court needs his expertise.

3. An expert must be impartial, unbiased and should not allow himself to be influenced by the prosecution or defence.

4. His evidence should be an independent product to assist the court in matters falling within his expertise.

5. He should not add to or detract from the actual findings in the case for his own benefits.

6. He should not try to answer the questions that fall outside his expertise.

7. He should not try to mislead the court by giving false statements or by giving wrong opinions with insufficient data.

8. If the court or any party in a particular case requires, he should make available all the materials used by him for reaching his opinion.
9. He should not usurp the role of an advocate in the case in which he is acting as expert.

10. He should not try to determine the legal issues or the main issue in the case in which he is appointed as expert.

11. He should give correct and precise answers in plain language for the questions asked by the advocates in the case.

A Three-tier Scheme for the Proper Evaluation of the Scientific Evidence:

From the comparative analysis conducted in chapter 2, it is clear that no test can be considered as complete for the evaluation of scientific evidence. However, the tests like reliability and Daubert have received approval and approbation from U.S. Judges. In India, the suggestion is to adopt a three-tier scheme for streamlining the field of the judicial appreciation of scientific expert testimony. In the first step of the scheme, it is advisable to adopt a pre-trial hearing as a full stretch reliability test for checking the probative value of the scientific evidence. In this stage, court should make a critical evaluation of the theory, technique and the application of the technique in the particular case. It is advisable to conduct this evaluation either with the help of an assessor or an independent expert having thorough knowledge about the technique. He must be a person totally independent from the proponent of the technique. The court may also provide a panel of experts for the said evaluation. During this evaluation, court shall properly analyse the factors provided in the proposed Section 299 B of the Code of Criminal Procedure. While conducting the analysis under this stage, court should make it clear that the projected scientific evidence has a well-founded scientific basis. Therefore, either party shall adduce scientific
expert opinion in court with sufficient scientific support for testing the quality of the evidence offered.

Once the first step analysis is completed, court should look into another important factor, i.e. the prejudicia effect of the evidence adduced and its effect. The expert testimony, a special category of evidence may create substantial danger of undue prejudice, confusing and misleading the judges etc. In such situations it is advisable to reject the evidence. The effect of this prejudicial effect will be high in the absence of any other evidence in the case to establish the facts sought to be proved. In such situations, court should clearly weigh the probative value of the evidence in the case with the prejudicial effect that may be occasioned by the acceptance of such evidence.

After the completion of these two steps, court should continue to use the corroborative proof as an additional requirement for validating scientific facts. This will help minimise to a great extent the miscarriages of justice arising from the blind acceptance of scientific evidence. However, insisting corroboration should not be made as an inflexible rule. If the scientific evidence from a single source is highly reliable to grant a conviction, court can pass it after the evaluation of the evidence with the help of the first two steps.

Suggestions for Minimising Miscarriages of Justice caused by the application of the Improper Forensic Scientific Evidence:

1. As a first step, the Department of Law and Justice should take immediate steps to appoint a commission in forensic justice to investigate and report about the functioning of all forensic evidence in criminal cases and observe the miscarriages of justice, if any, caused by the application of such evidence.
2. A permanent statutory body known as the Indian Forensic Science Council must be constituted similar to the Indian Medical Council or Bar Council of India. The Council must be a body empowered to formulate and implement forensic science policy and also to control and regulate all forensic science professionals. The Council shall be empowered to take disciplinary actions against the forensic persons who are going against the professional ethics.

3. The government shall implement a scheme for compulsory accreditation of all forensic and related laboratories and compulsory certification regarding the competence of all forensic scientists and technicians working in the laboratories.

4. The State monopoly of forensic science laboratories must be ended. Forensic science laboratories must be separated from the police department and independent status must be given to them. This will help avoid partisanship and bias on the part of the forensic scientists to a great extent.

5. If the forensic science laboratories are changed to independent institutions, equal opportunity must be given to both prosecution and defence to get forensic science services. Presently, only the prosecution has access to the forensic science laboratories managed by the State. State aid provided to indigent criminal defendants for defending the charge must also include the aid for forensic services.

6. Defence must be given opportunities to challenge the prosecutions forensic evidence. This is possible only if they are allowed to have access at the initial stage itself. Moreover, prosecution must make
available the samples collected from the crime scene to the defendants, if they want to retest or get them examined by an independent forensic expert. Law enacted for the purpose must regulate these things. The present position is that the prosecution will disturb almost all crime scenes and the exhibits might be damaged or destroyed by them by the time the defence lawyers reach the scene. Special provisions must be included in the relevant laws directing the police or forensic authorities for storing the samples till the final disposal of the case.

7. A special Act must be enacted for regulating forensic procedures.  

8. A Code of Ethics shall be framed for forensic profession.

9. If crime scene investigators are appointed, decision regarding which scene is to be searched and what evidence is to be collected from a scene should be left to the discretion of such officers.

10. The forensic scientific profession shall cooperate with legal profession for the smooth functioning of both and to prevent junk science from entering the legal system.

11. Educating persons belonging to the legal system:

Training centers shall be constituted at national level for giving special training to the Judges in all forensic techniques especially on novel forensic techniques. It is advisable to publish a journal on forensic techniques under the supervision of reputed forensic scientists and under the control of the National Judicial Academy. Similarly, Bar Council of India shall take steps to include forensic science as compulsory paper in

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9 Model legislation "The Indian Forensic Procedures, Act" is provided in appendix B.

10 As a model, the Code of ethics of the American Society of Crime Laboratories is provided in appendix C.
the curriculum of law graduation. This will help to a great extent the persons who are interested in criminal practice and who have no scientific background. The problem of lawyers’ illiteracy in science could be solved to some extent by this education program. A continuing scientific education to the judges and lawyers in forensic scientific techniques may help to some extent to remove the scientific ignorance.

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