Chapter-V

Legal Perspective of DNA Technology

1. Legislations in India

1.1 Constitution on India :

Following are the relevant articles of the Indian Constitution, which deals directly or indirectly with the use, and application of DNA technology

-Article 51-(a), (h), (j) Fundamental Duties

-Article-20 (3)

Article-21 Fundamental Rights Including Right to Privacy, Right To Information ,22,226 and 227

(i) Article -51- Fundamental Duties

The Constitution of India, by Article 51A (h) and (j), declares that, it shall be the duty of every citizen of India "to develop the scientific temper, humanism and the spirit of inquiry and reform"; and "to strive towards excellence in all spheres of individual and collective activity so that the nation constantly rises to higher levels of Endeavour and achievement." The Parliament is legislatively competent to make laws with respect to the Union agencies and institutions for professional, vocational or technical training, promotion of special studies or research, or scientific or technical assistance in the investigation or detection of crime and with respect to coordination and determination of standards in institutions for higher education or research and scientific and technical institutions.[161] The constitutional provisions take care of the scientific developments that may take place and may be put to use for the benefit of the people. The Constitution provides efficient scales for balancing between public and private interests and the Courts have put to use its provisions for an effective social

[161] V.D. Mahajan,Entries 65 and 66 of the Union List in the Constitution of India, *Constitution of India*, 9th Edition (Entries 65 and 66 of the Union List).

engineering to protect both the cherished human rights recognized by the Constitution and the paramount public interest in a welfare State.

(ii) Article 20(3):

Articles 20(3) of the Indian Constitution provides that no person accused of any offence shall be compelled to be a witness against himself. Article 20(3) is based upon the presumption drawn by law that the accused person is innocent till proved guilty. It also protects the accused by shielding him from the possible torture during investigation in police custody. What Article 20(3) contemplates is forcing testimony thereby incriminating oneself in a crime. Therefore police cannot forcibly extract confession. The term witness in this clause means source of information thereby incriminating self. But precondition to this is some sort of force or coercion. One cannot take advantage of his own wrong. Using DNA Technology for detecting the culprit is in no way against this right. In reality it facilitates the advancement of Justice; anyhow it is different from confession provided that DNA test is carried under the supervision/guidance of Judiciary, which will ensure just, fair and reasonable procedure. In Raman Lal Bhogi Lal Shah Vs V.K. Guha [162], Supreme Court held that protection under Article 20(3) is only against the person being compelled to be a witness against himself. It doesn't mean that he need not give information of matters, which don't tend to in cremate him. The accusatorial system gives too much importance to the right of the accused. It doesn't care about law enforcement if the accused is innocent then why he is refuge under Article 20(3), when subjected to DNA test. In order to reach the right conclusion, one must see the right perspective.

(iii) Article 21-Right to life

Our Constitution being an organic document caters the need of organic man with its omnipresence in every part of our lives. Fundamental rights are incorporated with a view to foster development of man and to check state action in this field. Fundamental

[162] B.R.Sharma, "Forensic Science in criminal investigation and Trials", Universal Law Co. Forth Ed., 2003 Available at Http.// in.news.yahoo.com/USA/DNAacts.asp (Last Accessed on 2nd November 2007)

rights in themselves are not absolute, which is in consonance with jurisprudential ideology. So they cannot be stretched too far or else the legal system will be in problem.

Under the garb of Article 21, the accused cannot be helped to free him. The concept of predominance of the legal sprit as accepted by the general conscience of the common man and the intellect speaks that if there is a written law or even there if there is not written law, such law must provide for justice which is actually manifested in action and not only on paper. So to be in line with predominance of legal sprit, care must be taken not only of the interest of the accused but the interest of the victim and society at large. Therefore proper thought should be given while appreciating any form of evidence within the notion of predominance of legal sprit.

a. Drawing Blood and Legal Questions:

It goes without saying that a blood/DNA test can only be conducted if blood or DNA samples are taken. In case, blood/DNA samples are otherwise available, it has to be further proved that these truly belong to the donor or the person in question and further that these match with the specimen samples. Unless samples are taken for matching – comparison, a report cannot be obtained from an expert and the chances of comparison would not arise.[163]

What would be the position when any sample is not available and the person? Whose blood/DNA test is to be undertaken? Does not consent to give it? Whether a sample of blood for DNA test can be taken by force? What is the legal scene in developed countries? Is there any law in India regarding the taking of blood/DNA sample? Can such a sample be taken under compulsion or use of force? What are the shortcomings in this behalf? In the absence of a specific legislation, how a sample of blood of a minor/child or chronically ill patient can be taken? All and such similar questions are being considered by legal regime all around the world.

So far as DNA technology is concerned there is the conflict between two fundamental rights i.e. right to privacy and right to information. welfare of the state and public policy. Because due to absence of specific legislation on DNA technology the court

[163] Criminal Law Journal 2004

cannot compel a person to go for DNA or blood test because it amounts to breach of right to privacy, the courts can only direct the parties to the criminal case or civil suits to go for the same. but it in criminal case for the interest of the victim and welfare of then state as a part of public policy and to give justice to victim there arise the question of right to information from the concerned person who is suppose to disclose the relevant facts to establish the conclusive proofs during the judicial proceedings before the courts of law.

So when we think to introduce any legislation on DNA technology we will have to respect the constitutional rights and at the same time see to it that the justice must be delivered properly.

1.2 The Indian Evidence Act, 1872

Section 2,3,4,5,27,45,112,113,114,115,122

The Indian Evidence Act 1872 does not directly specify the use or applicability of DNA technology. But some of its sections take into consideration the use of the DNA technology as a matter of Evidence. The sections, which take in to consideration the use and application of DNA technology directly or indirectly, are as under

Section -9 deals with "Facts...which establish the identity of anything or person whose identity ids relevant ....are relevant in so far as they are necessary for that purpose"

Section -45 Deals with the expert evidence " When the court has to form an opinion upon a point of foreign law or science or art or as to identify the handwriting or finger impressions, the opinion upon point of that person specially skilled in such foreign law, science, or art in question... such persons are called experts"

Section -46-Fcts bearing the opinion of an expert

Section-51 deals with grounds of opinion,

Section 112-deals with the provision of the legitimacy of the child born. At the same time illegitimacy of the of a child if "no access" between husband ands wife is established.

Section114- Court may presume existence of certain facts -The Court may presume the existence of any fact which it thinks likely to have happened, regard being had to the common course of natural events, human conduct and public and private business, in their relation to the facts of the particular case.

a) Evidence of Expert

Application of DNA testing is now well established in developing countries. In India in several cases the judgement has been given either based on the result of DNA testing alone or with other corroborative evidence, although many courts in India have accepted DNA test. It has not been included in Indian Evidence Act. It is therefore left to the discretion of the judges whether the DNA test under section 45 of the Indian Evidence Act to be accepted or not.[164]

The first paternity dispute in India[165], which solved by DNA fingerprinting test, was the case No. M.C. 1 f 1988 in the Court of the Chief Judicial Magistrate of Telicherry *(Thalassery).* The Chief Judicial Magistrate held that: The Evidence of Expert is admissible under Section 45 of the Indian Evidence Act, 1972. So also, the grounds on which the opinion is arrived at are also relevant under S.51 of the Indian Evidence Act, PW 4 is an expert in the matter of molecular biology and the evidence tendered by him is quite convincing and I have no reason why it should not be accepted. Just like the opinion of a chemical analyst, or like the opinion of a fingerprint expert, opinion of PW4, who is also expert in the matter of cellular and molecular biology, is also acceptable."This verdict was challenged the High Court but the High Court upheld the verdict of the Telicherry Court stating that the results of DNA test by itself could be deciding paternity.

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[164] DNA identification Act which allowed DNA Data bank to be created and amended the Criminal code to provide a mechanism for the judge to order persons convicted of designated offences to provide blood , buckle or hair samples from which DNA profile will be derived.- has been passed in Canada Britain has Criminal Justice Act provides for forcible testing of blood testing.

[165] Pandit, M. w. and Dr. Lalji Singh "DNA testing Evidence Act and Expert witness" *Indian Police Journal* December 2000

b) Evidentiary Aspects of DNA and Cases relating to Paternity Disputes: -

In India DNA fingerprinting and analysis has been widely used in paternity cases.[166] In this section of the project, several interesting issues will be dealt with. Prominent among these is the effect of the new developments in forensic in the form of DNA profiling/fingerprinting and the case for an amendment to S.112 of the Indian Evidence Act dealing with conclusive proof in paternity cases. The other major issue with respect to paternity cases, on which there is much conflicting case, law deals with whether the Courts can direct one of the parties to give a sample of DNA and the effect of refusal to undergo a DNA test. This has obvious constitutional implications.

Section 112 and DNA Evidence

Section 112 of the Indian Evidence Act deals with the proof of legitimacy of offspring if they are born during wedlock or within a certain period of the dissolution of marriage. In many ways it is a unique section. On the one hand it establishes the fact of marriage as conclusive proof of the legitimacy of the children and at the same time mentions that the conclusive proof of legitimacy (i.e. marriage) can be avoided if the parties could not have begotten the child as the spouses had no access to each other.[167] The obvious purpose behind such a section would be to prevent the unnecessary bastardization of illegitimate children and the condemning of their mothers and unchaste. However, with the advent of DNA fingerprinting analysis some problems have arisen. The problem that is being referred to came up for consideration by the Supreme Court in case of Kamti Devi v. Poshi Ram.[168]. In the facts of this case the respondent was the husband of the appellant. Fifteen years after marriage the appellant gave birth to a child. The respondent filed a civil suit for declaration that he was not the father of the said child. Though the issue was not directly in issue in the instant case, the Supreme Court opined that even a DNA test that indicated that the respondent was not the father of the child would not be enough to rebut the

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[166] Arukumar v. Turaka Kondalal Rao, 1998 Cri.L. J.4279 Where a single locus probe RFLP AND STR analysis was carried out to prove the paternity of the child

[167] Sec- 112 0f Indian Evidence Act – Birth during Marriage. Conclusive Proof of Legitimacy:" The fact that any person born during the continuance of the valid marriage between his mother and any man, within two hundred and eighty days after his dissolution, the mother remaining unmarried, shall be conclusive proof that he is the legitimate son of that man, in AIR 2001 SC 2226 it can be shown, that the parties to the marriage had no access to each other at any time when he could be begotten. '

[168] ibid

conclusiveness of the marriage as proof of legitimacy of the child. The Court held that the only way of rebutting the conclusive proof provision would be to adduce evidence of non-access.

In light of the fact that S. 112 was drafted at a time when even the discovery of DNA had not been contemplated, the section should be amended. What would be ideal is that another outlet apart from proof of non-access be provided in the form of evidence of a DNA test to rebut the conclusive proof provision in S.112. The Bombay High Court has also lamented the absurdity of having only proof of non-access when DNA evidence can decide the matter in a more scientific manner.[169]

The *raison deter* under the Evidence Act is against the legitimization of a child and is based on public policy and that a child should not suffer on account of lapses of parents. It is also the normative legislative intention that when certain fact is considered as conclusive proof of another fact, the judiciary generally disables the party in disrupting in such proof. The only exception provided in Indian Evidence Act is in the form of an outlet to a party, who wants to escape from the rigor of that conclusiveness. In such cases, it's the DNA test, which helps the Courts to decide on the contentious issue, based on aspect of conclusiveness[170]

Many a time's questions have been raised before the Courts in cases of DNA fingerprinting, creating a hindrance to the investigating agencies, and they are: whether a suspect, or for that matter anybody can be forced to give a blood sample for testing? And whether such a testing would be considered a violation of Article 20(3) of the Constitution of India, which protects every citizen from providing self-incriminating evidence? And whether an order forcing an individual for DNA testing would be violation of his right to privacy? And if the person refuses to submit

[169] Sadashiv Mallikarjun Khedarkar v. Nandini Sadashiv Khedarkar, 1995 Cri. L. J. 4090(Bom) at 4093 R.J. Vidyanath J,Observed as under -'There may be instances where the husband and wife are living together and the wife may have gone astray and then delivered a child through illicit connection. But in the view of legal presumption under sec-112 of Indian Evidence Act the husband cannot be allowed to prove that the child is not born to him since husband and wife are living together, even if it is proved that wife had some illicit relationship with another person. What should be done in such a case is a question death has cropped up in my mind ... but if we go by rigor or presumption under Sec-112 of the Evidence Act no husband can be permitted to prove that the child born to the wife is not his, if the husband and wife ere together even if wife is proved to be living in adultery.

[170] Gautam Kundu Vs State of West Bengal.26

himself/herself to such test whether adverse the Court can draw inference or presumption?

Justice Jagganatha Rao, Chief Justice of the Kerala High court pointed the lacunae in this regard in 1995 in a verdict of the paternity dispute, Justice Rao pointed out in his judgments two facts:[171]

(i) DNA testing is as yet not considered a conclusive proof under Section 112 of the Evidence Act, and

(ii) Law has not been passed by the Parliament for such testing.

Section 112 uses the words, "conclusive proof and refers to non-access as the sole exception. Therefore, as the language of the section stands, no other evidence is permissible except non-access, to prove that a person is not the father. This was held in several decided cases and also recently by the Supreme Court in Kanti Devi v. Poshi Ram.[172] That case concerned DNA evidence but the Supreme Court refused to permit the evidence on the ground that except non-access no other evidence is permissible to prove that a person is not the father. Judgment of the Supreme Court in 1993 also highlighted the fact that there is no provision in Indian laws to force or compel people to undergo blood tests or any other type of DNA testing

Bombay High Court in the case of Sadashiv Malikarjun Kheradkar v. Smt. Nandini Sadashiv Kheradkar, [173], it was held that the Court has power to direct blood examination but it should not be done as a matter of course or to have a roving inquiry. The Bombay High court even felt that there should be a suitable amendment by the Legislature and after nothing that no body can be compelled to give blood sample, it was held that the Court can give a direction but cannot compel giving of blood sample.

In a recent case of Mrs. Kanchan Bedi v. Shri Gurpreet Singh Bedi[174], where the parentage of the infant was in question, and the application filed by the mother for

[171]Though the Indian Evidence Act Proposed Bill 20o3 apart from the sole exception of 'non- access" other exceptions by way of blood-group[p tests, but subject to very stringent conditions.
[172] AIR 2001 SC 2266: 2001 Cri LJ 2615.
[173] 1995 Cri LJ 4090
[174] AIR 2003 Delhi 446

conducting DNA the father contending that it would violate his rights vehemently opposed test. Hon'bleVikramjit Sen, J. held that: "it-appears to me to be difficult to resist that the law, as it presently stands, does not contemplate any impediment or violation of rights in directing persons to submit themselves for DNA test, especially where the parentage of a child is in controversy for the grant of maintenance. It was further held that where the parentage of a child is I controversy for the grant of maintenance, parties submitting themselves for the DNA test is not violation of rights. He relied on the decision of the Hon'ble Supreme Court in the case of Geeta Daha v. NCT of Delhi (DB), [175], where a Division Bench of Hon'ble Supreme Court had ordered that a DNA test be conducted on a fetus of a rape victim. Hon'ble Vikramjit Sen. J. distinguished this case from the case of Goutam Kundu v. State of West Bengal,[176], where it was held that "wife cannot be forced to give blood sample and no adverse inference against her for this refusal". In M/s. X v. Mr. Z, [177], a single Judge of Delhi High Court had allowed a similar application and had directed that at the cost of husband, the Pathology Department of All India Institute of Medical Sciences should conduct the DNA test. The DNA test was to be conducted of a fetus.

c) Direction to Give Sample and Adverse Inferences

(Nemo Tenetur Scipsum Accusare- No Man Can Be Condemned To Criminate Himself)

In a very important and recent judgment Delivered by the Hon'ble Supreme court of India in the case of Sharda v. Dharampal, [178]where the core question was, whether a party to a divorce proceeding can be compelled to a medical examination. In this case the Respondent on the ground that such an order violates his right to privacy opposed an order for DNA test. The three Judge Bench of the Hon'ble Supreme court held that: "If for arriving at the satisfaction of the Court and to protect the right of a party to the lies who may otherwise be found to be incapable of protecting his own interest, the court passes an appropriate order, the question of such action being volatile of Art. 21 of the Constitution of India would not arise. The court having regard to Art, 21 of the Constitution of India must also see to it that the right of a person to defend himself

[175] 1997(1) JCC 101
[176] 1993 Cri LJ 3233: AIR 1993 SC 2295
[177] AIR 2002 Delhi 217
[178] 2003 AIR SVW 1950: AIR 2003 SC 3450

must be adequately protected." It further held that if respondent avoids such medical examination on the ground that it violates his/her right to privacy or for a matter right to personal liberty as enshrined under Art. 21 of the constitution of India, then it may in most of such cases become impossible to arrive at a conclusion. It was also said that if despite an order passed by the Court, a person refuses to submit himself to such medical examination, a strong case for drawing an adverse inference would be made out. Section 114 of the Indian Evidence Act enables a Court to draw an adverse inference if the party does not produce the relevant evidences in his power and possession.

Some controversial issues have also arisen with respect to whether a person can be compelled to give DNA samples as evidence. These problems have arisen particularly with reference to the dictum of the Supreme Court in Goutam Kundu v. State of West Bengal[179]. The interpretation of this case and others has led to some conflicting decisions in the High Courts.

In Syed Mohammad Ghouse v. Noorunnissa Begum[180], the Andhra Pradesh High Court held that the respondent in this case was under no compulsion to submit to a DNA test. The order of the family Court directing the DNA test was set aside and the Court relied on Kundu's case [181] In Goutam Kundu v. State of West Bengal the Supreme Court had made the following observations with respect to directions to give a blood test:

1. "That Court in India cannot order blood test as a matter of course."
2. "Wherever applications are made for such prayers in order to have roving inquiry the prayer for blood test cannot be entertained."
3. "There must be a strong prima facie case in that the husband must establish non-access in order to dispel the presumption arising under Section 112 of the Evidence Act."
4. "The Court must carefully examine as to what would be the consequence of ordering the blood test: whether it will have the effect of branding a child as a bastard and the mother as an unchaste woman."
5. "No one can be compelled to give sample of blood for analysis."

[179] 1993 Cri LJ 3233: AIR 1993 SC 2295
[180] 2001 Cri LJ 2028
[181] 1993 Cri LJ 3233: AIR 1993 SC 2295

However there have been several High Court cases that have distinguished Kundu's case while dealing with cases of DNA testing and paternity. In Kanchan Bedi v. Gurpreet Singh Bedi [182]the defendant denied that any marriage had taken place between him and the plaintiff, and therefore he was not the father of the child. A DNA test was demanded to determine the paternity of the child and the direction of the Court with respect to the DNA test was challenged. Kundu's case was distinguished on facts[183] and on the ground that the future of a minor infant was in question and the Court's parens patriae jurisdiction had been invoked in this regard.

Again, in Sajeera v. P.K. Sahm[184] a direction to undergo a DNA test was given. However in this case it was already admitted by the mother that the child was born out of wedlock and there had been an illicit relationship. Moreover the Respondent had expressed willingness to undergo the test at the petitioner's cost and there was no question of compulsion.

Another related issue is of the refusal to undergo a DNA test in paternity cases. It has been held by the Supreme Court that refusal to undergo a paternity (DNA) test would bar a party from challenging the paternity of the child. Dwarika Prasad Satpathy v. Bidyut Prava Dixit.[185]. This decision of the Supreme Court has been followed in the case of K. Selvaraj v. P. Jayakumari [186]and it was also stated that an adverse inference can be drawn if the party refuses to undergo a DNA test. The point of adverse inference is also referred to in another case Sadashiv Mallikarjun Kheradkar v. Nandini Sadashiv Mallikarjun Kheradkar [187]This seems to be a preferable interpretation and strikes a balance between the two extremes. The Court does not have the power to direct the giving of a sample, but if it is not given the Court may draw an adverse inference.

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[182] 2003 (103) Delhi LT 165

[183]The difference being that in the facts of Kundu's case the marriage of the spouses was admitted in the possible reason for the decision was that the legitimacy of the child was presumed and the subjection of the wife to a test was an attempt to "outrage her modesty".

[184] 2000 Cri L J 1208 (Ker). No question of compulsion arises in the case of preserved fetus and direction to conduct paternity test can be made- Alika Khosla v. Thomas Mathew, Manu/DE/1842/2001.

[185] 2000 Cri LJ 4748 (Kerala), 2000 Cri LJ 1 : AIR 1999 SC 3348

[186] 2000 Cri 1995, Cri LJ 4090 (Bom).

[187] 1995 Cri LJ 4090 (Bom).

An ordinary finger print (thump impression) is a reliable technique in crime detection but DNA finger printing is much more reliable, because ordinary finger prints are not always available in the crime scene, as shrewd criminals commit crimes by using hand gloves.

Every person has a unique and distinct DNA Characteristics and it will not match with any other person.[188]

By employing the basic structure of DNA finger printing many complicated legal problems have been solved.

1.3 Criminal Procedure Code, 1973

Section 125, 53, 54,295(4), 156,174,482

(i) Section 125- Maintenance of children both illegitimate legitimate, parents and wife125 (2)'(C) maintenance of illegitimate child, section125 (5) no, maintenance to adulterous wife. When it is proved through DNA test that parties civil suit are parents of the child, or if blood relation is established between the child and the accused person for the purpose of this section then the child (i9rrespective of legitimacy) and his mother becomes entitled to get maintainance from that person.

Following are some other provisions of the Criminal Procedure Code which can establish the relationship with application of DNA Technology in one or other way in case of commission of heinous crime such as murder, homicide, infanticide, abetment to commit suicide, sexual offences and all. Where after the examination of the things collected from the crime scene and matching the same with the accused persons DNA, it become easy for investigation agencies and court to reach to the conclusion that who committed the crime.

(ii) Section53- Examination of an accused by medical practitioner at the request of police officer

(iii) Section-53 An Examination of a person accused of rape by medical practitioner-

[188] The Unreported Judgments (Journal Section) Volume 2005 (2). Article by Dr.Durga Pada Das

(iv) Section 54- Examination of the arrested person by medical practitioner at the request of arrested person

With predominance of legal sprit in mind, Justice Malimath Committee recommended that DNA expert being included in the list of experts under Section 295(4) of Code of Criminal Procedure, 1973. Section 54 of Cr.P.C. provides for medical examination of the accused in case if there are any injuries on his person. In Ananth Kumar Vs Andhra Pradesh the expression 'examination of the person' includes physical examination, medical test of blood, Semen, sputum, urine etc. Thus under these provisions DNA Test can be done by medical practitioner. In D.J Vaghela Vs Kantibai Jethabai the High Court held that obtaining of blood, semen, saliva, urine etc; under Section 53 of Cr.P.C, is not volatile of Article 20(3) of the Constitution which permits protection against self incrimation under Sections 156 &174 of Cr.P.C. Predominance of legal spirit demanded that the court must be empowered to order for DNA testing (medical examination), so as to facilitate justice.

Thus, Justice MalimathCommittee Report also recommended for amendment of Section 482 of Cr.P.C, 1973, in the following words:

"Every Court shall have inherent power to make such order as may be necessary to discover truth or to give effective order under this Code or to prevent abuse of the process of the Court or otherwise to secure the ends of the justice" By using this provision the court will be better equipped with more powers of investigation like the Courts of inquisitorial system. DNA testing can also be carried out with the help of this provision. Section 313 of Cr.P.C, must be amended so as to draw adverse inference against the accused, if he fails to answer any relevant material against him. Therefore, DNA evidence can be used against the accused in light of this provision.

1.4 Code Of Civil Procedure, 1908 (section 151, Order XXXII r-15, Order XXXVI Rule -10-A)

Section 151 of Code of Civil Procedure saves the inherent power of the Courts to investigate up to any extent as may be necessary for the ends of justice ought to prevent abuse of the process of the court. So, DNA test can be conducted and necessary directions can be given by the use of the inherent powers of the court in

cases related to Succession and inheritance. As there is no direct law or legislation in India authorising Courts to direct the parties to the civil case to go for blood test or to under go DNA test, as it clashes with Constitutional provisions such as right to life, privacy, against self incrimination etc. in India.. So the give provision can be applied as an exception to the rule.

1.5 The Indian Penal Code 1860

Following are the important sections of Indian Penal Code[189]

Where there is a direct or indirect indication of the use of the DNA technology: these all relevant section are used in chapter 2 and 3 of the thesis under the title "Use of DNA Technology in administration of criminal justice system."

(i) The offences affecting the human body

Section-299 culpable homicide

Section-300 Murder

Section301- culpable homicide by causing death of a person other then the person whose death was interned

Section-304-A-Causing Death By Negligence

Section 304-B- Dowry death

Section-306- Abetment of suicide

Section312 Causing miscarriage

Section-313 to 315—causing miscarriage, injuries to unborn child, exposure of infant's concealment of birth of baby

[189] The above mentioned sections have already been discussed in chapter IV and VI of the research work with the description of case laws and supreme court-high courts judgments held in India.

(ii) Sexual offences

Section 375 Rape

Section 376 –A intercourse of man within wife during separation

Section 376-B Intercourse By A Public Servant With A Women In Custody

Section -376 C- Intercourse By Superintendent Of Jail, Remand Home-

Section376-D By Management Staff Of Hospital

(iii) Offences against marriage-

Section-497- Adultery

1.6 Identification of Prisoner's Act, 1920

The Justice Mallimath Committee has recommended for amending Section 4 of Identification of Prisoner's Act, 1920 on lines of Sec.27 of Prevention of Terrorism Act, 2002 (POTA)[190].

Sec.27 of POTA provided that the police officer while investigating any case can request the Court of CJM or the Court of CMM, as the case may be, in writing for obtaining samples of handwriting, fingerprints, blood, saliva etc. from any accused person. If these recommendations are implemented, it will be possible for the investigating agencies to go for DNA testing in identifying the culprit.

1.7 Transplantation of the human Organs Act 1994

It has recognized the status of gene test. Under this Act, to establish the identity of the nearer relation ship of donor and recipient, two-multi locus gene test is required in case of doubt. In this case use of DNA technology becomes helpful to curb the criminal malpractice of transplanting human organ without his knowledge, consent

[190] POTA was in force for certain duration and now it has been replaced with National Secuities Act 1980.

and with ignorance done by the medical practitioner by providing forensic evidential proofs of the same..

1.8 Patent Laws

Patent claims may assert rights over DNA in various ways, for example, they may claim one or more of the following.

- The DNA sequence, whether comprising a complete or partial gene promoters' enhancers
- Individualexons
- Expressed sequences as expressed sequence tags (*ESTs*) or *cDNAs* whole transcribed genes as cDNAs
- Individual mutations known to cause disease
- Variation between people not associated with disease (polymorphisms)
- Cloning vectors, formed from bacterial DNA, which are used to express
- Proteins in replicated DNA sequences
- Nucleic acid probes, which are fragments of DNA that are used to locate particular parts of DNA sequences
- Methods of identifying the existence of a DNA sequence or a mutation or deletion in an individual
- Testing kits for detecting genetic mutations
- Whole genomes

In the Doctrinal work, referring to the case of Diamond v. Chakraboarty, it was observed that, perhaps the most well known example of a living organism, which was granted a patent, is the genetically engineered bacterium that was the subject of litigation in that case. The Supreme Court allowed the grant of the patent to stand, US Chief Justice Burger famously remarking that in principle `anything under the sun that is made by man is eligible for patenting'. Other living organisms that have been patented include yeasts, viruses, and cell lines[191].

[191] See The Ethics of Patenting DNA, Discussion Paper by Nuffield Council on Bioethics-2002, para 3.12,Available at www.legalservicesindia.com/articles/dna.htm and

European patent law relating to naturally occurring phenomena and living organisms have evolved along similar lines. The 1998 EC Directive on the Legal Protection of Biotechnological Inventions (98/44/EC) states in Article 3 that: for the purposes of this Directive, inventions which are new, which involve an inventive step and which are susceptible of industrial application shall be patentable even if they concern a product consisting of or containing biological material or a process by means of which biological material is produced, processed or used. Biological material, which is isolated from its natural environment or produced by means of a technical process, may be the subject of an invention even if it previously occurred in nature.

Article 5 of the EC Directives states that, an element isolated from the human body or produced through a technical process, including the sequence or partial sequence of a gene, may be patented even where that element's structure is identical to that of a natural element. It can therefore be seen that in both the US and Europe, DNA sequences are regarded by the law, in principle, as being eligible for patenting once they have been isolated from their natural environment. However, to be granted a patent, they must meet the legal criteria of being novel, inventive and having utility or being capable of industrial application. The question whether DNA sequences are eligible for patenting is distinct from the question whether they meet these legal criteria.

Under the Patents Act, 1970, which is applicable in India "Invention" as defined in section 2(1) (j) means, any new and useful – (i) art, process, method or manner of manufacture, (ii) machine, apparatus or other article, (iii) substance produced by manufacture. Amongst the inventions which are not patentable are an invention the primary or intended use of which would be contrary to law or morality or injurious to public health; the mere discovery of a scientific principle or formulation of an abstract theory; the mere discovery of any new property or new use for a known substance or of the mere use of a known process, machine or apparatus unless such known process results in a new product or employs at least one new reactant; a substance obtained by a mere admixture resulting only in the aggregation of the properties of the components thereof or a process for producing such substance; any process for the

medicinal, surgical, curative, prophylactic or other treatment of human beings or any process for a similar treatment of animals or plants to render them free of disease or to increase their economic value or that of their products[192].

Section 5(1) of the Act, inter alia, provides that, in the case of inventions claiming substances intended for use, or capable of being used, as food or medicine or drug no patent should be granted in respect of claims for substances themselves, but claims for the methods or process of manufacture shall be patentable. However, a claim for patent of an invention for a substance itself intended for use, or capable of being used, as medicine or drug may be made, if it falls within sub-section (2) of section 5.

Section 6. Persons claiming to be the true and first inventor of the invention are entitled to apply for patents under this section.

To fulfill the requirement of novelty, an invention must not have been previously disclosed to the public. Individual genes in their natural state are not directly accessible and additional work is required to isolate them. The question is whether this is enough to allow the conclusion that the isolation of a gene actually deserves of recognition in the form of patent protection. The requirement for inventiveness means that applicants must be able to demonstrate that, when compared with what is already known, the claimed invention would not be obvious to the skilled person'- an ordinary worker with a good knowledge and experience of the subject.

There has been considerable debate about whether isolated DNA sequences, as they are used in diagnostic tests, medicines or as research tools, are inventive and known as obvious to the skilled worker. The Nuffield Council on Bioethics in Ethics in its Discussion Paper "Ethics of Patenting" has drawn an important distinction between the acquisition of knowledge about the nature and function of a DNA sequence, and the information contained within that sequence, in the following terms:

"Even though we think that the judgment that isolated DNA sequences are eligible for patenting is based on a questionable extrapolation to the case of genetic information from the case of the isolation of chemical compounds, we accept that a limited number of the early patents granted on that basis need not now be called in question,

[192] See clauses (b), (c), (d), (e) & (i) of Section 3 of the Patents Act, 1970

in view of the inventiveness required to isolate the DNA sequences. Since the early days of the pioneering experiments using positional cloning techniques, patents have been filed on many DNA sequences, which were mass-produced by a mixture of computational and cloning techniques. Even if it can be convincingly argued that these sequences were eligible for patenting, the patents should be examined in the light of the criteria for inventiveness and utility. We note that as techniques have advanced, and in particular as the use of computers to identify genes has become more widespread, the eligibility of DNA sequences for patenting should have diminished."

With regard to the legal criteria for assessing patents with claims to DNA sequences, it was said: "While we accept that the test of novelty can be met, the tests of inventiveness and utility are more problematic. In the case of inventiveness, we hold that as the use of computational databases becomes the standard way of identifying genes, it is difficult to see how the test can be met, despite current US practice. In the case of utility, we argue that the standard of credibility required for a claimed utility needs to be set higher than the mere theoretical possibility of this utility; some positive evidence that the DNA sequence has the claimed utility should be required. Finally, we consider the requirement that patents should satisfy the condition of not being contrary to morality or 'order public', and suggest that patent, offices should seek general ethical guidance, as necessary, from relevant bodies."

The Discussion Paper of the Nuffield Council suggested a number of ways in which the patent system should be modified for the future and made several recommendations aimed at ameliorating the deleterious effects of patents that have already been granted. Some of these are:

(a) Exclusive rights awarded for a limited period are, in the main, defensible and that the patent system has in general worked to the benefit of people. Nonetheless, in the particular case of patents that assert property rights over DNA, consideration should be given to whether the balance between public and private interests has been fairly struck.

(b) The rights asserted over DNA sequences that have been identified and characterized only by in silico analysis of the DNA sequence and comparisons with

other identified sequences should not be allowed, on the grounds of lack of inventiveness. The granting of patents that assert rights over DNA sequences should become an exception rather than norm.

(c) The criteria already in place within existing patent systems for the granting of patents, particularly the criterion of inventiveness, be stringently applied to applications for product patents which assert, inter alia, rights over DNA sequences for use in diagnosis. The European Patent Office (EPO), the United States Patent and the Trade Mark Officer (USPTO) and Japan Patent Office (JPO) should together examine ways in which this may be achieved. The USPTO and US lawmakers should give consideration to whether patent laws need to be amended for this purpose.

(d) The protection by "use patents" of specific diagnostic tests, which are based on DNA sequences, could provide an effective means of rewarding the inventor while providing an incentive for others to develop alternative tests

(e) In specific cases in which the. Enjoyment of exclusive rights to the diagnostic use of DNA sequence is not in the public interest, those seeking to use the diagnostic tool or develop an alternative, should seek a compulsory license from the relevant authorities if they are refused a license from the owner of those rights on reasonable terms, and the authorities may grant such license

(f) Granting of patents which assert rights over DNA sequences as research tools should be discouraged. The Council welcomed recent Utility Guidelines for DNA sequences introduced by the USPTO, which have, in effect, been endorsed by the EPO. The Council expected if these recommendations which included review of the guidelines and strengthening them to achieve their purpose was implemented, the result would be that patents which assert rights over DNA sequences for use in research will become the rare exception rather than the norm.

(g) When rights are asserted in terms intended to cover all sequences that contained EST (a research tool whereby the coding parts of genes could be rapidly sequenced), that is the subject of the original patent, no patent should be granted.

(h) The public institutions which already have been awarded patents that assert rights over DNA sequences as research tools be strongly encouraged not to license them exclusively to one or a limited number of licensees, even when, by not doing so, they may suffer some loss of revenue in the short term. Whenever possible, the private sector should

(i) Research exemption' be given a statutory basis in the US and clarified in Europe by policy-makers as a matter of urgency.

(j) Once a gene associated with a disease is identified, the use of the relevant DNA sequences in gene replacement therapy, to alleviate the effects of mutations in that gene, is obvious (particularly when such use is claimed on a purely speculative basis). Therefore, protection by product patents should seldom be permissible. Patent protection should be concentrated on developing safe and effective methods of appropriate gene delivery.

(k) While rights asserted over DNA sequences, which are used to make new medicines based on therapeutic proteins, are generally acceptable, they should be narrowly defined. This means the rights to the DNA sequence should extend only to the protein described.

The USPTO, EPO, JPO and other relevant bodies should give consideration to the concept of limiting the scope of product patents that assert rights over naturally-occurring DNA sequences to the uses referred to in the patent claims, where the grounds for inventiveness concern the use of the sequence only, and not the derivation or elucidation of the sequence itself[193].

1.9 Indian Succession Act, 1925

As per succession law, property right goes to a person who can prove the privy in blood, privy in estate and privy in relations. For this there must be a blood relation between the ancestors or parents denying property right-succession right and the so called heir claiming the property right. DNA Test is on of the best option or the only solution to establish or deny the blood relations. But there is absence of such relevant

[193] Ibid 192

provisions in succession act or relevant procedural laws. again here court can direct and cannot compel the parties to under go DNA test or blood test.

1.10 Family Laws in General:

Family Laws such as Hindu Laws, Mohammedan laws (Hindu Succession Act, 1956, Guardians and Wards Act, 1890, Hindu Marriage Act, 1955 and Family courts Act, 1984) and other laws as far as the disputes of marriage, paternity and maternity, Adoption and a maintenance guardianship are concerned, to resolve such type of disputes it is indispensable to go for DNA test. But absence of specific provisions restricts the flexibility of such laws.

1.11 Medical Termination of Pregnancy Act 1971 (Amd) 2004

Section- 3: "when pregnancies may be terminated by registered practitioners."

When a pregnancy is alleged by the pregnant women to have been caused by rape. This section goes hand in hand with section 376 of Indian Penal Code. Where by conducting DNA test on the fetus the criminal can be send behind bar if allegation is proved by expert opinion.

2. DNA Legislations in Other Countries / DNA Technology in Different Countries (An Overview)

2.1 Laws In New Zealand

New Zealand first raised the issue of DNA testing in 1978 when the New Zealand Criminal Law Reform Committee published a Report on Bodily Examination and Samples as a Means of Identification. At that time, the recommendation of testing criminal suspects was met with heavy resistance. During the next several years, the controversial report all but disappeared from the public's conscience. In the late 1980s, however, a private bill was introduced that proposed many of the same recommendations After remaining dormant for a few years, New Zealand's Minister of Justice announced government support for DNA testing and a national DNA databank..

The Criminal Investigations (Blood Samples) Act was passed in 1995 and went into affect in 1996. Under the Act, DNA samples from persons convicted of certain offenses, volunteers, and suspects are included in a national databank. Over 11,000 samples have been entered in the databank since its inception, and officials estimate that approximately three hundred samples are added each month. Starting in 1998 the databank began to search for comparisons between the individual samples and unsolved crime scene samples. Currently, approximately thirty percent of the crime scene samples match an individual sample present on the database. In addition, about twenty percent of the unsolved crimes match samples from other crimes on the database.

Despite the obvious success of the New Zealand databank, some groups still are concerned about the privacy issues implicated. While the Act was still under consideration, New Zealand's Privacy Commissioner expressed concern over some of the legislation's provisions. While noting the presence of certain safeguards, the Commissioner objected to the inclusion of voluntary samples of innocent people. He stated in a report regarding the proposed legislation that only samples from those convicted of serious offenses should be entered into the databank He supported his contention by arguing that certain convicted felons pose a greater risk to society as potential recidivists, while no similar justification exists for the inclusion of voluntary samples of innocent people. Likewise, the Auckland Council for Civil Liberties worries that DNA data banking creates a slippery slope of state surveillance that infringes the public's privacy rights. The general concern is that as society becomes more accepting of DNA sampling, police will continue to expand the DNA databank until it includes a large, if not complete, portion of society.

To harness the power of DNA test New Zealand enacted Criminal Investigation (Bodily Sample) Act[194].

[194] See, Allison Puri , "An International DNA Database: Balancing Hope, Privacy, And Scientific Error", Available at http://www.bc.edu/bc_org/avp/law/lwsch/journals/bciclr/24_2/05_TXT.htm (Last accessed on 25th November 2007)

2.2 Laws in China[195]

Ever since the 1997 rape and murder of Democratic Progressive Party official Peng Wan-ju, sex crimes have become a central issue for the public in China According to an analysis conducted by sociologists, approximately 10,000 sexual assaults are reported each year in Taiwan. In 1995, 624 people were prosecuted for sex crimes but only 216 were convicted. Sociologists claim that the low conviction rate is due to the difficulty of gathering appropriate evidence in such cases. Given these troubling statistics, China was ripe to pass a law in early 1999 that allows the Ministry of Justice and the Ministry of the Interior to establish a DNA databank.

Under the law, convicted and suspected sex offenders would be asked to provide voluntary blood samples. If they refuse, a prosecutor may force them to provide samples via a subpoena. The legislation allows the DNA samples to be kept for at least ten years In addition, written and photographic documentation of the DNA records may be retained until ten years after the death of the person who provided the sample. A similar proposal in southern China that would allow the formation of a DNA database, however, has encountered more resistance. Under the proposal, people suspected of committing crimes with a jail term of five or more years would be required to submit a non intimate sample. The database also would include samples from criminals convicted of serious offenses In addition; the draft law allows people to volunteer to submit a DNA sample to eliminate themselves from suspicion for specific crimes.

Limitation of draft: Proponents of the law argue that the draft law is too restrictive because it would require judicial authorization or consent in order to force a sample from a suspect. They claim that this will cause a tremendous backlog in the courts. On the other side of the debate, some argue that inclusion of convicts' samples is unfair to ex-convicts who are supposed to have paid their debt to society. In addition, others argue that the law should not allow for the inclusion of voluntary samples. They claim that this is a tactic to collect samples from society as a whole. Although the samples would be voluntary, many maintain that this would shift the burden of proof onto the public to prove their own innocence. In addition, the Privacy

[195] Ibid 194

Commissioner for Personal Data is closely reviewing the proposed legislation to ensure that it does not conflict with the Personal Data (Privacy) Ordinance

2.3 Laws in Canada:

Canada has passed DNA Identification Act, which became official on June 30, 2000[196]. This legislation allowed a DNA data bank to be created and amended the Criminal Code to provide a mechanism for a judge to order persons convicted of designated offences to provide blood, buckle or hair samples from which DNA profiles will be derived. The National DNA Data Bank respects considerations of genetic privacy and follows strict guidelines as specified in the DNA Identification Act. The biological samples collected from convicted offenders and the resulting DNA profiles can only be used for law enforcement purposes. It assists law enforcement agencies in solving crimes by:

- Linking crimes together where there are no suspects;
- Helping to identify suspects;
- Eliminating suspects where there is no match between crime scene DNA and a DNA profile in the National DNA Data Bank; and,
- Determining whether a serial offender is involved.

In Canada taking of a genetic sample without consent is held to be valid when the sample is collected by a health care professional.(relevant Indian case Sharda v. Dharampal,[197])Recently Advancing Justice through DNA Technology Act of 2003 has been enacted in the United States of America to [198]eliminate the substantial backlog of DNA samples collected from crime scenes and convicted offenders, to improve and expand the DNA testing capacity of Federal, State, and local crime laboratories, to increase research and development of new DNA testing technologies, to develop new training programs regarding the collection and use of DNA evidence, and for other purposes. By this Act imperative amendments have been made in DNA Identification Act of 1994 and DNA Analysis Backlog Elimination Act of 2000. Omnibus Crime Control and Safe Streets Act of 1968.

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[196] Ibid 194
[197] AIR 2003 SC 3450.
[198] Ibid 194

This Act also provides for the establishment of National Forensic Science Commission which shall make specific recommendations to the Attorney General, as necessary, to enhance the protections described in sub-paragraph (G) to ensure –

(i) The appropriate use and dissemination of DNA information;

(ii) The accuracy, security, and confidentiality of DNA information;

(iii) The timely removal and destruction of obsolete, expunged, or inaccurate DNA information; and

(iv) That any other necessary measures are taken to protect privacy.

Britain has Criminal Justice and Public Order Act, which provides for forcible testing of blood samples[199].

2.4 Law in United Kingdom/England

The U.K has also recognized the importance of DNA technology and has enacted Data Protection Act, 1998. In U.K DNA developed as an investigative tool. A boy from Ghana, born in U.K wanted to join his family in U.K, the authorities denied his entry because they were not satisfied that he was the son of alleged mother. Through DNA test it was found that he was the son of alleged mother and thus he was allowed to stay with his mother.

In England the question of blood test and constraints under law has been a subject matter of heated debates. In several cases the British Courts had occasion to consider the powers of a Court vis-à-vis the parties for carrying out blood test against the will of a person. In other cases where the person was a lunatic or of unsound mind or under the age of sixteen years or otherwise unable to consent, from whom such consent should be taken also came up for consideration before the Courts.[200]

Justice Ward in Rc. H. said, "This Court will not order a blood test to be carried out against the will of a parent." To the similar tune were the observations of Justice Pal comb in another case. In an earlier decision, the House of Lords speaking through

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[199] See, National DNA Data Bank Advisory Committee, Royal Canadian Mounted Police, 2004-2005 *Annual Report* , rcmp-grc.gc.ca/dnaac-adncc/annurp/2004-2005-annurp-eng.htm(Last Accessed on 28th November 2007)

[200] See,PoojaVadodaria,M.S.University,Vadodara,"DNA Test in paternity Dispute" http://www.lawyersclubindia.com/articles/DNA-Tests-in-Paternity-Disputes-3388.asp(last Acessed on February 2011)

Lord Reid observed. There is no doubt that a person of full age and capacity cannot be ordered to undergo a blood test against his will. The real reason is that English law goes to great lengths to protect a person of full age and capacity from interference with his personal liberty.

This being the proposition. It appears to be impermissible under law to direct the taking of a blood sample from a minor. Lord Hudson in an earlier decision had observed. "The position of a child is different. Here the Court is occupying the position of a parent, hence must act as the judicial reasonable parent." Likewise, in a minor's case, Lord Donaldson M. R. observed, "The parents owe a child and duty to give or withhold to consent in the best interests of the child and without regard to their own interest. The Court when exercising the parents patriae jurisdiction takes over the rights and duties over the parents. Although this is not to say that the parents will be excluded from the decision making process. Nevertheless in the end the responsibility for the decision, whether to give or to withhold consent is thus of the Court alone.[201]

In England the propositions of law were further developed on account of some provisions under the children Act, 1980. The Courts in England were empowered to exercise their inherent jurisdiction rigorously and creatively in other, often-graver circumstances. These included involving the use of compulsion in respect of a heart transplant against the wishes of a teen-ager, a liver transplant, blood transfusion against the wishes of teen – age Jehovah witness, blood testing to a baby for HIV against parent's wishes; and directions for medical/psychiatric treatment against the wishes of a teen-ager. In another blood test case. Justice Hale observed that the mechanism to obtain a blood sample may be to order the delivery of the child to the care and control of the Official Solicitor at aparticultimeand and place for that purpose and to make its plan that the official Solicitor is permitted to consent on the child.

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[201] Ibid 200

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a. Legislative Foundation

1. The foundation of the Database system's success is the series of Parliamentary Acts establishing the right of law enforcement to collect and profile individuals arrested for or suspected of committing a crime. Empowering police to obtain DNA from arrestees and to use the database during the investigative process, rather than subsequent to any possible conviction, provides numerous advantages. It allows them to:

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[202] ibid

- solve cases faster,
- consolidate cases (and thus valuable resources) before trial,
- detain dangerous individuals arrested on a minor charge but identified as having committed a much more serious offense,
- Exonerate innocent suspects more quickly.

2. Legislation also establishes the ability of law enforcement to obtain DNA profiles for individuals arrested for or suspected of "any recordable offense." With this legal authority, the Home Office has established the goal of DNA databasing the "entire active criminal population."iv Currently, the database population stands at approximately two million individual profiles. By nature of its size, the database matching potential increases. However, it is the ability to profile individuals arrested for relatively minor offenses which provides police the ability to solve more serious crimes.

Funding

3. The National DNA Database (NDNAD) is well funded

In England and Wales, the DNA expansion funds are provided directly to police departments. While allowing investigating agencies the flexibility to apply grant monies for DNA testing as they see appropriate, direct funding also forces departments to make better decisions about which samples are forwarded to the laboratories for analysis. Smarter submission decisions result in better resource management.

England is widely recognized as having the most effective and efficient approach to the use forensic DNA technology in the world. Since the establishment of the National DNA Database (NDNAD) on April 10, 1995, England has become a world leader in discovering innovative ways to use DNA to identify suspects, protect the innocent, and to convict the guilty. DNA technology and DNA databasing has become central to the process of criminal investigation. The decision to integrate DNA technology so thoroughly and the subsequent success of the National DNA Database can be attributed to three major factors: the political will of the Home Office, the

technical capability of the Forensic Science Service and the operational desire of the Police.

The foundation of DNA driven investigations in England and Wales is its expansive DNA database. Many factors however, contribute to the success of the UK's approach to forensic DNA applications.

b. Conclusion

DNA technology is used more effectively in England and Wales than elsewhere because it is no longer considered simply another forensic tool available to law enforcement. Rather, it is considered to be an integrated and routine part of the investigative process. It is not a technology to be used in special or particularly serious cases. It is a process invested in so as to become a routine part of every investigation in which biological material may be left by the perpetrator. Commitment to the use of DNA to solve volume crime and to the rapid analysis of crime scene evidence is key to this effort.

The progression of DNA data banking laws has helped that process by allowing police to utilize the profiles of individuals arrested or suspected of less serious crimes. Realizing that serious offenders commit less serious offenses too, the UK database laws take advantage of offender's likelihood to commit minor offenses. And realizing that offenders often commit more than one crime, allowing the use of suspect profiles empowers law enforcement to identify perpetrators sooner and to consolidate evidence and cases more effectively.

The Government has also followed up its expectations of the technology with the appropriate amount of funding. Not only is the technology funded well, but that funding is distributed wisely. By allocating the money directly to the law enforcement agencies themselves, they encourage the police to be thoughtful about their evidence collection and submission policies.

2.5 Law in United States

In United States of America, Otterbein published Paternity Exclusion tests as early as in 1921, even prior to Dyke, which did it in England in 1922, Weiner did exclusion

test in a paternity case in 1933. There after, relying upon a decision by Italian Supreme court of Cassation Justice Steinbrink of the New York Supreme Court ruled that blood test can be performed in a disputed paternity action. There after several states passed laws empowering courts with statutory authority to order blood testing in disputed paternity cases. In USA, the law is fully developed, and blood group serology, using proven genetic marker system and other accurate scientific methods are being displayed in matters concerning paternity.[204]

In US, DNA Technology has developed as a prosecutorial tool. It developed as a way to prove cases in the courtroom. In 1986, DNA as evidence was introduced for the first time in a Criminal Court. Now, America is implying huge resources and tremendous amount of attention in DNA Labs. There are more than 130 Labs both at State and local level that can conduct DNA analysis on forensic evidence. The National Commission on the future of the DNA evidence was established in 1998 in response to number of cases in which individuals were essentially being freed from prison, who were shown to be convicted wrong by nature of DNA testing. There is some exclusive legislation like:[205]

DNA Identification Act, 1994,Transplantation of Human Organs Act,1994 and Advancement of Justice through DNA Technology Act, 2003. In Doubter Vs Merrell Dow Pharmaceuticals[206], the Court laid down that for a scientific evidence to be admissible it must be shown scientifically valid and must be relevant to at least one issue in the case.

a. Admissibility

As we discussed in Chapter –II In the United States, there are two main tests for admissibility of scientific information from experts. One is the ***Frye*** test, enunciated in ***Frye v. United State[207]s***.The other is a "helpfulness" standard found in the Federal Rules of Evidence and many of its state counterparts We must introduce and enact the laws that essentially mandate the admission of DNA typing evidence and emphasis on

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[205]Peruml Gounder vs Pachappan AIR 1990 Mad 110, 121 National Law Enforcement Summit, Washington.
[206] 509, US 579, 59 (1993)
[207] 293 F. 1013 (D.C. Cir. 192

use of these two methods in addition to other favourable methods in this regard. Which we have discussed at length in chapter -2.

i. The Frye Test

Frye rule is used by almost all courts in U.S.A. although a growing number have adopted variations on the helpfulness standard suggested by the Federal Rules of Evidence. Admissibility depends on the quality of the science underlying the evidence, as determined by scientists themselves. Theoretically, the court's role in this preliminary determination is quite limited: it should conduct a hearing to determine whether the scientific theory underlying the evidence is generally accepted in the relevant scientific community and to determine that the specific techniques used are reliable for their intended purpose.

When a process is new and complex, a court should recognize that the expertise of more than one discipline might be necessary to explain it. That is the case when the admissibility of DNA evidence is judged as a matter of first impression. Among the issues raised is the validity of the assumptions that:

(1) except for identical twins, each person's DNA is unique, (2) the technique used allows one to determine whether two DNA samples show the same patterns at particular loci, and (3) the statistical methods used and the available population databanks allow one to assess the probability that two DNA samples from different persons would by chance have the same patterns at the loci studied. Even if those assumptions are accepted, there is the important question of whether (4) the laboratory's procedures and analyses in the case in question were performed in accordance with accepted standards and provide reliable estimates of the probability of a match.

Assumption 1—that, with the exception of identical twins, each person's DNA is unique—is so well established in human molecular genetics that a court is justified in judicially noticing it, even in the context of a *Frye* hearing.

Assumption 2—concerns the validity of procedures for extracting DNA from samples of blood, semen, and other materials and analyzing it for the presence and size of

polymorphisms. With regard to application in scientific research, the validity is sufficiently well established in the case of RFLP analysis with Southern blots that judicial notice is also appropriate.

With regard to the application in forensic science, however, additional questions of reliability are raised. For example, forensic DNA analysis frequently involves the use of small, possibly contaminated samples of unknown origin, such as a dried blood stain on a piece of clothing. Some experts have questioned the reliability of DNA analysis of samples subjected to "crime scene" conditions. In addition the details of the particular techniques used to perform DNA typing and to resolve ambiguities evoke a host of methodological questions. It is usually appropriate to evaluate these matters case by case in accordance with the standards and cautions contained in earlier portions of this report, rather than generally excluding DNA evidence. Of particular importance once such a system of quality assurance is established would be a demonstration that the involved laboratory is appropriately accredited and its personnel certified. Some aspects (such as the validity of the theory underlying RFLP analysis) might be so well established that judicial notice is warranted.

Assumption 3—related to the adequacy of statistical databanks used to calculate match probabilities—rests on unproven foundations. Many experts question the adequacy of current databanks for making probability estimates, and the use of multiplicative modes of combining probabilities are also open to serious question (see Chapter 3). The solution, however, is not to bar DNA evidence, but to ensure that estimates of the probability that a match between a person's DNA and evidence DNA could occur by chance are appropriately conservative (as described in Chapter 3).

The validity of assumption 4—that the analytical work done for a particular trial comports with proper procedure—can be resolved only case by case and is always open to question, even if the general reliability of DNA typing is fully accepted in the scientific community. The DNA evidence should not be admissible if the proper procedures were not followed. Moreover, even if a court finds DNA evidence admissible because proper procedures were followed, the probative force of the evidence will depend on the quality of the laboratory work. More control can be exercised by the court in deciding whether the general practices in the laboratory or the theories that a laboratory uses accord with acceptable scientific standards. Even if

the general scientific principles and techniques are accepted by experts in the field, the same experts could testify that the work done in a particular case was so flawed that the court should decide that, under *Frye*, the jury should not hear the evidence.

ii. Admissibility According to the Helpfulness Standard

The Federal Rules of Evidence, without specifically repudiating the *Frye* rule, adopt a more flexible approach. Rule 702 states that,

if scientific, technical or other specialized knowledge will assist the trier of fact to understand the evidence or to determine a fact in issue, a witness qualified as an expert by knowledge, skill, experience, training, or education, may testify thereto in the form of an opinion or otherwise.

Rule 702 should be read with Rule 403, which requires the court to determine the admissibility of evidence by balancing its probative force against its potential for misapplication by the jury. In determining admissibility, the court should consider the soundness and reliability of the process or technique used in generating evidence; the possibility that admitting the evidence would overhwelm, confuse, or mislead the jury; and the proffered connection between the scientific research or test result to be presented and particular disputed factual issues in the case.

The federal rule, as interpreted by some courts, encompasses *Frye* by making general acceptance of scientific principles by experts a factor, and in some cases a decisive factor, in determining probative force. A court can also consider the qualifications of experts testifying about the new scientific principle, the use to which the new technique has been put, the technique's potential for error, the existence of specialized literature discussing the technique, and its novelty.

iii. Cases on Admissibility of DNA Evidence under the Federal Rules

As with the *Frye*[208] rule, courts applying the federal rules or conforming state rules must consider whether the particular techniques used in a particular case pass scientific muster. Three federal courts have now conducted thorough hearings on the

[208] *Frye v. United States*, 293 F.2d 1013, 104 (D.C. Cir. 1923)

admissibility of DNA evidence, with two courts finding it admissible and one ruling it inadmissible.

The U.S. District Court for the District of Vermont conducted a detailed analysis in *United States v. Jakobetz*[209]. It reviewed the literature and FBI practices. Despite a strong attack from the defense and its experts, the court found that the DNA evidence was "highly reliable" and that its probative value outweighed the potential for prejudice. Strict application of the *Frye* test was rejected in accordance with Second Circuit standards.

Most recently, the Superior Court for the District of Columbia reached the opposite conclusion and held DNA typing inadmissible. In *U.S. v. Porter*, the court ruled that the technical reliability of DNA typing was generally accepted, but that the FBI's method for calculating the probability of a coincidental match was not. The court ruled that the scientific foundation of these probability calculations bears on the admissibility (and not simply the weight) of the evidence. Applying the *Frye* standard, the court found that "there is a controversy within the scientific community [on this issue] which has generated further study, the results of which will soon be available for scrutiny. It is after these studies and others ... when the court should be called upon to admit DNA evidence."

In addition, a number of state courts that apply analogues of the federal rules have considered the admissibility of DNA evidence. In *Andrews v. State*[210], a Florida court of appeals (the first higher-level state court to consider DNA evidence) determined that the relevance approach was applicable under the Florida evidence code that tracks the federal rules. The court admitted the evidence presented by the plaintiff's three scientific experts, two of whom worked for a private testing laboratory; the defense called no experts. The court concluded that the DNA typing evidence offered by the plaintiff was clearly helpful to the jury. With respect to the possibility of prejudice, the court found that DNA typing is not particularly "novel," in that it had been used in nonforensic applications for 10 years. The issue of differences between scientific applications and forensic applications were not raised by the defense. The court also noted the existence of specialized literature about the technique. As for the possibility

[209] 747 F.Supp. 250
[210] 2008-Ohio-625

of erroneous test results, the court credited testimony that an error in the testing process would mean that there would be no result, rather than a false-positive or false-negative result. The court also credited the efficacy of the laboratory's control runs and approved the use of statistical data to determine the probability of a match.

In *Spencer v. Commonwealth*[211] the Supreme Court of Virginia affirmed a trial court's finding that evidence derived from RFLP analysis was sufficiently reliable to be admitted. The trial court heard testimony from three experts for the prosecution in molecular biology and genetics. The defense called no expert witnesses. The trial court credited testimony that there is no risk of false positives, that the testing techniques are reliable and generally accepted in the scientific community, and that the particular test was conducted in a reliable manner[212].

Admissibility Statutes

Since 1987, the admissibility of DNA typing evidence was raised repeatedly in the courts, largely in the context of *Frye* hearings. Challenges to admissibility have become more sophisticated over the last 2 years. State legislatures have recently begun to address the matter. Several states have enacted laws that declare that appropriately performed DNA tests are admissible. Although they do not specify what an appropriate test is, the statutes must have been passed with single-locus RFLP analyses by Southern blotting in mind. Arguably, some of them should not be interpreted as applying to technologies that were not in general use and therefore could not have been evaluated by the legislatures that passed the statutes. Such technologies could be validated by amended statutes or by courts in *Frye* or Rule 702 hearings. For most purposes, states with such laws have statutorily resolved disagreements over the scientific reliability of DNA testing, although the questions of whether tests were performed properly in a given case and of the adequacy of statistical calculations based on test results probably remain subject to challenge.

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[211] 238 Va. 275, 384 S.E.2d 775 (1989) *Virginia Law Review* Vol. 76, No. 4 (May, 1990), pp. 853-876,Available at www.courts.state.va.us/scndex.htm (Last Accessed on 27th Dec. 2007)

[212] 238 Va. 275, 384 S.E.2d 775 (1989) ,*Available at* ,caselaw.findlaw.com/va-supreme-court/1558154.html – (Last Accessed on 28th Dec. 2007)

The state laws are of two types. A number of states—including Arkansas, Connecticut, Michigan, Montana, and New Mexico—now specifically admit DNA evidence to assist in the resolution of paternity—noncriminal—cases (and, by inference, probably other disputes concerning biological relationships). Louisiana, Maryland, Minnesota, Virginia, and Washington have enacted laws that recognize the admissibility of DNA evidence in criminal cases.

Maryland requires that the DNA report be delivered to the defendant 2 weeks before the criminal proceeding and specifies that the defendant may require a witness who analyzed the sample to testify as to the chain of custody. The Minnesota statute states that in any civil or criminal trial or hearing DNA evidence is admissible without "antecedent expert testimony that DNA analysis provides a trustworthy and reliable method of identifying characteristics in an individual's genetic material upon a showing that the offered testimony meets the standards for admissibility set forth in the Rules of Evidence"; a companion provision specifically permits the admission of "statistical population frequency evidence ... to demonstrate the fraction of the population that would have the same combination of genetic markers as was found in a specific human biological specimen." Louisiana provides that "evidence of deoxyribonucleic acid profiles, genetic markers of the blood, and secretor status of the saliva offered to establish the identity of the offender of any crime is relevant as proof in conformity with the Louisiana Code of Evidence."

Legislative interest in DNA evidence remains active, and it is likely that other states will enact laws generally favorable to its admissibility.

2.6 The Australian Law

Reforms Commission recently published the results of the inquiry conducted jointly with NHMRC's Australian Health Ethics Committee, "Essentially Yours: The Protection of Human Genetic Information in Australia", a two volume, 12,00 page report, containing 144 recommendations about how to deal with ethical, legal and social implications of the "New Genetics".[213] The report covers a wide range of areas,

[213] See, NHMRC's Australian Health Ethics Committee , "Essentially Yours: The Protection of Human Genetic Information in Australia",Available at http://www.nhmrc.gov.au/your_health/egenetics/practitioners/education.htm(Last Accessed on 2nd Jna. 2008)

including human genetic research and genetic databases, genetic privacy and discrimination, and regulating the use of genetic testing and information in employment, insurance, immigration, parentage testing, sport and other contexts. The report has been described as "an extraordinary accomplishment", providing a "world - leading platform for policy development". It is a comprehensive and instrumental report producing a number of welcome recommendations.

a. The following are the main recommendations made by the A.L.R.C. Final Report:

(i) The establishment of a standing Human Genetics Commission of Australia (HGCA) to provide high-level, technical and strategic advice about current and emerging issues in human genetics, as well as providing a consultative mechanism for the development of policy statements and national guidelines in this area.

(ii) Discrimination laws should be amended to prohibit discrimination based on a person's real or perceived genetic status.

(iii) Privacy laws should be harmonized and tailored to address the particular challenges of human genetic information, including extending protection to genetic samples, and acknowledging the familial dimension of genetic information. For example, doctors might be authorized to disclose confidential information to a genetic relative where it is necessary to avert a serious threat to an individual's life, health, or safety.

(iv) Ethical oversight of genetic research should be strengthened by: ensuring that all genetic research complies with National Health and Medical Research Council, (NHMRC) Standards; better supporting Human Research Ethics Committees; providing more guidance to researchers and research participants about best practice; developing new rules to govern the operation of human genetic research databases; and tightening reporting requirements[214].

(v) Employers should not be permitted to collect or use genetic information except in those rare circumstances where this is permitted under anti-discrimination laws or is

[214] See,Aritle on DNA ,available at www.findlaw.com.au/.../research-into-human-genetics.aspx(Last Accessed on 5th Jan 2008)

necessary to protect the health and safety of workers or third parties, and the action complies with stringent HGCA standards.

(vi) The insurance industry should be required to adopt a range of improved consumer protection policies and practices with respect to its use of genetic information (including family history) for underwriting purposes. New laws and practices should ensure that: genetic information is only used in a scientifically reliable and actuarially sound manner; reasons are provided for any unfavorable underwriting decision; industry complaints-handling processes are strengthened and extended to cover underwriting decisions; and industry education and training about genetics are improved.

(vii) A new criminal offence should be created to prohibit someone submitting another person's sample for genetic testing knowing that this is done without consent or other lawful authority (e.g. a court order, or the statutory authority given to police officers).

(viii) Lack of harmonization is threatening the effectiveness of any national approach to sharing DNA information for law enforcement purposes. The governments should develop national minimum standards for the collection, use, storage, destruction and matching of DNA samples and profiles. No inter-jurisdictional sharing of information should be permitted except in accordance with these minimum standards.

(ix) DNA parentage testing should be conducted only with the consent of each person sampled, or pursuant to a court order. Where a child is unable to make an informed decision, testing should proceed only with the consent of both parents, and a court order.

In late 1999, Australia's federal government decided to fund a national forensic DNA database as part of a fifty million dollar national criminal investigation system. Currently, only a few of the territories have legislation that allows for the police to build up a DNA databank. The push for the national database, however, has caused the other territories to begin to review and model similar legislation.

The Model Criminal Code Officers Committee of the Standing Committee of Attorneys-General published the Model Forensic Procedures Bill in May 1999 to act as a guide for the territories to develop or enhance their DNA legislation. The territory of Victoria closely follows the model by authorizing police to seek court orders to secure DNA samples from convicted murderers and rapists. The legislation in the Northern Territory, however, is more closely modeled after the British legislation Because the police do not classify the sample as intimate, they are able to secure samples without obtaining consent or a court order. In addition, the Northern Territory legislation is more like the British model in that it allows for sampling from a broader class of convicts, including those guilty of some driving offenses. The Privacy Commissioner has urged the government to consider a number of issues before passing any legislation, including deciding who will be sampled, who will have access, what kind of auditing will be done, and the procedures for expansion.

3. Indian Legal Scene: A Comparative-study/Analytical Study

However, in India, we don't seem to have realized how vast the potential of science technology is. DNA technology has made a drastic improvement in the methodology of providing different types of disputes of civil and criminal cases. Established in the middle of 19th century, today in India there are about 21- well-established forensic labs, 4 of them being administered by the Central Government. The scientific methods are being adopted in crime investigation in India in an organized way from 1849 onwards. Despite having DNA Technology in India, it is not seen used in the administration of Criminal Justice System[215].

There is no special enactment dealing with DNA profiling as is there in other countries. However, there are few legal provisions in Indian Constitution,

The Indian Evidence Act, 1872, The Code of Criminal Procedure, 1973 and in The Identification of the Prisoner's Act, 1923 which deems to deal with DNA Profiling. Many criminal as well as civil cases has been decided by the different courts taking into consideration the DNA evidence, but still it can be said that DNA technology is not widely used in India.

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[215] See,Article on develpoement of Science in India, Available at www.indianscience.org(Last Accessed on 7th Jan 2008)

Quite early, the Kerala High Court in Vasu v. Santa, [216] had held that taking of a blood sample is a constraint on personal liberty and cannot be carried out without consent. The Madras High Court relying upon a very old case had lain down that it appears doubtful whether such a compulsion can be made even under legislation. It also questioned the power of a guardian ad litem to give consent in such cases.

Realizing the value of such tests for determining paternity, maternity, and fixing identities, a Bench of Allahabad High court in Bharu Raj v. Sumesh Sachdeo, [217]held that such a test puts a child on the anvil of legitimacy and illegitimacy and therefore it would be unjust and not fair either to direct a test for collateral reason to assist a litigant in his or her claim. He Hon'ble Allahabad High Court further held that the child could not be allowed to suffer because of his incapacity and that if in a case the Court has reasons to believe that the application for blood test is of fishing nature or was made for some ulterior motive it would be justified in not acceding to such a prayer.

3.1 Position in Civil Law:

It may be mentioned at the very outset that dealing with civil cases, Courts in India [218] have adopted a trend that a party cannot be compelled to give sample of blood for blood group tests. Therefore such a sample cannot be collected against the will of such a person Courts in India have adopted this general trend, in the absence of any statutory law in the field.

In Hargovinda Soni v. Ram Dularey, [219](Ram pal Singh.J.) The Madhya Pradesh High Court was categorically of the opinion that no person can be compelled to give a sample of blood against consent. In a case where a party does not consent for giving his sample for blood or DNA fingerprint test, the maximum the Courts can do is to draw an adverse inference against that party for such refusal. Indicating a gap in law on such question, a single Judge of Madras High Court had, however, held it long

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[216] 1975 Ker LT 53
[217] AIR 1986 All 259
[218] See, State v.Sheshappa Dudhappa Tambade , AIR 1964 Bom. 253 and Bipin Chandra Shantilal Bhattv. Madhuriben Bhat AIR 1963 Gujrat 250. And Krishna Murthi Aiyer v. Govind Swami Palley , AIR 1966 Mad.443.
[219] AIR 1986 Madh Pra 57

back [220], that "there is no procedure either in the Civil Procedure Code or the Evidence Act which empowers the Court to enforce" the taking or giving of blood samples. However, in some cases it has been held that the Courts are seized to inherent powers, which can be exercised ex debito justitiae. Following Madras High Court, the Bombay High Court[221] was also of the considered opinion that though a Court can direct respondent to give blood sample, it cannot compel her to do so. Bombay High Court, however, clearly held that the Court lacked powers in enforcing the giving of blood samples in case of failure to do so, even inspite, of the directions by the Court. It ultimately favored for merely drawing an adverse inference in case there was a clear dental for giving such samples. Yet, in another case R.P. Uloganambi v. K. C. Loganayaki,[222]. The Madras High Court has gone to the extent holding that a party having consented to give such a sample on one stage of the proceedings can validly make a withdrawal of such an offer and the principle of estoppels (Section 115 of Evidence Act) would not come across.

The Hon'ble Supreme Court in Goutam Kundu finally considered this matter [223]in a proceeding under Section 125, CPC (Maintenance), wherein after considering the entire legal scene it was held:

1. That Courts in India cannot order blood test as matter of course:
2. Wherever applications are made for such prayers in order to have roving inquiry, the prayer for blood test cannot be entertained.
3. There must be a strong prima facie case in that the husband must establish non-access in order to dispel the presumption arising under Section 112 of the Evidence Act.
4. The Court must carefully examine as to what would be the consequence of ordering the blood test; whether it will have the effect of branding a child as a bastard and the mother as an unchaste woman.
5. No one can be compelled to give sample of blood for analysis.

The Apex Court upholding Madras High Court observed that it required to be carefully noted no person can be compelled to give sample of blood for analysis

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[220] Polavarupu Venkataswarlu v. Polavarappu Subbaya, AIR 1951 Madras 910.
[221] Sadashiv Khedarkar v. SMT. Nadinee sadashiv Khedarkar and others , 1995 Cr. L. J. 1995.
[222] 1986 Cr LJ 1522
[223] AIR 1993 SC 2295, See also Kantideve v. Poshiram. AIR 2001 SC 2226

against (his or) her will and that no adverse inference can be drawn against (him or) her for such a refusal.What weighed the mind of the Apex Court appears to be the effect over the paternity of a child, since there was likelihood for terming him bastard. Supreme court relying upon its earlier judgment in Smt. Dukhlar Jahan [224] observed that such a test should not be directed for upholding the legitimacy of a child unless the facts are compulsive and clinching as to necessarily warrant a finding that a child could not at all have been begotten to the father and such a legitimation of the child would result in rank injustice to the father. The Apex Court further remarked Courts have always desisted from lightly or hastily rendering a verdict and that too on the basis of slender materials which will have the effect of branding a child as a bastard and its mother unchaste woman.

It may be observed that in given circumstances, simply an adverse inference may not be of any consequences since such a process would tantamount the prevention of positive evidence before the Court. The law as laid down by Madras High Court in Subayya Gounder v. Bhoopala Subramaniam[225], was considered in the light of these circumstances, but that view was not disturbed by the Apex Court in Gautam Kundu . Quite recently the Supreme Court in divorce proceedings again considered the question of compulsion to undergo medical examination and held that it was well within the power of the Court to compel such examination.[226]

3.2 Position in Criminal Law:

It is again interesting to observe that the Criminal Law is also significantly silent on such a power of a "Court to direct the talking of blood samples for blood/DNA analysis.

A single Judge of Gujarat High Court in Najabhai v. State of Gujarat, [227]has held that the bar of Article 20(3) of the Constitution of India would extend with regard to compelling the accused to submit himself to medical examination also. However, this proposition runs contradictory to a decision by Apex Court in State of Bombay v.

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[224] AIR 1987 SC 1049
[225] AIR 1959 Madras 396 : 1959 Cri LJ 1087
[226] Sharad v. Dharmapal AIR 2003 SC 3450.
[227] 1972 Cr. LJ 1605

Khthikalu, [228]wherein, such examinations were held not included within the meaning of becoming a witness. Referring to the powers conferred under Section 53, Cr. P.C. the Andhra Pradesh High Court [229]has held that although there is no clear provision in Cr. P.C. for taking such blood samples yet there is no prohibition for taking such blood samples of an accused by exercising powers under Section 53 Cr. P.C. The Court observed that taking samples of blood and semen would come within the scope of examination of the person of the arrested person and therefore, "examination of a person by a medical practitioner must logically take in examination by testing his blood, sputum, semen, urine etc. The Court further held that Section 53 provides the use of such force as it reasonably necessary for making such an examination. Therefore, it held that whatever discomfort might be caused, when samples of blood of semen are taken from an arrested person, would be justified under the provision of Section 53 and 54 of Cr. P.C.

On the other hand a Division Bench of Allahabad High Court[230] dealing with a criminal case, was of the view that though there was no specific provision in Indian Law permitting taking of blood yet in a criminal case, an examination of person can be made under Section 53(1) of the Cr. P.C. which shall include the taking of blood samples, including an examination of an organ inside the body. The Court drew the aforesaid conclusion per force the provisions of Section 367 (1) and Section 482 of the Cr. P.C. It also held that there is nothing repulsive of shaking to conscience in taking the blood of an accused person in order to establish his guilt and so far as the question of causing hurt is concerned, even causing some pain may be permissible under Section 53, Cr. P.C.Quite recently Delhi High Court considered the question of privacy (in relation to fetus) and DNA test and held that such directions cannot be issued which forces

[228] 1961 (2) Cr LJ 856 SC: AIR 1961 SC 1809
[229] Ananth Kumar v. ST. of A.P.1997, CR. L.J. 1797
[230] Jamshed v. st. of U.P. 1760 CR. LAW. J.1680

3.3 Legislative Responsibilities[231]

- To make proper panel and advisory body for maintaining uniformity on DNA identification records, storage and DNA analyses
- State wise contributory funding for DNA Databanks
- Relevant state and central acts to safeguard public interest
- Establishment of DNA Data bank and introducing legislations to regularize the same
- Draft DNA Profiling Bill 2006
- Need for large expansion in DNA Profiling services in country
- Possibility of incorporating this expansion as part of a larger reform of separating "investigative" and "law and order" wings, The National Police Mission etc.
- Need also for an enabling legislation to regulate the provision of DNA Profiling services for lawful purposes
- Experience in and examples from other countries

[231] See more on this topic in conclusion part-chapter-vii of the Research work