DNA, Human Rights and The Criminal Justice System

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Part One: Human Rights and the Criminal Justice System

DNA is the molecule that encodes the entire hereditary information about each individual in almost every cell of the body. With the exception of identical twins, the DNA of every individual is unique. The increasing use and acceptance of DNA technology as evidence raises many issues relating to the criminal justice system. There is not, and has never been, controversy about its ability to eliminate suspicion in cases where the suspect's DNA does not match the evidentiary sample. One of the earliest uses of DNA profiling in the law occurred in 1987 in England, when a 17 year old boy was accused of the rape and murder of two girls. He happened to live close to Alec Jeffreys, discoverer of "DNA fingerprints", and as a result of these methods, it was determined that whilst the girls were killed by the same person, the boy was not responsible[5].

Debate continues, however, concerning the extent to which guilt can be inferred when an apparent match occurs. DNA evidence, of course, will never prove all elements of an offence. In most cases, the best it can ever do is to place a suspect at the scene of a crime. In the particular case of rape, it may do more than this, but it will still not address the issue of consent. Nevertheless, the astronomically small probabilities[6] claimed for DNA evidence may overwhelm other considerations in the minds of jurors. In this article we endeavour first to consider the legitimacy of these

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5 Roeder K "DNA fingerprinting: a review of the controversy" (1994) 9 *Statistical Science* 222.

6 For example, it may be claimed that the probability of a match between the suspect's DNA and the evidentiary sample occurring by chance is one in twenty million.

small probabilities, and secondly to address the interaction of these scientific elements with other critical criminal justice considerations. Many broad human rights issues, particularly the rights of the accused in relation to a fair trial, will be mentioned in this context.

A starting point to our discussion may be provided by the current changes to the so-called right to silence.[7] This has meant that silence, or refusal to speak at either investigation or trial stage, may come to be associated with guilt, notwithstanding calls from commentators who note that while silence may be "equivocal", nevertheless "there are reasons for silence which are consistent with innocence."[8] There have been considerable legislative inroads into this right under English law in particular.[9] In Australia, the reformulation has been limited to explanation of facts peculiarly within the knowledge of the accused.[10] As Dixon[11] has commented, the right to silence (which Dixon considers a criminal justice myth) is in fact rarely exercised because it is difficult to maintain and may have adverse consequences. However, it may form part of a negotiating situation between suspect and police so that the evidence available and the charges contemplated are made clearer. Silence may also be used tactically to sanction officers with inappropriate behaviour eg. oppressive questioning. In Dixon's view, here, as elsewhere, criminal justice has to be seen as a negotiated process whose outcome is typically the guilty plea, rather than an adversary process whose outcome is the contested trial. Sometimes silence may haveless to do with rights than with negotiation with police. In Dixon's view, changing rules of evidence would be unlikely to affect this.[12] However, broader rights issues span the practical realities.

The changes effectively place some obligations on the accused to provide vital information. In our view, similar concerns can be raised regarding the use of DNA evidence, which is obtained via the production of intimate body samples for DNA

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7 See Hocking BA "Communication, community, conviction, conspiracy" *The Journal of Criminal Law* (forthcoming, 1997) concerning in particular the changes under the *Criminal Justice and Public Order Act* (UK) and the earlier Northern Ireland Order.

8 Jackson J "Inferences from Silence: From Common Law to Common Sense" (1993) 44 *Northern Ireland Legal Quarterly* 103 at 110; Greer S "The right to silence: a review of the current debate" (1990) 53 *The Modern Law Review* 709.

9 In particular, through the *Criminal Justice and Public Order Act* 1994 (UK)

10 Following the High Court decision in *Weissensteiner* v *Queen* (1993) 178 CLR 217.

11 Dixon D "The myth of the right to silence" (1995) 6 *Polemic* 13.

12 *Ibid* at 16.

testing. DNA is most readily obtained from blood samples. Obtaining such samples is rarely a problem in family law cases, but the extent to which accused persons should be obliged to provide samples raises a number of significant human rights issues. In some cases, sufficient DNA for testing purposes may be obtained from blood or semen smears on the suspect's clothing and has even been obtained from saliva on a cigarette butt. Such smaller and possibly degraded samples are of poorer quality than blood samples and may yield less reliable results.

Links between refusal to submit to testing, in this case to DNA fingerprinting as part of parentage testing, and a right to silence, were highlighted in the High Court case of *G v H*.[13] The relevant issue was the use of DNA evidence to establish paternity of a child in proceedings under the *Family Law Act* 1975 (Cth). The putative father refused to comply with an order to submit to testing.[14] The court held that where the person whom the evidence identifies as being most likely to be the father refuses to submit to testing, the just inference to be drawn is that it is more probable than not that he is the father. This conclusion was reached by applying the principle first enunciated in *Jones v Dunkel*[15] that an adverse inference may be drawn from the failure to call a material witness or if the accused fails to give evidence on facts which must be within his knowledge, and which would contradict or deny evidence already given against him.[16] In *G v H*, the court framed the inference to be drawn in terms of the fact that DNA testing is very reliable, and that if the respondent refused to undergo testing, the just inference is that the test would reveal that the respondent is in fact the father.[17] The circumstances were brought within the *Jones v Dunkel* sphere of being facts within the accused's own knowledge by Brennan and McHugh JJ:

> [I]n the absence of the evidence – indeed, the conclusive evidence – which G could have provided, the inference of his paternity can be drawn with more confidence than it would otherwise have been drawn.[18]

13 (1994) 181 CLR 387.

14 Pursuant to *Family Law Act* 1975 (Cth), s 66W(1)

15 (1959) 101 CLR 298.

16 See *Weissensteiner v R* (1993) 178 CLR 217

17 Ironically the Full Court of the Family Court indicated that there were profound problems with this particular DNA evidence.

18 (1994) 181 CLR 387 at 391.

The suggestion raised by the finding in this case is that every time identity is in issue which could be settled conclusively by the use of DNA evidence, the failure of the accused to provide that evidence is a fact from which an adverse inference could be drawn. While the court did note the special considerations which apply to a criminal trial as a result of the right to silence,[19] their Honours went on to say that "there may sometimes be an inference in criminal cases of 'guilty knowledge', ... that the evidence cannot be explained in a way that is consistent with innocence."[20] There is at least a hint in this reasoning that once we accept the accuracy of DNA testing, this raises the possibility that every time identity is in issue, lack of DNA evidence will provide the weight which swings the balance against the presumption of innocence. Once again, the need for evidence is put back upon the accused.

The possibility of an increasing usage of DNA evidence highlighted by *G v H* also raises the issue of the collection of DNA samples and the ultimate fate of those samples. The use of fingerprints as a reliable form of identification has led to people being fingerprinted, for example, upon arrest. If DNA evidence proves to be as reliable as fingerprints for identification evidence, are we to see provision made for the taking of DNA samples, for example, upon arrest? Is it reasonable, given concerns about the current extent of police powers, to contemplate extending police powers even further, especially to the taking of intimate body samples? This is already virtually a past issue in some States, for in New South Wales, Queensland, South Australia and Tasmania the police are authorised by statute to take blood samples for the purposes of forensic DNA analysis.[21] The utility and justifications for such a move would require very strong scrutiny, particularly regarding privacy

19 *Ibid* at 402.

20 *Ibid.*

21 *Crimes Act* 1900 (NSW), s 355A(2); *Criminal Code* 1899 (Qld), s 259; *Police Offences Act* 1953 (SA), s 18(2); *Criminal Process (Identification and Search Procedures) Act* 1976 (Tas), s 7. In a strongly worded criticism of Canadian legislation allowing a warrant to be issued for the non-consensual removal of DNA material, Bassan notes that in these laws there is no requirement of consent, contrasting this with the "different approach" in the Victorian *Crimes (Blood Samples) Act* 1989. This Act allows blood samples to be taken from a person where it is believed on reasonable grounds that the sample would prove or disprove the person's commission of an indictable offence, and also accomodates informed consent to the taking. See Bassan D "Bill C-104: Revolutionizing criminal investigations or infringing on charter rights?" (1996) 54 *University of Toronto Faculty of Law Review* 246 at 279.

concerns about the use of such samples and results gained from them once they are stored and recorded. It is often said that the innocent person has nothing to fear, but it seems reasonable to assert that the innocent person would have many things to fear if measures were not put in place to protect the individual from unwarranted invasion of privacy.

Arguing from a feminist perspective, Jocelynne Scutt proposes two central human rights considerations in relation to DNA testing. The first question concerns whether police require increased powers to effectively deal with crimes of violence against women. This is inextricably linked to the second question, which is whether DNA testing will assist in combating crimes of violence against women. For Scutt, the utilitarian benefits of DNA cannot confront the reality that confronts most women in dealing with crime, the law and production of evidence. That reality consists of the significant problem already referred to: the predominance of "consent" as the central issue in rape cases. Scutt considers this a reality upon which DNA has no bearing. Identity, with which DNA is concerned, is for the most part not in issue. For Scutt, the evidentiary aspects associated with DNA cannot confront or bear any relevance to the reality of the most common defence to rape actions. It is consent and not identity which is the critical issue. Therefore, Scutt asserts a false match between the significance being attached to this form of testing and the reality of criminal defences. Only in a very limited number of cases will this technology be relevant. By this view, the present developments manifest a legal confusion between the relative importance of "identity" and "culpability."[22] This holds particular implications for the reality of most women"s experiences of the law. What we need to confront is our failure to define consent:

> Tackling this problem requires a will to define in law "lack of consent", in realistic terms, rather than in resorting to any scientific "solution" such as DNA.[23]

It can be summarised that the acceptance and use of DNA evidence should rest on more than scientific accuracy. Care needs to be taken to balance the rights of the accused with the interests of justice, particularly in an era when "scientific" is generally equated with "correct". In the face of increasing reliance on and the reliability of such evidence, human rights issues need to be considered, and measures need to be put into place at the relative genesis of this form of evidence, rather than trying to redress human rights breaches when they happen.

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22 Scutt J "Beware of new technologies" (1990) 15(1) *Legal Service Bulletin* 9 at 10.

23 *Ibid* at 11.

One of the most significant evidentiary connections lies between expert opinion and the recent High Court emphasis upon probative evidence. As Odgers and Richardson have observed,[24] Australian rules relating to the admission into evidence of expert opinion remain "unsettled".[25] In their opinion, Australia must seek to avoid both the descent into the American realm of "junk science"[26] and any repeat of the conclusion by the Royal Commissioner into the *Chamberlain* case, Morling J, that the expert evidence at the trial caused the miscarriage of justice.[27]

The Scientific Debate

With the exception of identical twins, the DNA of each human individual is unique. However, all techniques currently used in forensic science, and in all likelihood to be available in the foreseeable future, use only a minute fraction of the total DNA. There is no absolute guarantee that these fractions will be unique: to talk of "genetic fingerprinting" is highly misleading.

In 1991, two leading population genetic theorists, Richard Lewontin and Daniel Hartl, published a trenchant criticism of the current use of DNA for forensic purposes in the prestigious journal *Science*.[28] Some idea of the highly controversial nature of their conclusions can be gained from the fact that the editors of *Science* took the highly unusual course of commissioning an equally trenchant rebuttal, which followed on immediately from Lewontin & Hartl's article in the same issue of the journal.[29] Since 1991, advances in DNA technology and population genetics have rendered several of their arguments moot. Nevertheless, to conclude that all technical issues have now been resolved would be premature. Several procedures recommended as best practice by the United States National Research Council ("NRC") Report on DNA Technology in Forensic Science in 1992 are unequivocally rejected in the 1996 report of the same body.[30] Will the 1996 report

24 Odgers S and Richardson J "Keeping bad science out of the courtroom – Changes in American and Australian expert evidence law" (1995) 18 *UNSW Law Journal* 108.

25 *Ibid.*

26 *Ibid* at 115, referring to Huber PW *Gallileo's Revenge: Junk Science in the Courtroom* (Basic Books, New York 1991).

27 *Royal Commission of Inquiry into Chamberlain Convictions* (Report, Justice Morling, NT Govt. Printer 1984) p 112.

28 Lewontin RC and Hartl DL "Population genetics in forensic DNA typing" (1991) 254 *Science* 1745.

29 Chakraborty R and Kidd KK "The utility of DNA typing in forensic work" (1991) 254 *Science* 1735.

30 Weir BS "The Second National Research Council Report on Forensic DNA Evidence" (1996) 59 *American Journal of Human Genetics* 497.

be similarly treated in four year's time? There has been a continuing scientific debate, covering technical biochemical issues, population genetics and statistical inference.[31] Whilst the issues are of the utmost significance to practising criminal lawyers, the scientific debate is obfuscated by the acronym soup used by DNA workers, and the application of apparently obscure rules in probability theory such as Bayes' Theorem. The basic arguments, cleared of jargon, are nevertheless quite straightforward. The purpose of this section in this article is to outline and explain the scientific issues together with their legal implications, particularly in the Australian context.

Acronym Soup: DNA, PCR, RFLP and VNTR

DNA

DNA is itself an acronym, standing for Deoxyribonucleic Acid. Every cell (with the exception of red blood cells and eggs or sperm) in an individual's body contains the full "genetic program" for that individual in its DNA. The program is coded by just four bases, or subunits, Guanine, Cytosine, Adenine and Thymine (usually abbreviated to G,C,A & T). Groups of four bases (known as codons) code for the 20 amino acids, the basic building blocks of life. The amino acids in turn are linked together to form proteins. Other codons are "stop codons" and signal that the reading of the amino acid sequence should be terminated. Although enormous progress has been made in recent years, and the code is well understood, biologists are still a long way from understanding how the code is expressed: although they contain identical genetic information, the way the information is realised in a liver cell is obviously very different from the way it is realised in a brain cell.

The portion of the DNA that produces proteins obviously varies between individuals. Otherwise, all humans would look identical. Of more importance for forensic science, however, is that much of the human genome appears to be "junk DNA": it does not code for proteins, and it is doubtful whether it has any function at all. Furthermore, within the parts that do code for proteins, many variations or "mutations" are silent: whilst the base pairs vary, they still generate the same amino acids, and even if the amino acids differ, some mutations are selectively neutral: whilst the amino acids differ, the proteins they generate seem not to differ functionally. All these forms of variation which do not affect functionality tend to vary greatly between individuals, because aberrant or new forms are not eliminated by natural selection. These highly variable or polymorphic genes (or more technically, loci) are the basis of most forensic DNA analysis.

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31 Roeder, *op cit*; Balding DJ and Donnelly P "Inferring identity from DNA profile evidence" (1995) 92 *Proceedings of the National Academy of Sciences of the United States of America* 11741.

PCR

Extraction of DNA from cells is a relatively straightforward process. Yields, however, are typically low, and DNA is frequently rapidly degraded once it is no longer within a living organism. A spectacular advance has been the discovery of the Polymerase Chain Reaction (PCR), which permits potentially unlimited amplification of minute DNA traces, such as may be found in small samples of dry bone or skin. An inevitable consequence of this massive amplification potential is its sensitivity to contamination, particularly if the same forensic laboratory and technicians are handling samples from both the suspect and the crime scene.[32] Some idea of the potential extent of this problem can be gained from the fact that technicians frequently amplify their own DNA due to contamination from the oils on their fingertips. Only strict and independently supervised quality control can minimise this problem.

RFLP

It is possible to sequence (directly read off the bases) from short strands of DNA, typically a couple of hundred bases at a time. Most forensic analysis is currently not based on direct sequence comparisons, but on analysis of Restriction Fragment Length Polymorphisms: RFLP. The idea is that an enzyme is used which cuts the DNA whenever a certain sequence of bases occurs (a restriction site), generating a number of fragments of the DNA of varying lengths. In some individuals, random changes in the DNA will cause one or more sites to be lost or may otherwise cause variation between individuals in these fragment lengths. If the DNA is placed on a gel, and an electric field applied, the differing sized fragments will move varying distances across the gel. The DNA can then be rendered visible by a variety of methods, yielding a pattern of bands sometimes described as similar to a supermarket bar code.[33] It is a poor analogy, however, as the information content is far lower, and the ambiguity far greater than any bar code. It is relatively easy to determine that two samples are different, if one has a band the other lacks, but it is far more difficult to determine, on the basis of identical banding patterns, that two samples must have come from the same individual. This problem of determining the significance of matches lies at the basis of debate on the use of DNA in legal cases.

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32 Lewontin RC "Comment: the use of DNA profiles in forensic contexts" (1994) 9 *Statistical Science* 259.

33 Frederico RG "'The genetic witness': DNA evidence and Canada's criminal law" (1991) 33 *Criminal Law Quarterly* 204.

VNTR

DNA "fingerprinting" is based on small portions of the DNA which consist of the same short codon sequence, repeated a number of times. The number of repeats is highly variable between individuals, and because of the double nature of DNA, these repeats occur in tandem. Hence, the sequences are known as Variable Number of Tandem Repeat sequences or VNTRs. At present, four or five separate VNTRs are commonly used for forensic purposes.

Population subdivision

In the early debates about DNA evidence,[34] the effect of division of the population into ethnic or racial groups was central. A simplified version of the argument is as follows. Suppose the DNA profile is based on five separate loci or genes, and that the suspect possesses alleles or versions of these that are present respectively in 10 percent, 1 per cent, 5 per cent, 20 per cent and 2 per cent of the total population. Then the chance that a random member of the population would have all 5 of these particular alleles is 0.1 x 0.01 x 0.05 x0.2 x 0.02 = 0.0000002, or two in 10 million. The problem is that the multiplication of the proportions is valid only if a 1 1 the alleles are distributed randomly throughout the population, and particular allele combinations do not tend to co-occur. In population genetics, this requires that a population should mate randomly. Human populations plainly do not do this: particular ethnic and racial groups are currently more likely to marry amongst themselves, and in the recent past must have done so to an even greater extent, as they came from geographically widely separated locations. Population subdivision will lead to probabilities of matches calculated by the above method being smaller than they should be. The question is by how much.

Attempts have been made to minimise this problem through using appropriate reference populations. If the suspect in a US case is Hispanic, for example, allele frequencies would be obtained from the Hispanic population, not that of the entire US. Since 1991, databases on various ethnic groups have been established and it is currently recommended that frequencies from the appropriate ethnic group should be used.[35] However, recent research has shown that the alleles typically used in DNA profiling do not differ greatly in frequency between

34 Lewontin and Hartl, *op cit.*

35 Weir, *op cit.*

36 Roeder, *op cit.*

major ethnic groups (in the US at least).[36] The population subdivision issue is probably not of major practical importance, although this conclusion is not universally accepted.[37]

Various *ad hoc* rules have also been suggested to adjust match probabilities to take account of population subdivision. One approach that has been rejected unequivocally by the National Research Council 1996 report is the "ceiling principle" recommended by the 1992 report.[38] The "ceiling principle" was an attempt to adjust probabilities conservatively, so that alleles were assigned a "ceiling" frequency, which was either the greatest frequency observed in any ethnic group, or 10 per cent, whichever was the greater.[39] A rule with equally little justification proposed by the 1996 report is that probabilities should be assigned "confidence limits" by multiplying and dividing by ten.[40] This amounts to stating that probabilities are good only to an order of magnitude, but fails to take into account sample size or the actual size of the probability.

The possibility that DNA evidence may lead to conviction when the true culprit is a close relative is a far more serious problem than that of ethnicity. It is possible to adjust probabilities to deal with this. A far simpler and straightforward approach is to obtain profiles from near relatives to establish unequivocally whether a relative has an identical profile.[41] This, of course, raises an interesting human rights issue. Should people against whom there is not even suspicion be compelled to produce samples, when the result of so doing will either be to tend to incriminate themselves (if the profile matches) or to increase the weight of evidence against a family member (if the profile does not match)?

Probability Theory

It is clear from the above discussion that the scientific debate is moving away from issues of population genetics and into the area of probability theory and statistical

37 See Lewontin RC "The use of DNA profiles in forensic contexts – comment" (1994) 9 *Statistical Science* 259 and Lempert R "Comment: theory and practice in DNA fingerprinting" (1994) 9 *Statistical Science* 255

38 See Marshall E "Criminology – Academy's about-face on forensic DNA" (1996) 272 *Science* 803; Macilwain C "Ceiling principle 'not needed' in DNA cases" (1996) 381 *Nature* 103 and Weir *op cit.*

39 Marshall, *op cit.*

40 Weir *op cit.*

41 Roeder, *op cit.*

inference. This is an important development, as probability theory is notoriously slippery conceptually. The possibilities of genuine misconceptions in counsel and deliberate confusion of juries are great. The reason that a sample was collected is of crucial importance to the correct evaluation of probabilities. Suppose, for example, that a jury is presented with a suspect whose DNA profile matches that of a sample found at a crime scene, and that the probability of such a match is given as one in 2 million. This appears to be impressive evidence, and would indeed be so if the suspect had been apprehended because of other evidence, with the DNA profile being obtained afterwards. However, if the probability of a match from an individual taken at random is one in 2 million, then one would expect perhaps six to ten individuals in Australia to have such a profile. If the suspect had been apprehended after a search through a database of all Australians, there would be about a 90 per cent chance of having the wrong person- a rather different figure from the original one in two million chance.[42] This is an extreme example: there is no genetic database for the general population yet in existence. However, such databases are being established for convicted criminals and suspects. As the size of such databases increases, the chance of such grossly misleading probabilities being generated increases.

The most appropriate way to handle such problems is via statistical approaches such as likelihood ratios and Bayesian methods.[43] There is far more support for these approaches in the NRC 1996 report than in the 1992 report.[44] The difficulty is that the methods are highly technical, and may not be understood by lawyers or jurors. A likelihood ratio is a measure of how much more likely a particular set of observations is under one hypothesis compared with another. Given a DNA profile match and a likelihood ratio of one million, a jury could be told that it was one million times more likely that the DNA left at the crime scene and that of the suspect were from the same individual than from different individuals.[45] This is all very well, but does not solve the problem of "database trawling".

Bayesian methods involve commencing with a prior probability, based on all evidence other than the DNA profile, and then using the DNA evidence to generate a modified or posterior probability. This addresses the "database trawling" issue, as in that case the prior probability would be very low (1/N, if the database has N records, because each individual in the database is equally likely to be the defendant

42 See Balding DJ and Donelly P "How convincing is DNA evidence?" (1994) 368 *Nature* 285.

43 Roeder, *op cit.*

44 Weir, *op cit.*

45 Roeder, *op cit.*

before the DNA profile is examined). In a case where the defendant has been initially identified for other reasons, the prior probability would be much higher. Unfortunately, the application of Bayesian methods in the courtroom is highly controversial, as it may either usurp the jury's role by having an expert fix the prior probability, or if the jury fixes the probability, it is required to translate subjective beliefs into a hard number. A possible solution is for the expert to present the jury with a graph showing the relationship between a range of prior and posterior probabilities, given the DNA data.[46]

Binning and Matching

It is easy to gain the impression that determining whether alleles match or are present or absent in two samples is unequivocal. This is not the case. Electrophoretic gels are often blurred or unclear, and the bands on them are broad and fuzzy. As is explained above, what is being compared is the length of DNA fragments, measured by how far they move across a gel in an electric field. There is thus measurement error involved in determining whether two fragments are the same length and can be declared a "match". The continuous distribution of allele lengths may also be placed into "bins" of similar size to enable allele frequencies to be determined.[47] Such approaches are defensible, but they do introduce elements of uncertainty and subjectivity into the process.

The Link Between DNA and the Production of Evidence

As Hunter and Cronin observe, personal attributes such as fingerprints and DNA codes should provide, like blood groupings and dental impressions, "reliable sources of identification"[48] because they are unalterable. They should provide more reliable sources of identification than attributes which can be altered or disguised. Yet even the reliability of DNA profiles and blood tests can be "reduced by defects in police investigation practices and problems of interpretation."[49] There is a perpetual evidentiary need for characteristics that are personal, fixed and distinctive.

In the interaction between science and law, the most significant recent changes involve the increasing reliance upon DNA profiling and the use of electronic audio

46 Kaye DH "DNA evidence: probability, population and the courts" (1993) 7 *Harvard Journal of Law and Technology* 101.

47 Roeder, *op cit.*

48 Hunter J and Cronin K *Evidence, Advocacy and Ethical Practice* (Butterworths, Sydney, 1995) p 392.

49 *Ibid.*

50 Corns C "The science of justice and the justice in science" (1992) 10(2) *Law in Context* 7 at 7.

and video equipment to record police interrogations of suspects.[50] Both these major developments have been widely recognised in the literature and considered significantly important as to change the face of the production of evidence. Indeed, these two major changes are considered in conjunction to militate against the perpetuation of such evidentiary problems as uncertain identity and police "verbals." Although these changes have been the subject of a range of critical perspectives, nevertheless, it has also been suggested that despite the increasing pervasiveness of science in criminal justice, the "more subtle, adverse effects of this process" have been strangely neglected in the criminal justice literature.[51]

However, in an article in the *Alternative Law Journal*[52] Freckelton addressed several of the central problems confronting lawyers dealing with DNA evidence. Freckelton contends that the topic is one of particular interest to lawyers and scientists and that this duality necessitates a perspective which accommodates both scientific rigour and legal persuasion. The introduction of DNA evidence into the legal trial raises critical questions given lawyers' unfamiliarity with scientific matters. Debates about the production of evidence in criminal trials and police methods of investigation continue to occupy centre stage in academic and theoretical thought in England and Australia. The issues addressed by Freckelton, in particular the detailed outline of the deficiencies in scientific work documented in the Morling Report,[53] are exemplified by recent scientific research findings.

Corns has argued that three basic models of interpretation have emerged in the relevant Australian literature. The first is the "legal" model: focussing upon the future role and impact of new technology based on DNA within the existing framework of criminal investigation and prosecution structures. The overriding concern evidenced within this discourse is the conviction of the guilty. By this view, any expansion of police powers incumbent upon the introduction of this form of evidence is simply an "appropriate means".[54] The second model juxtaposes the utilitarian benefits of DNA profiling against traditional rights of the accused such as the right to silence, the right against self-incrimination and the resting of the burden of proof with the Crown. This view, which Corns labels the "libertarian" model, interprets DNA technology "in terms of its impact upon traditional criminal justice

51 *Ibid.*

52 Freckelton I "Problems posed by DNA evidence: Of blood, babies and bathwater" (1992) 17(1) *Alternative Law Journal* 10.

53 Morling Report, *op cit.*

54 Corns C "DNA is Watching" (1990) *Arena* 92 (spring) 24 at 25.

principles and rights of accused persons." Inevitably, the framework of analysis questions the infallibility of the scientific method. The third model is that offered by the scientific community which "views DNA in terms of testing procedures, probability theories, sampling errors, contamination potential, screening mechanisms and similar scientific jargon."[55] This model demands "conformity to the scientific model and the scientific validation of test results."[56] For Corns, the existence of these three discrete frameworks of analysis has excluded consideration of more relevant conceptual frameworks:

> What is missing from these models are links between the deployment of DNA technology and broader socio-political trends in the context of criminal justice.

Corns has argued elsewhere that significant consequences stem from the theoretical neglect of the "subtle, adverse effects" of the increasing pervasiveness of science in criminal justice.[57] One marked effect of the theoretical lacuna concerning the science-justice relation is that the loss of civil liberties that has been consequent upon the accompanying changes to police powers, has occurred "virtually without challenge or question."[58] Corns asserted a theoretical neglect of the increasing pervasiveness of science into criminal justice territory and linked this to the scientific-technological "appropriation" of the legal process.[59] A number of consequences arise from this appropriation process, including the critical need for recognition of the means by which: "Science has the power to alter the fundamental relationship between the citizen and the State."[60]

Furthermore, there is a critical need for a recognition of the role played by governments and legislatures, which are also part of the appropriation process and, consequently, "any shifts in political policies regarding law and order need to be considered."[61] By this view, a whole range of conceptual as well as technical legal terms and frameworks, particularly the meaning of the very term "justice", urgently require reconstruction. This is perhaps a vital message considering the shift in Australian politics recently and the emphasis upon privatisation.

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55 *Ibid.*

56 *Ibid.*

57 Corns (1992) *op cit* at 7.

58 *Ibid* at 8.

59 *Ibid.*

60 *Ibid.*

61 *Ibid.*

Also writing in the Australian context but taking a different view, Read[62] has asserted that DNA fingerprinting (a label considered somewhat misleading) is an important forensic discovery which will have the potential to "revolutionise law enforcement in Australia."[63] This scientific development brings certainty to a verdict which previously would have been uncertain, and spares "many victims of violent crime from the ordeal of giving evidence."[64] Read's concept of civil liberties is more victim oriented, focussing upon the civil liberties of the party attacked and not just the accused. Read's central contention was that the Victorian government should enact enabling legislation which will take advantage of the availability of this technology. Read notes that the superior courts in the United States and United Kingdom have accepted evidence of DNA profiling as relevant and admissible.[65]

For Corns, however, the bipartisan political support for and consequent ease of enactment of the Victorian legislation, the *Crimes (Blood Samples) Act* 1989, raises precisely the political and legal dilemmas considered to be missing from the debate due to the scientific-technological appropriation. Corns suggests that the "deployment of DNA and its requisite legislation neatly aligns with a "crime-control" model of criminal justice traditionally propounded by conservative political parties."[66] Magnification of the "reality" of crime has generated a uni-dimensional response to crime control by political parties: the unquestioning acceptance of DNA profiling and other scientific methods heralds a "new, or at least extended, conservatism in the response of the state to the 'problem' of crime."[67] By this view, the acceptance of new technology such as that based on DNA represents the subtle extension of the "authority and regulatory capacity of the state."[68] The incorporation of this scientific technique into the evidentiary network must be set within the context of wider developments within the criminal law which reflect the increasingly bipartisan political approach to criminal justice.

Perhaps the most useful aspect of this analysis lies in its examination of the role the judiciary has fashioned for itself as the standard-bearer in the incorporation of the

62 Read RM "The presentation of DNA evidence in a criminal trial – A prosecution viewpoint" (1989) 63 *Law Institute Journal* 1156.

63 *Ibid* at 1156.

64 *Ibid.*

65 *Ibid* at 1157.

66 Corns, (1990) *op cit* at 27.

67 *Ibid.*

68 *Ibid.*

new scientific methods into the legal system. Corns refers to the Victorian situation, mentioning that the first application by the Victoria Police seeking an order for the non-consensual taking of blood from a suspect was refused by the Court. Corns interprets such judicial reservations (which espouses caution in much the same way as the United States courts) concerning the apparently neutral infallibility of scientific method as a reflection of the law-making function of judges and the "self-perception of the judiciary as the ultimate determinants of justice."[69]

Freckelton has questioned the utilitarian benefits of DNA testing against the practical reality of court practices and procedures. A comment on *Chamberlain* suggested that science and law can be mismatched: "the legal system has not functioned in such a way as to facilitate the accountability of forensic science as a reliable discipline." If lawyers are unfamiliar with scientific matters, the recent high profile cases where miscarriages of justice have been revealed cannot be explained away as simply "extraordinary phenomenon." Furthermore, the "system is not structured in such a way that expert witnesses, particularly in the criminal field, will regularly be subjected to rigorous and well-informed cross-examination"[70] and expose deficiencies in the quality of scientific work.

There have been many stumbling blocks along the way to admissibility of DNA profiling evidence in criminal trials. It has already been observed that Odgers and Richardson drew attention to Commissioner Morling's finding that the expert evidence caused the miscarriage of justice in the *Chamberlain* case.[71] These included some "either wrong or highly suspect" evidence at the trial: for example, that some experts were over-confident of their ability to form reliable opinions on matters on the outer margins of their field of expertise. Secondly, that some of their opinions were based on unreliable or inadequate data. Thirdly, that other evidence was given at the trial by experts who lacked the experience, facilities or resources necessary to enable them to express reliable opinions on some of the novel and complex scientific issues which arose for consideration. Finally, Commissioner Morling pointed to the failure of the defence to put in issue some of the scientific opinions at the trial, and suggested this may have been due, in part, to lack of access to the necessary expert witnesses.[72] Freckelton details the deficiencies outlined by Commissioner Morling in

69 *Ibid* at 28.

70 Freckelton, *op cit* at 10.

71 Odgers and Richardson, *op cit*, citing *Royal Commission of Inquiry into the Chamberlain Convictions, op cit* p 338.

72 *Royal Commission of Inquiry into the Chamberlain Convictions, op cit* pp 340-341.

his 1987 report into the Chamberlain convictions in more detail. These included inappropriate methodologies, inadequate quality assurance systems and unacceptable practices on the part of forensic scientists.[73]

Other Theoretical Approaches

Another major issue raised by legal commentators concerns the relationship between this form of investigation and the scope, framework and potential broadening of police powers. Walker and Cram[74] suggest that the element of compulsion involved in the production of DNA profiling brings with it the inevitable possibility of abuse of procedure. Citing the Scottish Law Commission's recommendation that compulsory taking of blood samples be allowed under the authority of judicial warrant, they suggest that an "ethical barrier" has been passed without comment. That barrier legitimates a procedure which will involve:

> [A] legally justifiable assault upon a detainee for the purpose of gathering evidence by the invasion of his body rather than for the restraint of his liberty or search of his body.[75]

A similar perspective is adopted by Clough,[76] who comments that, irrespective of other considerations, the usefulness of scientific methods of identification is dependent upon the powers given to the police to make relevant examinations of suspects and to take suitable samples for analysis. Such usefulness is, in itself, something of an impetus for pressure on governments to award more extensive powers of investigation to police. Clough considers that enacting legislation allowing police officers to use reasonable force in order to examine/take samples from suspects without consent will not remove the possibility that the contentious issue of unfairly obtained evidence will be raised.

It will be clear from this brief outline of the theoretical approaches to new technologies based on DNA that a number of significant issues which appear peripheral could be brought to the centre of the legal debates. Particularly significant are the concerns raised about possible inroads into civil liberties through the extension to the powers of police occasioned by the introduction and acceptance of

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73 Freckelton, *op cit* at 11.

74 Walker C and Cram I "DNA profiling and police powers" [1990] *Criminal Law Review* 479.

75 *Ibid* at 493.

76 Clough J "Will mercy season justice? An analysis of Victorian proposals relating to the physical examination of suspects" (1990) 16(2) *Monash University Law Review* 251.

this form of technology into criminal evidence. Yet there are obvious parallels with the relatively similar arguments that were raised regarding powers available in relation to the general community with respect to breath testing. The judicial system has appeared cognisant of any mooted deficiencies in this form of evidence and cautious in its use. It will be seen below that in America, the courts have furthermore therefore appeared willing to impose a higher standard upon acceptance of DNA than is imposed upon other scientific subjects.[77]

A range of significant related procedural issues could also be asserted in relation to Freckelton's documentation of those scientific deficiencies which have come to light within the framework of the legal system. It seems likely that provided lawyers can be reasonably assured that there is a very small probability of incorrect matches (falsely declared matches) then defence lawyers will be advising clients who claim that they are innocent to volunteer to supply such information. The only reason not to so advise would be on the basis of a reasonable belief on the part of the experts that there is a real probability of false matches. If experts believe this to be the case (that there is a low probability of false matches) they will recommend that defendants who strongly assert their innocence should subject themselves to such a test. This will hold particularly important evidentiary implications: an issue which has been countenanced, yet not drawn out, in the literature. The significant result of this in legal terms will concern the client who refuses to give a sample. Even if the judge directs that failure to provide a sample should not be seen as evidence of guilt, nevertheless refusing to undergo a test will be interpreted as an admission of guilt whether or not the judge directs that no such inference should be drawn.[78]

Significant United States Developments

DNA-based identification testing has become increasingly acceptable to

77 Anderson C "Courts reject DNA fingerprinting, citing controversy after NAS report" (1992) 359 *Nature* 349. Anderson notes that in the United States, that standard, after *Frye*, requires only "general acceptance" in the scientific community whereas DNA is often rejected on the basis of controversies involving a few scientists, such as Lewontin, "who proclaim themselves to be extremists." As such, the fundamental soundness of DNA evidence, endorsed by the NAS report, is considered obscured "by this debate on the scientific fringe."

78 The analogy has already been drawn with the situation where a client chooses to remain silent, from which evidentiary implications are often drawn, although in the case under discussion the consequences are arguably more severe.

American courts.[79] Indeed, DNA profiling techniques have reached a point where objections to admissibility tend to be based upon evidence as more prejudicial than probative rather than upon unreliability.[80] The courts have therefore become increasingly convinced of the strict admissibility of testing procedures used to procure the resultant identification evidence. This has its genesis in the decision in *People v Castro*[81] which was decided in 1989 in the New York Supreme Court.[82] The case involved a woman and her child stabbed to death in their Bronx apartment and a bloodstain on the watch of an (Hispanic) neighbourhood handyman. From that bloodstain about 0.5 micrograms of DNA were extracted and compared with DNA from the victims. A formal report to the district attorney by Lifecodes stated that the DNA patterns on the watch matched that on the mother and that the frequency of the pattern was about one in 100 million in the Hispanic population. No difficulties or ambiguities were mentioned in the report. Nevertheless, a virtual "mini-scientific conference"[83] was held, so great was the scientific concern that the court might be misled by the evidence put before it. Scientists in fact issued a "consensus statement"[84] to the effect that overall the DNA data was not scientifically reliable enough for a clear conclusion to be drawn. Scheindlin J issued a comprehensive and extensive legal analysis of DNA forensic identification and a pre-trial hearing developed into a detailed technical examination of the identification tests and techniques as applied to forensic science.[85] In determining admissibility, the judge asked first if there was general scientific acceptance of the theory underlying this form of identification. The second question was whether there were techniques or experiments currently in existence which were accepted in the scientific community and capable of producing reliable results. The third question was

79 McElfresh KC, Vining-Forde D and Balazs I "DNA-based identity testing in forensic science" (1993) 43(3) *BioScience* 149 at 149.

80 Freckelton I and Selby H *Expert Evidence* (Law Book Company, Sydney, 1993) at 1-3691.

81 Burns, *op cit* and Freckelton, *op cit* at 11.

82 *People of the State of New York v Joseph Castro* (quoted in Burns, *op cit* as County of Bronx: Criminal Term Pt. 28, Indictment No. 1508 of 1987 and quoted in Freckelton and Selby *op cit* as 144 Misc. 2d 956 (NY 1989)).

83 Freckelton and Selby, *op cit* at 1-3693.

84 *Ibid.*

85 Burns, *op cit.*

86 Like Anderson, Freckelton observes that the employment of this third prong takes the threshold of admissibility beyond the *Frye* ruling which involves only that there be general acceptance among expert witnesses.

whether the laboratory performed the accepted scientific techniques in the particular forensic samples under scrutiny.[86] As a result of this comprehensive three fold test, the evidence was held to be inadmissible because the testing laboratory had failed in several major respects to use the generally accepted scientific techniques and experiments for using reliable results.[87]

Therefore, for the first time, the proposition was raised and accepted in law, that the complex nature of testing procedures requires scrutiny and that these testing procedures can give rise to errors notwithstanding the reliability of DNA identification. Furthermore, mention is made in the judgment of apparent differences of opinion within the scientific community as to the appropriate techniques which must be employed to produce reliable results.[88] The Court therefore held that the DNA identification test was admissible and capable of producing reliable results. However, the particular evidence established and demonstrated an exclusion of the accused as the source of the blood on the crime scene sample. Because the evidence established an exclusion the second stage population genetics question did not really arise for consideration.

From that point some lack of uniformity characterised the approaches of the United States courts. Anderson[89] considered that while in several states DNA evidence has been admissible in paternity cases, nevertheless, since the NAS report's endorsement of the "fundamental soundness" of DNA evidence, it is often just as likely to be rejected. Rulings in Massachusetts and California underpin this argument: in *People v Barney*, the California court suggested that prosecutors were introducing evidence using a "product rule" calculation which gave an extremely low chance of a random match. And in *Commonwealth v Lanigan* the Massachusetts court ruled that although appropriate, conservative approaches to DNA testing, such as the use of ceiling frequencies, had not formed part of the approach in this case, thus underscoring the wisdom of the rejection of DNA evidence in an earlier trial.[90] Freckelton summarises the current state of DNA profiling evidence under United States law by noting

87 *Ibid.*

88 *Ibid.*

89 Anderson, *op cit.*

90 Anderson, *op cit* at 349. No citations were provided for these cases.

Thompson's conclusion that in the *Daubert*[91] era it is necessary to "verify that the testing methods were properly applied in each case."[92]

Australian Case Law

In an early work, Freckelton summarised the "disturbing problems" of scientific methodology identified in the *Castro* decision, pointing to close parallels with the arguments raised by Commissioner Morling in his Chamberlain Report. Those problems were:

(i) discrepancies between forensic report and laboratory findings;
(ii) deficient laboratory records;
(iii) the use of controls;
(iv) identification and matching of bands;
(v) the impact of degradation of DNA samples;
(vi) the impact of probe contamination;
(vii) calculation of matching probabilities.

Considering these early problems, Freckelton argued that it was hardly surprising that Australian cases involving objections to prosecution-led DNA profiling evidence and judges had "been wary of allowing conflicting expert evidence to go before jurors if they would be in no adequate position to evaluate the competing contentions."[93] There have been several prominent cases on the matter to date in Australia and considerable attention has been devoted to these legal developments in Freckelton's later work *Expert Evidence*.[94] In the case of *R v Tran*[95] the Crown sought to lead evidence of DNA profiling to connect the

91 *Daubert v Merrell Dow Pharmaceuticals, Inc* (1993) 113 S Ct 2786. The United States Supreme Court decided that the "general acceptance" test formulated in *Frye* v *United States* (1923) 293 F.1013 at 1014 which had led to the exclusion of much new scientific evidence in criminal cases was not a precondition to admissibility of scientific evidence under the Federal Rules of Evidence. See Majmudar K "*Daubert v Merrell Dow*: A flexible approach to the admissibility of novel scientific evidence" (1993) 7 *Harvard Journal of Law & Technology* 187

92 Freckelton and Selby, *op cit* at 1-3700.

93 Freckelton, *op cit* at 12.

94 Freckelton and Selby, *op cit* at 1-3691

95 (1990) 50 A Crim R 233.

accused with the rape and murder victim. Vaginal swabs and a bloodstain were taken from the deceased and bloodstains also taken from her boyfriend and the accused, and sent to Cellmark Diagnostics ("Cellmark") for analysis.

There were considerable problems with the testing and an inconclusive first attempt. Cellmark's first report stated that DNA was extracted from the swabs and processed fully in accordance with laboratory procedures. Some of the bands were very faint, and scientists agreed that they could "not put a statistical weight on them."[96] However, the Cellmark expert witness measured the faint bands using a ruler and considered that those in the sample corresponded with those of the accused. The probability of a chance match of the bands was calculated at one in 152 using an extra-Australian database of 300 Afro-Caribbeans. This was considered the most conservative of the databanks possessed by the Cellmark laboratory. Several scientists of "varying backgrounds"[97] called by the defence questioned the reliability of the prosecution's evidence. Freckleton provides a summary of these concerns. They include possible cross-contamination, technical problems with the reading of the gels, and the fact that the reference database did not match the Vietnamese ethnicity of the defendant.

Considering all this, it was the opinion of McInerney J that a major scientific dispute confronted the jury. This led to the finding of a danger that the jury would look at the bands as they appeared and "could subjectively conclude that there was a match." Therefore it was decided that "the jury would not be entitled themselves to perform that function"[98] for the issue could only be resolved where it was open to them to accept one witness against another. By this view, a jury could not determine presence initially, although they could determine whether a faint "lower band" was in fact a band. This determination would not, however, provide sufficient data to link the accused with the deceased. Besides problems with the database, McInerney J identified other difficulties making the tests "unreliable." To put this material before the jury would have a tendency to produce a "misleading and confusing impression"[99] and they might resort to speculation to resolve the issues. Since the jury could not determine the threshold question and there was no database for Vietnamese, the evidence was excluded.

96 *Ibid* at 235.

97 Freckelton and Selby, *op cit* at 1-3733.

98 (1990) 50 A Crim R 233 at 241.

99 *Ibid* at 242.

The essence of the McInerney J's reasoning lies in the state of the evidence: since it was unsatisfactory, it had to be excluded. Even if the evidence had not been rejected because the jury could not determine the threshold question, it would have been excluded as more prejudicial than probative. Freckelton, in discussing this case, suggests that it must be confined to the particular circumstances of the testing in the same way that the decision in *People v Castro*[100] also does not have wide application beyond its facts.

What is significant about *Tran* is, in Freckelton's view:

> the telling evidence from the defence scientists which persuaded his Honour of the unreliable aspects of the DNA testing in this case.[101]

In *R v Lucas*,[102] Hampel J in the Victorian Supreme Court also considered the matter and also excluded DNA profiling evidence. The prosecution case rested upon circumstantial evidence consisting of a human blood smear on the accused's father's garage wall where the Crown alleged the accused had killed the deceased. The Crown sought to admit the results of DNA tests of blood samples claiming they would show the bloodstain to be the blood of either the deceased or of a close relative to a high degree of probability. The various experts differed in their estimations of the new techniques and procedures employed and Hampel J drew attention to the difficulty confronting the jury in resolving those different views and queried whether they could resolve them meaningfully and relate them to the reliability of the tests and the significance of the results.[103] It was decided that admissible specialist scientific evidence must be grounded in a body of recognised scientific theory although need not necessarily be subject to complete unanimity by all experts in the field. It must be tested by cross examination and the jury must decide the proper weight to give that evidence. Caution is expressed as to the fact that "the scientific appearance of expert evidence may be overwhelming"[104] and particularly so where the evidence is somewhat esoteric and there may be no real basis for a non-expert jury to make an independent evaluation. There was in this case no evidence before the jury as to the frequency of a match in the general

100 (1989) 144 Misc 2d 956; 545 NYS 2d 985.

101 Freckelton and Selby, *op cit* at 1-3734.

102 (1992) 55 A Crim R 361; [1992] 2 *VR* 109.

103 (1992) 55 A Crim R 361 at 366.

104 *Ibid* at 368.

population and Hampel J therefore contemplated the danger that "consistency might assume the colour of identity or at least of probability."[105] The evidence was therefore not admissible because its lacked sufficient probative value compared with its possible prejudicial effect."[106]

Once again, the case illustrates the extent to which the Australian law is developing within the framework of judicial perception of the function and capacity of jurors. In that regard, the next case is illuminating. In *R v Jarrett*[107] Mullighan J in the Supreme Court of South Australia was confronted by an accused (charged with the murder of an elderly woman) who sought exclusion of DNA analyses and the statistical interpretation of those analyses. It was decided firstly that once it is determined that evidence (including expert evidence) is relevant to a fact in issue, and there is no policy or discretion based reason for its exclusion, it should be admitted even if it is contested and there is credible expert testimony to the contrary. In so deciding, the court applied *Chamberlain (No. 2)*[108] and *Duke*.[109] Secondly, it was decided that there is no requirement in Australian law that, where the issue is not admissibility but whether the expert analyst employed recognised and standard techniques or did the work competently, there ought to be a voir dire on those issues. In so deciding, the court applied *The People v Castro*,[110] *Commissioner for Government Transport v Adamcik*[111] and *Gilmore*.[112] Thirdly, the court determined that once there is relevance, and the conditions for the admission of expert evidence are met, it is difficult to see how the evidence may have a prejudicial effect which outweighs its probative value, unless the probative value is slight. There is no rule of admissibility in such cases directed to complex scientific evidence which may not be understood by the jury, or where the jury may not be able to choose between experts. At most, matters of this nature must, in the court's view, be dealt with by appropriate direction to the jury. On this point the court applied *Noor Mohamed*,[113] and refused to follow *Tran*.[114] Fourthly, on the question of whether the DNA evidence was substantially probative, the court

105 *Ibid* at 370.
106 *Ibid.*
107 (1994) 73 A Crim R 160.
108 (1983) 153 CLR 521.
109 (1979) 22 SASR 46.
110 (1989) NYS (2d) 985.
111 (1961) 106 CLR 292.
112 (1977) 2 NSWLR 935.
113 (1949) AC 182.
114 (1990) 50 A Crim R 233.

decided that it was, and that any prejudicial effect arose from that probative weight. The evidence (that from a DNA analysis of the blood of various men, only the accused could not be excluded as the donor of the semen) was admissible. The court observed also that the giving of blood for the DNA analysis by the appellant was free and voluntary, and not tainted by any impropriety or unfairness. The appellant had also freely and voluntarily answered questions from police, and had been fully aware of his position as a suspect. He was cautioned, and participated in the interview, in the court's view, in the exercise of a free choice to speak or to be silent. On this point, the court applied *MacPherson v The Queen*,[115] *Attard and Mifsud*[116] and *Geesing*.[117]

It was also decided in a separate judgment that the computer-generated evidence as to the frequency in the general population of the DNA match was admissible and there was no reason to exclude the evidence in the exercise of discretion. In that separate judgment, Mullighan J observed that the database is used for the purpose of preparing reports for use in court proceedings as to the frequency in the local population of combinations of genotypes. The information as to DNA genotypes of Aboriginal people was stored in the database and was produced in the computer outputs as part of the data of the general population. However:

> The computer program was rewritten to exclude Aboriginal data and it is apparent from perusal of printouts of the database in 1992 and in 1994 that the alteration to the program has had the desired effect.[118]

The Victorian Court of Criminal Appeal has also considered the matter in *R v Percerep*.[119] In an appeal against convictions of (inter alia) armed robbery the appellant challenged (inter alia) admission of DNA profiling evidence. Prosecution witnesses had admitted upon a voir dire that opinions contrary to their own existed in the scientific community, although they were resolute as to the correctness of their own views. Counsel had persuaded the trial judge to exclude the evidence on the basis of it being so imprecise as to lack probative value. Neither of these arguments was accepted by the appeal court as sufficient to warrant exclusion of the evidence. For Freckelton and Selby, the case probably only stands as authority for the

115 (1981) 147 CLR 512.

116 (1969-70) 91 WN (NSW) 824.

117 (1984-5) 16 A Crim R 90.

118 (1994) 73 A Crim R 160 at 186.

119 [1993] 2 VR 109.

proposition that "in most cases it will be necessary for the defence to call their own expert evicence if they are to have a realistic prospect of disputing the admission of DNA profiling evidence."[120]

It should be clear from this outline of the Australian case law that much of the judicial attention confronts the capacity of juries to deal with DNA evidence. The Canadian courts have also actively pursued this question. At times, the courts have pointed to a danger that expert evidence will be misused and will distort the fact-finding process. In *R v Beland*,[121] LaForest J spoke of the results of a polygraph tendered by the accused, arguing that such evidence should not be admitted by result of "human fallibility in assessing the proper weight to be given to evidence cloaked under the mystique of science."[122] In *R v Melaragni*,[123] Moldaver J applied a threshold test of reliability to what was described as "a new scientific technique or body of scientific knowledge."[124] Two factors were mentioned: whether the evidence was likely to assist the jury in its fact-finding mission or likely to confuse and mislead them, and whether the jury was likely to be overwhelmed by the "mystic infallibility" of the evidence or able to keep an open mind and objectively assess the worth of the evidence. A similar approach can be found in *R v Bourguinon*[125] where, in ruling upon a voir dire concerning the admissibility of DNA evidence, Flanigan J admitted most of the evidence but excluded statistical evidence about the probability of a match between the DNA contained in samples taken from the accused and those taken from the scene of the crime. It was considered likely to put additional pressure on a jury, by making them overcome "such fantastic odds" and asking them to weigh it as just one piece of evidence to be considered in the overall evidentiary picture. The "real danger" perceived was that the jury would use the evidence as a measure of the probability of the accused's guilt or innocence and thereby "undermine" the presumption of innocence and "erode" the value served by the reasonable doubt standard. By this view, DNA testing evidence can be ruled admissible but the statistical probabilities cannot. In following this approach in *R v Mohan*[126] Sopinka J for the Supreme Court of Canada said that the restriction could be easily overcome

120 Freckelton and Selby, *op cit* at 1-3737.

121 (1987) 36 CCC (3d) 481; 43 DLR (4th) 641.

122 (1988) 43 DLR (4th) 641 at 642.

123 (1992) 73 CCC (3d) 348.

124 *Ibid* at 353.

125 OJ No. 2670 (QL).

126 (1992) 71 CCC (3d) 321.

by evidence that "such matches are rare" or "extremely rare" or words to the same effect, which are considered to:

> [P]ut the jury in a better position to assess such evidence and protect the right of the accused to a fair trial.[127]

Sopinka J observes furthermore that courts since *R v Bourguinon*[128] have rejected Flanigan J's distinction and admitted both DNA evidence and evidence regarding statistical probabilities of a match.[129] Reliance is placed upon *R v Bourguignon*:

> [S]imply to illustrate the mode of approach adopted there and leave the specific issue decided by Flanigan J to be considered when it arises.[130]

Two recent New South Wales cases, *R v Pantoja*[131] and *R v Milat*[132] have added to Australian case law on DNA evidence. The ruling in *Pantoja* emphasises the essential point that DNA evidence merely establishes that the suspect and the offender *may be* the same person, not that they *are* the same person. In this particular case, two expert witnesses, using a combination of RFLP analysis and blood substance testing, declared a match between offender and suspect, whereas a third expert, using PCR analysis, positively excluded the suspect. The appeal court ruled that whatever evidence of a match is found from other blood testing, a single positive exclusion is sufficient to eliminate a suspect. Accordingly, the conviction was quashed and a new trial ordered. *Pantoja* provides a nice illustration of the caution necessary in interpreting the astronomical odds arising from DNA evidence. Based on the evidence of the Crown's scientific witness alone, the probability of a match occurring at random was calculated to be one in 792,000, yet the third scientific witness, using different markers and methods, positively excluded the suspect.

Pantoja also raised questions about appropriate reference databases and the minimum size necessary for determining reliable probabilities of matches. Appropriate databases were particularly important in this case, as the accused was a member of a Peruvian native ethnic group. This is an unusual ethnic group in

127 *Ibid* at 327.

128 OJ No. 2670 (QL).

129 Citing *R* v *Lafferty* [1993] NWTJ No. 17 (QL).

130 (1992) 71 CCC (3d) 321 at 327.

131 (1996) 88 Al Crim R 554.

132 Unreported, NSW Supreme Court, 30 May and 5 June 1996.

Australia, and one for which databases are not available. As is noted above, however, ethnic group subdivision is probably not the problem it was once thought to be. *Milat* was also concerned with the size of databases necessary for reliable analysis. In that case, Hunt CJ ruled that databases of several hundred are of adequate size. As with *Pantoja*, the importance of informing juries about the assumptions involved in determining match probabilities was emphasised, and that "the jury should, of course, be directed not to approach the issue of chance upon any strictly mathematical basis".

By way of conclusion to this section, the views of Robertson and Vignaux[133] warrant a mention. They suggest that much of the controversy over DNA evidence is due to the way in which forensic scientific evidence has classically been presented. The orthodox approach is to consider whether two samples match according to a predetermined criterion. If they do, the fact of match is reported along with an estimate of the frequency of the characteristics. This method fails to address the questions raised in court cases, diverts argument into irrelevancies and stultifies research. Presentation of evidence in the form of likelihood ratios, on the other hand, forces the witness to answer the questions the court is interested in and makes apparent lines of research required to increase our understanding. This may be one of the most significant considerations that lawyers can reflect upon as they determine the current state of the law.

Conclusion

The focus on DNA as an evidentiary mechanism is connected to a broader inquiry into the role of forensic science in law and criminal investigations. The research on the subject is clearly also related to and holds enormous implications for, the broader interest in and analysis of means of production of evidence and evidentiary requirements at large. It is a timely debate for many evidentiary matters are at the cutting edge of Australian judicial policy. However, there is considerable conflict over the usefulness and reliability of this form of evidence, and it inevitably touches on important human rights issues within the criminal justice system.

The use of DNA (and other scientific) evidence has raised a number of concerns about increased police powers and the unquestioning adoption of a conservative crime control agenda in the administration of the criminal justice system. These

133 Robertson B and Vignaux GA "DNA evidence – wrong answers or wrong questions" (1995) 96 *Genetica* 145.

concerns are clearly legitimate given the current attack on the right to silence as a protective cloak for "the guilty". Corns correctly highlights the lack of critical debate over the use of scientific technology in this erosion of civil liberties and points to a reconstruction of the notion of "justice" which corresponds to the idea of a value-free scientific method.[134] The uncritical adoption of "scientific truth" as the objective solution to the problem of determining criminal identity raises the possibility of "scientific appropriation"[135] of the criminal justice process and ignoring the fact that in most contested trials, the crucial issue is not identity but may be, for example, consent or *mens rea*; issues for which DNA evidence provides no assistance.[136] From the scientific community, Lewontin's early claims concerning the use of such evidence clearly fuels some scepticism over the interaction between science and the criminal justice system.

However, there will be a number of situations where DNA evidence will be crucial in determining identity and scepticism should not obscure the importance of engaging in critical debate about the appropriate uses of scientific methods and technology in gaining evidence. While it is important not to engage in scientific triumphalism or allow DNA (or other "expert") evidence to swamp the ordinary processes of the criminal justice system, debate about these issues is essential if the question of the admission of such evidence be freed from the rhetoric of a conservative law and order agenda.

So far, the fears of a wholesale "scientific appropriation" of the criminal justice process have not been realised. The courts, particularly in Canada and Australia, and less so in the United States following *Daubert*,[137] have shown some reticence in admitting DNA evidence and in protecting the rights of the accused, particularly in the situation of conflicting expert evidence. This may reflect the inherent resistance of the judiciary to the encroachment of the scientific disciplines as much as a concern over civil liberties, but it is obvious that the courts are still evaluating the appropriate role and utility of DNA evidence within the criminal justice system.

134 Corns, *op cit* at 18.

135 *Ibid* at 7.

136 Scutt, *op cit* at 10.

137 *Daubert v Merrell Dow Pharmaceuticals, Inc.* (1993) 113 S. Ct. 2786 in the United States Supreme Court has been considered "not revolutionary" but marking "a shift towards more flexible standards regarding the admissibility of scientific evidence." Majmudar, *op cit* at 188.

The concerns with the admission of DNA evidence outlined by the commentators discussed here are not the end of the story, but are the very issues identified by Freckelton as requiring critical analysis in Australian forensic science and legal debate. Many of these are unfortunately clouded by the persistently problematic nexus between science and law and uncertainty just as they were earlier clouded by considerations of Lewontin's place within the scientific mainstream. Whether that was, as Anderson maintains, a "debate on the scientific fringe"[138] does not matter, for neither lawyers or scientists should close ranks against a debate which may prove critical in many senses of the word.

Only recently it was announced that Australia's[139] criminals are in line for a DNA database.[140] This would mean that instead of requests for DNA sampling having to be determined, as required in most States at present, on an individual basis by a magistrate, there would be a DNA database which could be accessed by police. States now have a fingerprint database that can be accessed by police. The use of the DNA database is seen to lie particularly in ensuring easy detection of re-offenders.[141]

There are many other issues that might be raised here[142] but there is one final appropriate consideration in the context of this symposium. It lies in the "general unwillingness of the common law to place obligations on the accused."[143] Yet "the situation changes where the accused alone can provide relevant information to the court."[144] What has yet to be determined is how DNA evidence may fit into the continuing reappraisal of human rights not only of the accused but also of the victim. ●

138 Anderson, *op cit* at 349.

139 Various statutes establish criminal DNA data banks in the United States. See Bassan, *op cit* at 279.

140 "Criminals in Line for DNA" *The Australian*, 3 April 1997, 1-2.

141 *Ibid.*

142 For example, whether there should be specialised scientifically educated juries. This has also been proposed in relation to fraud cases, particularly in England following the jury acquittal of the two Maxwell brothers with regard to alleged fraud of pension funds.

143 Hunter and Cronin, *op cit* p 259.

144 *Ibid.*